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'City-wide' or 'City-blind?' An Analysis of Emergent Retrofit Practices in the UK Commercial Property Sector

Summary Report

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About the report

This report covers research which is part of the **Urban Foresight Laboratory** work package. This work package is part of the wider EPSRC Retrofit 2050 programme of work.

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Key Messages

- ✚ *There are emergent examples of niche experiments in commercial property retrofit at company and pan-industry influencer level. These relate to company practices, property portfolio approaches and policy and practice guidance as well as the use of 'test bed' technologies.*
- ✚ *Despite this, the rate of retrofit progress in the sector is slow and the commercial property regime is being hampered by complexity, fragmentation and conservatism.*
- ✚ *There is a lack of consistency over the use of the term 'retrofit' within the commercial property regime. 'Refurbishment' is also used and may or may not be distinguished from retrofit in the sector.*
- ✚ *The most important drivers in commercial property retrofit relate to policy, economic factors (for example rising energy costs) and marketing/reputation. These varied for owners and occupiers.*
- ✚ *The most important barriers relate to economic factors (overall cost and value impact), organisational issues and lease structures.*
- ✚ *Key retrofit technologies include energy efficient lighting and controls, building services, and management systems and controls. These can reduce energy costs by up to 30-40% pa.*
- ✚ *There is a range of financing models used in commercial property retrofit. The majority of projects are self-financed or paid through a service charge. Payback periods for retrofit typically are a maximum of 5 years, with 2-3 years more common. Declining lease lengths and risk aversion militate against 'unproven' technologies.*
- ✚ *There are a number of emergent and niche financing models in the sector, including Energy Performance Contracting (EnPC). Specialist investment funds have also emerged.*
- ✚ *Assessment, monitoring and verification in the sector are fragmented and lack consistency.*
- ✚ *The commercial property sector does not necessarily take a city scale view of retrofit projects—in this sense it is 'city-blind'. The focus is more likely to be on individual building or property portfolio level strategies.*
- ✚ *'Sticky' infrastructure projects such as district heating schemes could, if accompanied by mandatory measures and incentives, provide opportunities for the sector to take a different view.*

Policy and practice implications

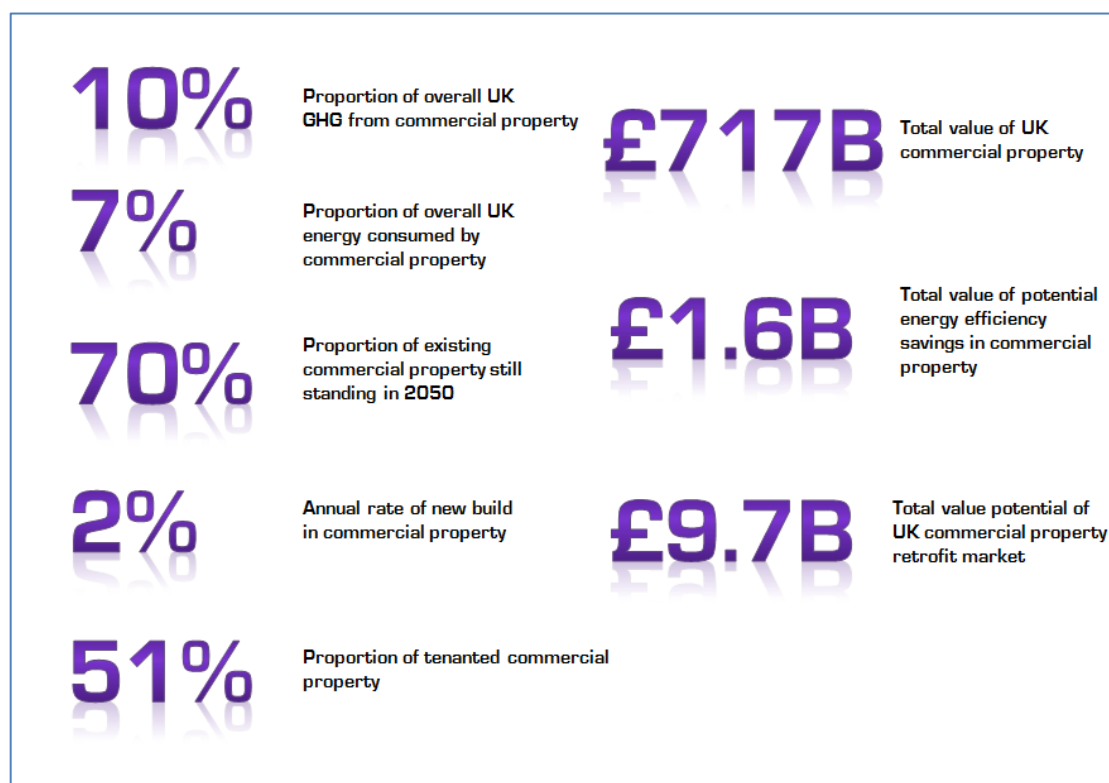
- ✚ *Consensus on the meaning of 'retrofit' is needed and how it differs from 'refurbishment'. Retrofit is also about energy, water and waste and not just energy.*
- ✚ *Better leadership from national government on low carbon cities is needed in alliance with city-based local authorities and LEPs. This should be closely aligned with clear low carbon visions for cities and with improved incentives for distributed energy schemes.*
- ✚ *Mandatory DEC's need to be implemented in commercial property underpinned by incentives.*
- ✚ *Restructuring of the Green Deal is needed, particularly in the SME sector, and increased support from UKGIB is required at city level.*
- ✚ *An approved products and suppliers list is needed for commercial property retrofit.*
- ✚ *Better and more transparent performance in use data is required and better support for emergent technologies is needed.*
- ✚ *There needs to be a clearer consistency in commercial retrofit assessment standards around BREEAM, Ska Rating and other related standards.*
- ✚ *There should be better consistency in monitoring and verification standards, perhaps based around the International Performance Measurement and Verification Protocol (IPMVP®).*

Executive Summary

Introduction and Overview

In comparison with the domestic property sector the commercial property sector is perhaps relatively under-researched when it comes to examining energy efficiency and other wider 'retrofit' measures such as water and waste. Yet commercial property produces about 10% of the UK's greenhouse gas emissions and consumes 7% of UK energy. It is estimated that UK business is overlooking a potential cost-saving of £1.6b through under-investment in energy efficiency, with the UK's commercial retrofit market potential estimated at £9.7b (or US\$16b) (Figure 1).

Figure 1 Key commercial property statistics



With an estimated 70% of existing commercial property still expected to be standing in 2050, understanding how the commercial property sector approaches retrofit activity also requires an understanding of its characteristics.

Firstly, there is a *higher level of tenanted property* in the commercial property sector than in the domestic sector. Over half of commercial property is rented (51%), compared to only a third of housing. This is because many businesses have become increasingly reluctant to commit the capital and management time required in owner occupation, and owner occupiers took advantage of high prices in the mid-2000s to participate in 'sale and leaseback' deals.

Secondly, *the sector is an important part of the UK economy*. In value terms the sector is worth about £717b, with retail, at £227b the largest commercial property sector. Offices are, however, catching up with retail, with greater capital value growth in 2011.

Thirdly, we also know that *average lease lengths in the sector are falling*. The average length of a new lease in 2011 fell to below 5 years, compared to 8.7 years in 1999. Over 75% of new leases now have durations of 5 years or less. Larger tenants, occupying bigger units, tend to have relatively long leases. Many tenants benefit from rent free periods at the beginning of a lease. Retail warehouses, where demand from tenants is relatively strong, have the longest leases and industrials the shortest.

Fourthly, we know that the sector is *complex*. The Carbon Trust report, *Building the Future* (Carbon Trust, 2010) talked about the complexity of the sector in terms of its diversity building types and its diversity of stakeholders. But the report also spoke about the *conservatism* of the sector and its risk-averse nature.

Aims and objectives of research

There is a need for research which examines the emergence of retrofit practices in the commercial property sector that: (i) places them in a socio-technical context; (ii) examines energy, water and waste retrofit; and (iii) analyses emergent practice across scales.

The overall aim of the research is to examine the emergent trends in commercial property retrofitting at a 'regime' level and to examine the following key questions:

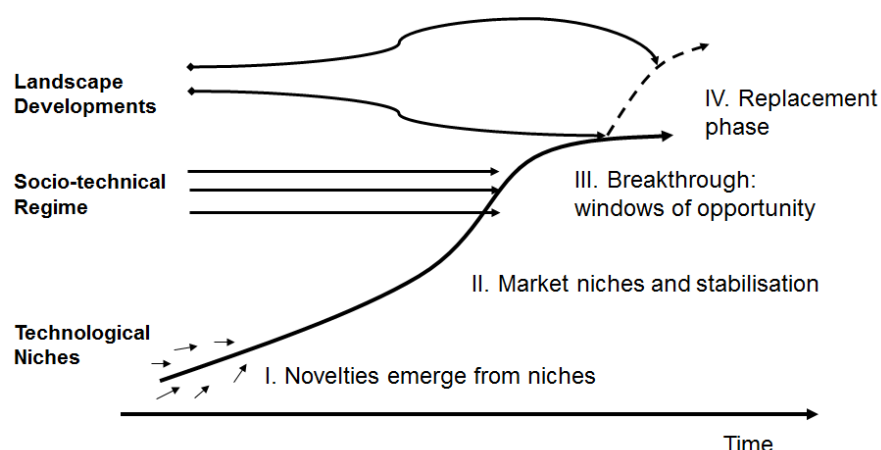
- **Who?** – identifying the main stakeholders in the commercial property retrofit regime and the main characteristics of the regime;
- **What?** – defining what is meant by 'retrofit' in the regime and examining the key retrofit technologies being used;
- **Why?** – examining the key drivers and barriers for commercial property retrofit; and,
- **How?** – examining the institutional frameworks, legislation and monitoring/standards behind commercial property retrofit (including financing, assessment methods and monitoring and verification systems).

The research also examines issues of scale, particularly at city level (and also summarises the key challenges to retrofitting at city scale in the regime), and finally sets out insights for the future.

How the research was carried out

There have been a number of conceptual frameworks which have attempted to provide insights into how we should analyse decision-making contexts at an individual firm level or a wider, sector level. These range from organisational models such as PTEM and Market Transformation frameworks through to the more complex multi-level perspective (MLP), linked with transition theory. In this research we use the MLP model. In the MLP (Figure 2), 'lock-in' to existing systems is overcome and transitions occur as a result of experimentation and the emergence of new socio-technical configurations (innovations) within protected niches. These factors, combined with landscape pressures, destabilise and transform or replace the existing 'regime'. The socio-technical regime, as defined by Geels (2002), includes a web of inter-linking actor networks across different social groups and communities following a set of rules. These rules comprise the established practices of a system and relate to technology; user practices and application; the symbolic meaning of technology; infrastructure; policy; and techno-scientific knowledge.

Figure 2 Multilevel perspectives on transitions



In our research, *commercial property* comprises retail, offices and industrial space (excluding public buildings and other ‘non-domestic’ property).

As well as using the lens of MLP to analyse the regime, we also examine the extent to which other conceptualisations of organisation-level technology deployment can offer a coherent view of the commercial property sector. These include technology diffusion models and technology push-pull models.

The research is based on 37 semi-structured interviews with key actors in the commercial property retrofit regime which were carried out between November 2012 and May 2013. All interviewees were senior decision-makers in their organisations. All interviews were transcribed and coded. Table 1 summarises the groups.

Table 1 Summary of interviewee groups

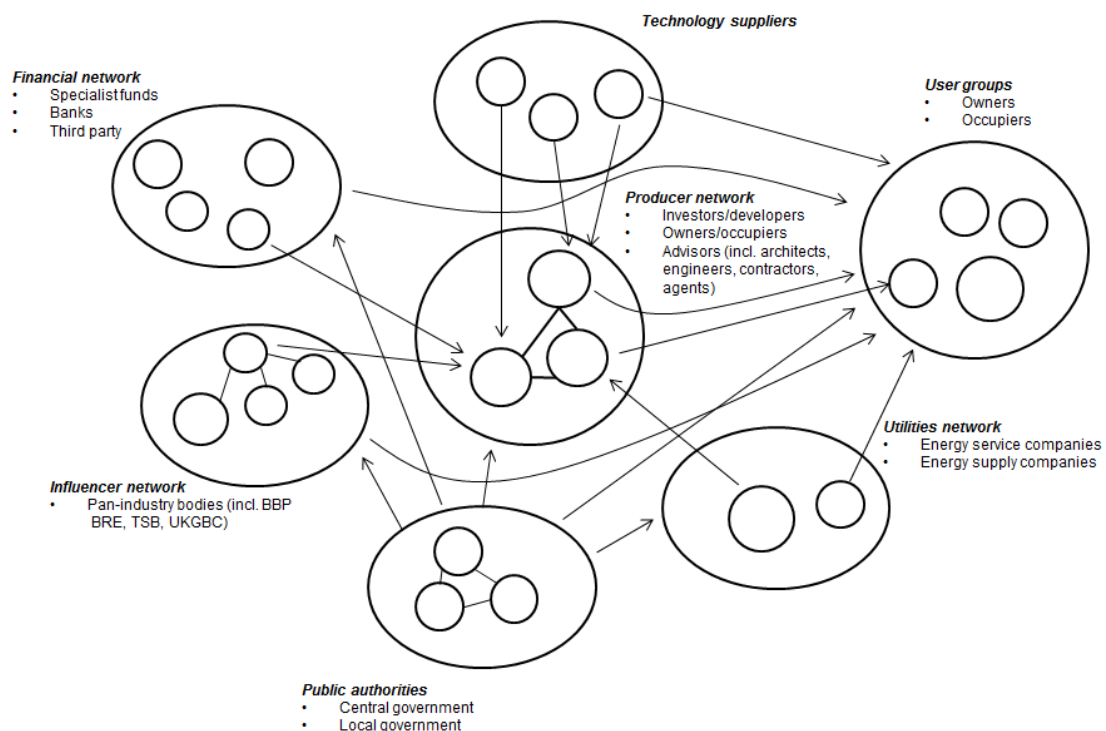
Group	Number of interviews
Consultant (includes 3 architects and engineers)	10
Influencer	9
Investor/developer	5
Financier	4
Occupier (including retail)	3
Technology company	3
Corporate owner	2
Government	1
Total	37

Main Findings

'Who'? - the main stakeholders in the commercial property retrofit regime and the nature of the regime

The commercial property retrofit 'regime' is made up of a complex array of stakeholders who interact in a variety of ways when a retrofit project is undertaken. In the interviews that we conducted the commercial retrofit projects were generally carried out at building level, and organised from within the company undertaking the project, although this can also occur at a wider, portfolio level if the organisation holds a number of property assets. These projects therefore were primarily 'driven' and 'led' by owner occupiers, or in the case of tenanted property, by landlord investors or tenants (Figure 3).

Figure 3 Conceptualisation of the commercial property retrofit regime



Note: Owners and occupiers feature in both producer and user groups because they may provide retrofitted buildings, or use them, depending on context.

The commercial property retrofit regime is characterised by complexity, fragmentation and conservatism despite emergent niche experiments.

'What'? – retrofit defined and the key technologies being used

There is a lack of consistency over the use of the term 'retrofit' within the commercial property regime. 'Refurbishment' seems to be distinguished in some instances from retrofit but may also be used instead of the latter term. However, retrofit may be characterised by 'light' or 'deep' measures, which represent differences in the nature and extent of internal and external fabric measures, and related building services.

Key retrofit technologies include energy efficient lighting and controls, building services, and management systems and controls. Where retrofit projects were carried out, the primary focus was on energy, with a relatively lower degree of

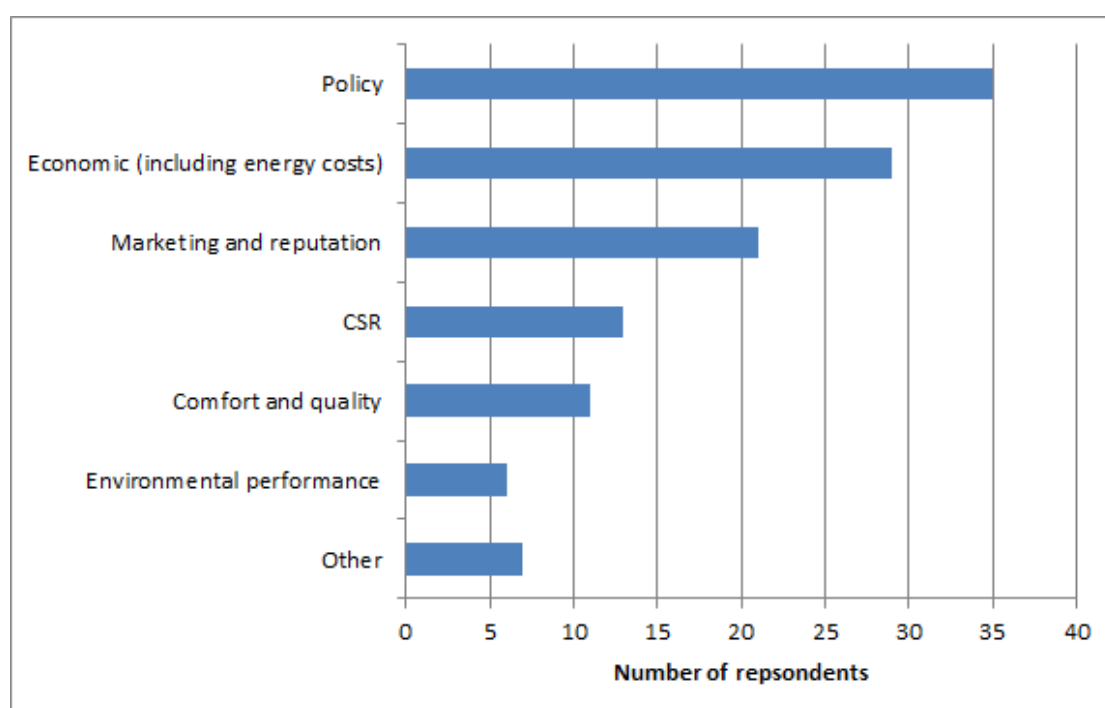
emphasis on water and waste, and with the latter tackled mainly through recycling measures.

There are examples of emergent niche experiments in commercial property retrofit at company and pan-industry influencer level (through BBP, UKGBC for example). These relate to company practices, property portfolio approaches, and policy and practice guidance, as well as the use of 'test bed' technologies.

Why'? – the key drivers and barriers

The most important drivers in commercial property retrofit relate to policy, economic factors (for example rising energy costs) and marketing/reputation (Figure 4). Despite the criticism levelled against the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme, for example, it was seen as being important in driving change in organisations¹.

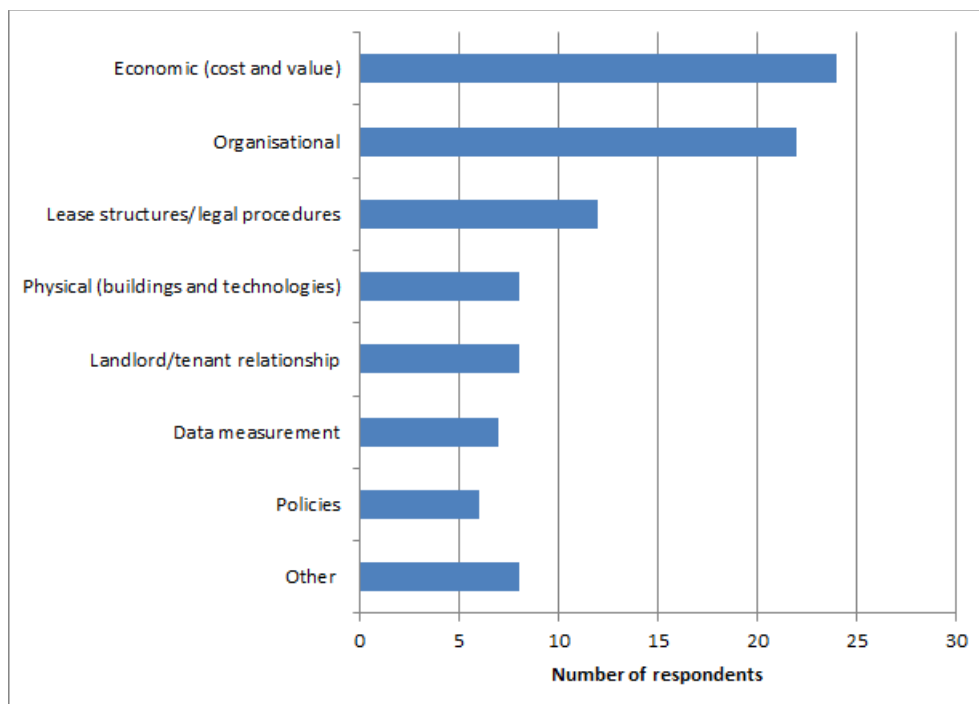
Figure 4 Key drivers for commercial property retrofit



The most important barriers relate to economic factors (overall cost and value impact), organisational issues and lease structures (Figure 5). The significance of organisational barriers should not be underestimated. For some commentators the term 'barriers' carries the sense that in some way if these were removed then energy efficiency would automatically act as a precursor to 'rational' behaviour in the marketplace, but this ignores the organisational context for decisions, and also ignores the interrelationship between the barriers themselves, and the fact that they should best be seen in the context of the socio-technical landscape and regime.

¹ Other relevant emerging policies include the Energy Savings Opportunity Scheme (ESOS), which under Article 8 of the EU Energy Efficiency Directive states that non-SMEs are subject to an energy audit.

Figure 5 Key barriers for commercial property retrofit



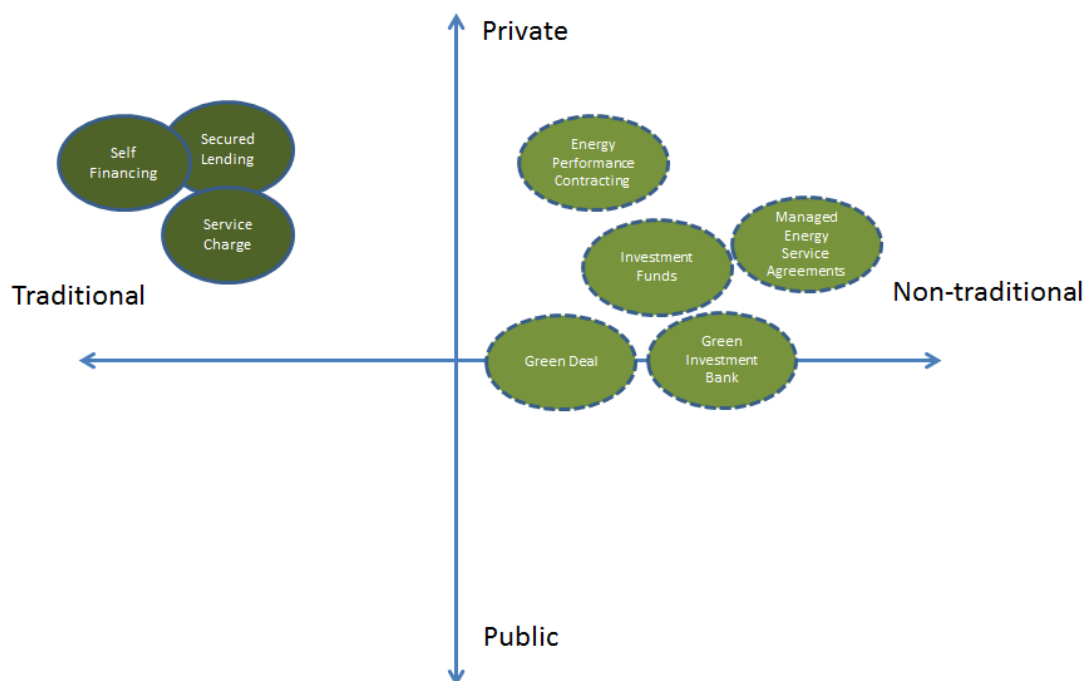
‘How’? – institutional frameworks, legislation and monitoring/standards

Many in the ‘producer’, ‘user’ and ‘technology supplier’ groups saw the big picture as one of technology push, with some degree of market pull. Other interviewees saw that the big picture was one of emerging niches within a landscape of wider policy and practices. There is a need to recognise the importance of the complex relationships that exist in the socio-technical configuration of the commercial property retrofit regime.

Key challenges for emerging niches in commercial property retrofit were related to the types of technology being used, and revolved around collaboration; alignment of the technology and development lifecycle; improving the evidence base; and issues around technology innovation.

There is a range of financing models used in commercial property retrofit (Figure 6). The majority of projects are self-financed or paid through a service charge. There are a number of emergent and niche financing models in the sector, including Energy Performance Contracting (EnPC), alongside the emergence of specialist investment funds. There was a high degree of scepticism surrounding the Green Deal and its potential impact in the sector.

Figure 6 Commercial property retrofit financing: current and emerging niche models



Note: Dotted lines indicate more recent initiatives.

Further issues: A question of scale? The key challenges to retrofitting at city level

The diversity and heterogeneity of commercial property presents challenges in large-scale retrofit. Investors and landlords did not necessarily **take a city scale view** of the world. As one investor/developer suggested:

'We are kind of city blind. We do look at our portfolio, from a retrofit point of view we'll look at our portfolio and say, OK, where can we get best bang for buck, if you like? We're trying to reduce our carbon emissions; there's no point in us concentrating on the lowest carbon emitting building in our portfolio. We'll go and concentrate on the biggest one, and ... can we actually do to it? The only time that cities come into it is through either the legal requirements of that particular city, if we're doing developments in that city or something like that'.

As a result, the commercial property sector does not necessarily take a city scale view of retrofit projects. The focus is more likely to be on individual building or property portfolio level. 'Sticky' infrastructure projects such as district heating schemes could, if accompanied by mandatory measures and incentives, provide opportunities for the sector to take a different view.

A clear vision with local authorities leading at city level is needed for the commercial sector to engage and improved data access and more information on actual energy performance of buildings at city level are needed.

Implications: why is the research important?

For the commercial sector and other players to engage at city level requires change at two levels: (i) city scale; and (ii) commercial property retrofit regime.

City scale

At city scale therefore there is a clear need for UK cities (and their constituent local authorities) and national government to take the following actions.

There is a need for UK cities to:

- *Do more to develop fully integrated low carbon plans and strategies.*
- *Help play a leading role in developing and promoting a low carbon economy.*
- *Help develop networks to ensure best practice, through such bodies as the Local Government Association (LGA) in UK and ICLEI.*

There is a need for UK government to:

- *Develop a new policy framework which recognises the role of cities in the climate change and low carbon agendas.*
- *Help support the development of local carbon visions for cities.*
- *Use the UK Green Investment Bank (UKGIB) to assist in funding city-based low carbon projects.*

Commercial property retrofit regime

In policy and practice terms if commercial property retrofit is to be rolled out at scale, and the transition management structures for this scaling up are to be strengthened, then policy and practice needs to be adjusted in a number of ways. In **policy** terms, the current research suggests that²:

- *A balance of incentives and regulation is needed to increase the rate of retrofit in the commercial property regime.*
- *Improved joining up of thinking is needed around retrofit across all relevant government departments.*
- *DECs should be mandatory across the sector.* The draft carbon plan proposed extending the current requirement on public buildings to publish DECs to all commercial buildings by the end of last year, but this was thrown out by the Treasury in 2011 despite support from within the commercial property sector. DECs could be underpinned by incentives linked to stamp duty and business rate reductions for more energy efficient properties.
- *The Green Deal needs to be re-structured to make it more attractive for SMEs and others in the sector.* This requires a reduction in the interest rate and much clearer signposting of how the Green Deal can be used in the run-up to the implementation of the Energy Act in the sector by April 2018.
- *The role of the UKGIB needs to be strengthened and more capital provided to help support commercial property and city-level retrofit projects (see above).*

² As APGEBE (2013) points out, a major, independent study is now underway into whether the Government's energy and carbon policies are having the desired effect on the property sector. The Government-led Green Construction Board has joined forces with the Green Property Alliance, a group of the UK's leading property organisations, to commission Deloitte to carry out the study. A recent study (Westminster Sustainable Business Forum/Carbon Connect, 2013) also made a number of policy recommendations for the commercial property sector particularly around the Green Deal.

- *There need to be improved frameworks for the R & D of emerging retrofit technologies in the regime, and a reduction in the lifecycle time for approval of emerging technologies, without prejudicing the need for testing and verification.*
- *There should be a clearer and more powerful role for local authorities leading the retrofit agenda at city level, underpinned by stronger legislation (and improved incentivisation for partnership with the private sector through, for example, tariffs/subsidies around district heating) to act and to help in the deployment of decentralised energy projects. Improved integration is needed of both the public and private sectors.*

In terms of **practice** the research suggests that:

- *There should be a clearer definition of retrofit and consensus in the regime as to what the term constitutes (Table 1). For example, although the RICS provides guidance on sustainability and valuation, the guide does not define 'retrofit' and 'refurbishment' explicitly.*
- *It is also important to recognise that commercial property retrofit is not just about energy efficiency: it is also about water and waste efficiency.*
- *Proving the 'business case' is vital in terms of the economic viability of commercial property retrofit projects at scale. More research is needed to address this issue.*
- *An approved products and suppliers list in commercial property retrofit should be developed which should also have regime-level support. There also needs to be clearer information on what makes a good technology, and with better access to performance in use data.*
- *There should be a wider acceptance of monitoring, 'soft landings' and POE in commercial property retrofit programmes.*
- *There should be improved communication between key actors in the regime and a greater willingness to engage at city and community level. At company level this requires the development of a specific 'retrofit strategy' and strong championing. This should also be supported by clear monitoring and assessment measures and the use of innovative stakeholder groups—for example, green building management groups.*

Table 1 Suggested definitions for retrofit and refurbishment

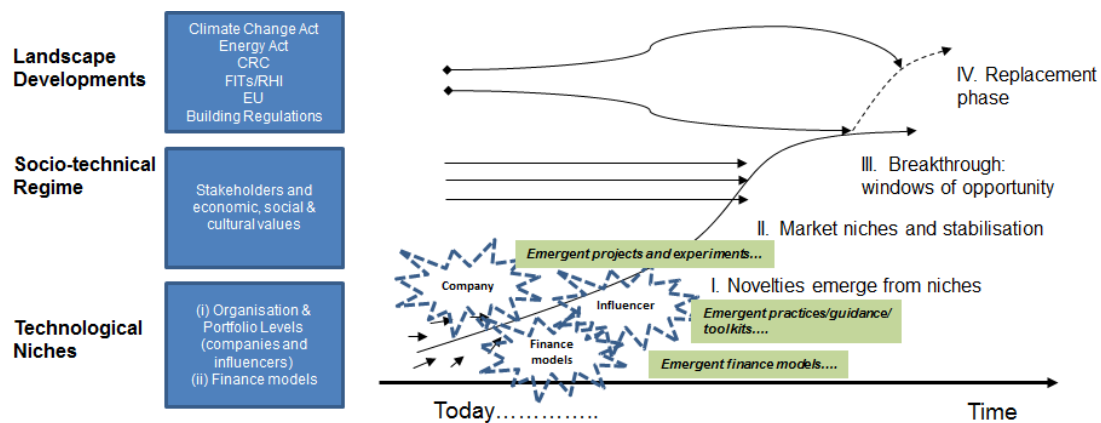
Commercial property retrofit	Commercial property refurbishment (or renovation)
The process of making planned interventions in a building to install or replace elements or systems which are designed to improve energy and/or water and waste performance.	The cyclical process of improving a building above and beyond its initial condition in order to improve asset value. The focus is on systemic upgrading and renewal of building elements, finishes and mechanical services, with a potential impact on energy and/or water and waste efficiencies.
Typical Characteristics	Typical Characteristics
Non-intrusive whole system upgrades, or new elements added to existing systems.	Major alterations to fabric and/or services at a systemic, whole building level.
Carried out during lease or during ownership.	Carried out on lease renewal (or lease end), or on a cyclical basis in owner occupied property.

Conclusions

The MLP offers a helpful perspective through which to view emergent practices in the commercial property retrofit regime. It is clear that a number of niche experiments have been emerging at company level (for example, through the producer network and the user network) and these relate to company-level practices through, for example, the development of sustainable development briefs; company-wide sustainability plans; and asset management strategies (see Figure 7).

We are also seeing further development of emergent practices at pan-industry influencer level with 'best practice guides, toolkits and other guidance (for example, 'low carbon retrofit', 'green leases' and 'green building management groups'. Finally, a further set of niche experiments relate to the development of specialist funds and financing models for commercial property retrofit.

Figure 7 Emergent practices in the commercial property retrofit regime: a multi-level perspective



We need to understand these experiments within the context of a complex set of relationships between key actors/stakeholders in the regime, founded on a cultural values, market and user practices and regulations and policies.

Despite the emergence of these experiments and the importance of policy as a key driver (for example, the Climate Change Act, Energy Act and CRC), the sector remains one which is conservative and risk-averse in nature. This is hampering whole-scale transformation of the sector and the roll-out of retrofit in the sector at city level. Stronger legislation is needed to drive change and better integration of the public and private sectors around the retrofit agenda at city scale.

We should therefore understand that complexity and fragmentation are also key characteristics of the sector which make it very different from, for example, the domestic sector.

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1 Introduction: Background and Context

1.1 Introduction

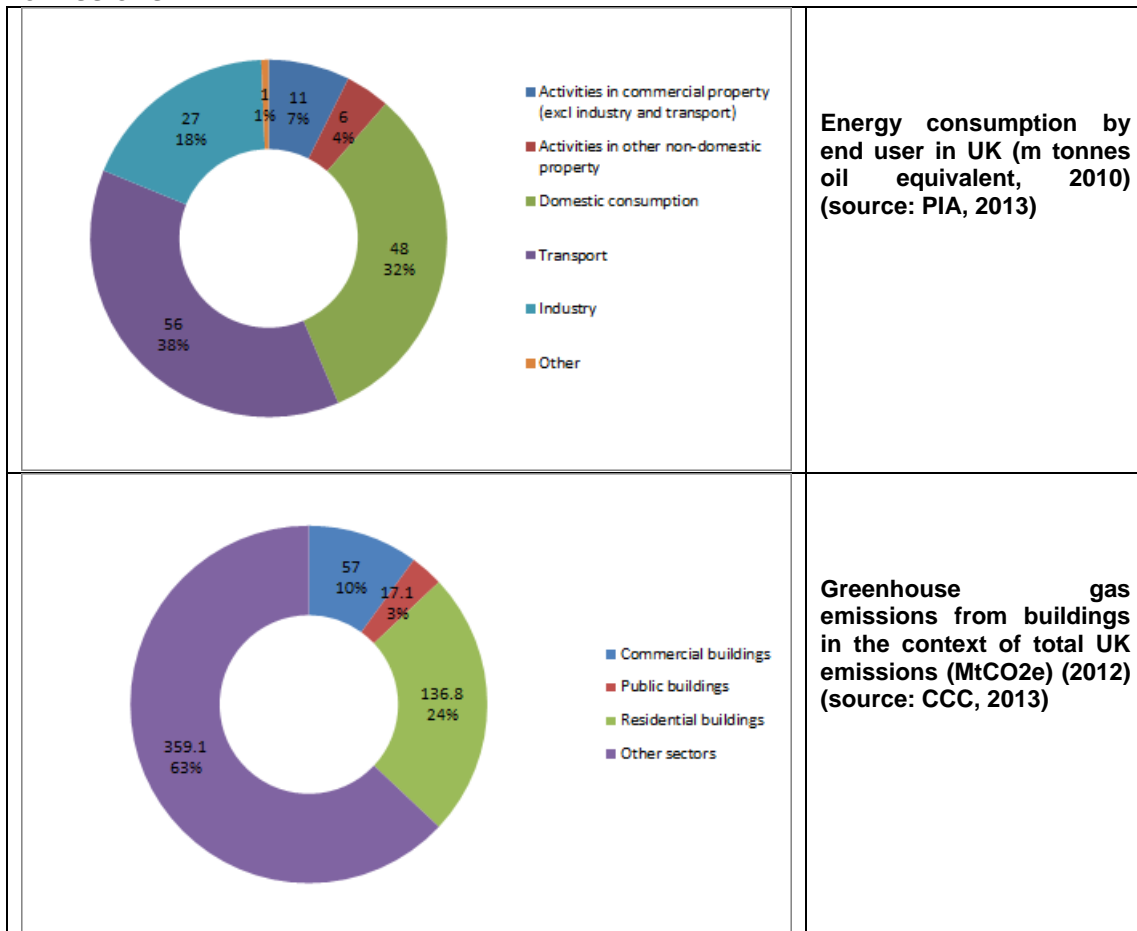
In this chapter of the report the background and context to the research are discussed, together with the aims of the research. We also review the conceptual frameworks which can be adopted for studying energy efficiency in the commercial property regime, before explaining and justifying the use of the multi-level perspective in the context of transition theory. Finally, the methodology for the research is discussed.

1.2 Overview

1.2.1 Commercial property and carbon emissions

In comparison with the domestic property sector the commercial property sector is perhaps relatively under-researched when it comes to examining energy efficiency and other wider ‘retrofit’ measures such as water and waste. Yet commercial property produces about 10% of the UK’s greenhouse gas emissions (CCC, 2013) and consumes about 7% of UK energy (Figure 1.1), and it is estimated that UK business is overlooking a potential cost-saving of £1.6b through under-investment in energy efficiency (Westminster Sustainable Business Forum/Carbon Connect, 2013). The UK’s commercial retrofit market potential is estimated at £9.7b (or US\$16b) (WEF, 2011).

Figure 1.1 Commercial property: energy consumption and greenhouse gas emissions



Often the research focus in commercial property (which includes retail, offices and industrial space) has been on ‘new build’ as the growth in ‘green’ and ‘sustainable’

buildings has taken root (Dixon et al, 2009; Leishman et al, 2011). However, there is an increasing concern that the rate of progress in tackling energy inefficiency in existing commercial stock is too slow. This is challenging because it is estimated that by 2050 some 70% of today's buildings will still be standing, with 40% built prior to 1985 (when Part L of the Building Regulations was first introduced (BBP, 2010)), and 60% built prior to 2010 (Mackenzie et al, 2010).

The importance of existing stock is also brought home when it is appreciated that the rate of turnover of the building stock in the UK is very slow: less than 1-2% of total building stock each year is new build (Dixon, 2009 Stafford et al, 2011). Current renovation and refurbishment rates are somewhat higher, with between 2.9% and 5% of existing stock for domestic buildings and 2-8% for commercial stock, depending on the sector (Stafford et al, 2011), but still present a very significant challenge in meeting the UK's carbon reduction targets.

1.2.2 The importance of retrofit

Retrofitting therefore takes on an important significance in the context of commercial property.

In the academic literature there has been much debate over the meaning of 'retrofit' and its distinction, if any, from 'refurbishment' or indeed 'renovation'. In a literal sense retrofit can be defined as (Oxford English Dictionary): *'to provide (something) with a component or feature not fitted during manufacture; to add (a component or feature) to something that did not have it when first constructed'*.

In other words, the term, which originated in the USA in the late 1940s and early 1950s is essentially a blend of the words, 'retroactive' (applying or referring to the past) and 'fit' (to equip). Within the context of the built environment, the term retrofit has been used to imply substantive physical changes to a building or buildings (for example, mitigation activities to improve energy efficiency), and often linked to the concept of 'adaptation' (i.e. intervention to adjust, reuse, or upgrade a building to suit new conditions or requirements (Douglas, 2006; Wilkinson, 2012)). Confusingly, the term has also been used interchangeably with other terms such as 'refurbishment', 'conversion', 'renovation' and 'refit' (see Mansfield, 2002 and Wilkinson, 2012 for a discussion of this point at a property level) (Dixon and Eames, 2013).

However, at a city level it can be argued that the term retrofit is distinguishable from these terms, because the defining characteristics of urban retrofitting are (i) its comprehensive nature and large scale; (ii) its integrated nature, requiring a high degree of private–public partnership arrangements; (iii) the sustainable nature of its funding; and (iv), a clearly defined set of goals and metrics for monitoring (Living Cities, 2010). In the EPSRC Retrofit 2050 project we define urban retrofit as the:

'Directed alteration of the fabric, form or systems which comprise the built environment in order to improve energy, water and waste efficiencies' (Eames, 2011:2).

However, understanding processes of sustainable urban retrofit at a city scale, and within the context of city visions, also requires the development of an integrated perspective on long-term socio-technological systems innovation, commonly referred to within the literature as 'transitions' (Geels et al, 2004). This is because the defining characteristics of urban retrofitting are seen as being its comprehensive nature and large scale, and its integrated nature, both of which require a high degree of private–

public partnership arrangements and strong governance frameworks (Living Cities, 2010).

Responding to these 'scale' challenges in a purposive and managed way also requires us to bring together four important questions which have often been treated in a 'disconnected way' (Dixon and Eames, 2013; Dixon et al, 2014):

- (i) 'Who' is involved in this process? (i.e. key actors and networks);
- (ii) 'What' is to be done? (i.e. technical knowledge, targets, technological options, costs);
- (iii) 'Why' is it important? (i.e. individual, organisational and cultural drivers and expectations); and,
- (iv) 'How' will it be implemented? (i.e. institutions, capacity, publics, governance).

Currently, in policy and disciplinary terms, there is still too large a separation between these important questions, characterised by disciplinary fragmentation; an absence of appropriate governance frameworks; and a failure to learn from projects and experiments and incorporate these into systemic transitions (Bai et al, 2010; May, Marvin, Hodson and Perry 2010). This is true not only at the scale of the city but also within the commercial property retrofit regime itself.

In this research therefore we seek to address these questions using a multi-level perspective (MLP), which draws on the work of Rip & Kemp, 1998; Geels, 2010 and Eames et al, 2013.

1.3 Aims of the research

The overall aim of the research is to examine the emergent trends in commercial property retrofitting at a 'regime' level and to examine the following key questions:

- **Who?** – identifying the main stakeholders in the commercial property retrofit regime and the main characteristics of the regime;
- **What?** – defining what is meant by 'retrofit' in the regime and examining the key retrofit technologies being used;
- **Why?** – examining the key drivers and barriers for commercial property retrofit; and,
- **How?** – examining the institutional frameworks, legislation and monitoring/standards behind commercial property retrofit (including financing, assessment methods and monitoring and verification systems).

The research also examines issues of scale, particularly at city level (and also summarises the key challenges to retrofitting at city scale in the regime), and finally sets out insights for the future.

In doing so the research employs the following definitions:

- *Commercial property*: comprises retail, offices and industrial space (excluding public buildings and other 'non-domestic' property).
- *Regime*: The socio-technical regime, as defined by Geels (2002) includes a web of inter-linking actor networks across different social groups and communities following a set of rules. These rules comprise the established

practices of a system and relate to: technology; user practices and application; the symbolic meaning of technology; infrastructure; policy; and techno-scientific knowledge. Change can, and does, occur at the regime level but it is normally slow and incremental in contrast to the radical changes at the niche level. The actors who constitute the existing regime are set to gain from perpetuating the incumbent technology at the expense of the new. This is known as 'lock-in'.

As well as using the lens of MLP to analyse the regime, we also examine the extent to which other conceptualisations of organisation-level technology deployment can offer a coherent view of the commercial property sector. These include technology diffusion models and technology push-pull models.

1.4 Background and Context

1.4.1 Nature and characteristics of commercial property

Understanding how the commercial property sector approaches retrofit activity also requires an understanding of the characteristics of the sector.

Firstly, there is a *higher level of tenanted property* in the commercial property sector than in the domestic sector. Over half of commercial property is rented (51%), compared to only a third of housing (Property Industry Alliance, 2013). This is because many businesses have become increasingly reluctant to commit the capital and management time required in owner occupation, and owner occupiers took advantage of high prices in the mid-2000s to participate in 'sale and leaseback' deals.

Secondly, *the sector is an important part of the UK economy*. In value terms the sector is worth about £717b, with retail, at £227b, the largest commercial property sector. Offices are, however, catching up with retail, with greater capital value growth seen in 2011 (Property Industry Alliance, 2013).

Thirdly, we also know that *average lease lengths in the sector are falling*. The average length of a new lease in 2011 fell to below 5 years, compared to 8.7 years in 1999. Over 75% of new leases now have durations of 5 years or less. Larger tenants, occupying bigger units, tend to have relatively long leases. Many tenants benefit from rent free periods at the beginning of a lease. Retail warehouses, where demand from tenants is relatively strong, have the longest leases and industrials, the shortest (Property Industry Alliance, 2013).

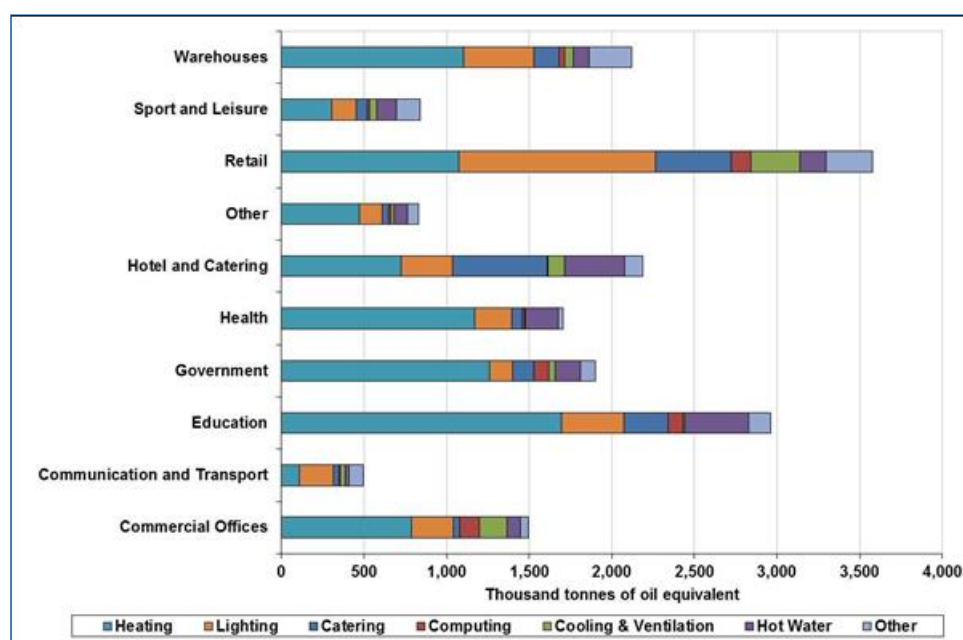
Fourthly, we know that the sector is *complex*. The Carbon Trust report, *Building the Future* (Carbon Trust, 2010), highlighted the complexity of the sector in terms of its diversity, building types, and its range of stakeholders. But the report also spoke about the *conservatism* of the sector and its risk-averse nature.

1.4.2 Previous research: what do we know already about commercial property energy use and retrofitting and what do we need to know?

There have been a number of previous research reports which have focused on energy use and energy efficiency projects in the commercial property sector. These reports have tended to focus on the following main areas.

- *Energy use:* energy is used in different ways across the sector but generally space heating makes up the largest proportion of service sector energy use, except in retail and communications/transport, where lighting is the most important (e.g. retail uses about 35% of all lighting in the services sector) (Figure 1.2) (DECC, 2013).

Figure 1.2 Service sector energy consumption by end use and sub-sector
(Source: DECC, 2013)



- *Levels and type of retrofit activity:* Previous research has pointed out that company size is an important factor in the decision to invest in energy efficiency projects. Often large companies lead the way, and offices tend to be the primary focus for retrofit activity (Westminster Sustainable Business Forum/Carbon Connect, 2013; EEVS/Bloomberg, 2013). Retrofit projects tend to be predominantly focused on lighting, with much less emphasis on renewables.
- *'Barriers':* previous research has highlighted key barriers in energy efficiency investment (see for example, BBP, 2010; WEF, 2011; BPIE, 2012; CBI, 2013; Westminster Sustainable Business Forum/Carbon Connect, 2013). Generically these reports and other work, tend to see the barriers to retrofit in terms of:
 - Financial and economic, particularly around payback times for retrofit projects.

- Institutional and administrative, often related to organisational context, company size and complexity in the sector.
- Awareness, advice and skills barriers in the sector.
- Separation of expenditure and benefit (the split incentive issue).

In many ways previous research has adopted a fairly deterministic view of the commercial property sector, in the sense that there is an underlying principle that if barriers are somehow removed that would itself mean the rate of slow progress in the sector would be remedied. This view assumes therefore an underlying ‘rational’ behaviour. However, there is a strong argument for seeing barriers as a feature of the socio-technical landscape which influences the diffusion of technology, and so removal is more likely to change the shape of the landscape, open up new paths in some areas and make others more difficult to follow, without necessarily automatically catalysing action (DECC, 2012). In short, we can only understand the sector in the context of social and cultural practices and their complex relationship with the underlying landscape (DECC, 2012).

Moreover, previous research has also focused on energy *per se* rather than including water and waste, and yet we know that in creating sustainable buildings we should be taking a holistic view (Appleby, 2013)³. In turn this also raises the issue of scale: again, previous research has addressed the building scale, or the company/organisation scale, without either setting these in the context of wider participation of the commercial property sector within city level transitions, or the linkages of practice across scales.

On this basis there is a research gap then which needs to be addressed. There is a need for research which examines the emergence of retrofit practices in the commercial property sector that: (i) places them in a socio-technical context; (ii) examines energy, water and waste retrofit; and (iii) analyses emergent practice across scales.

1.4.3 What conceptual frameworks can we use to understand commercial property retrofitting?

There have been a number of conceptual frameworks which have attempted to provide insights into how we should analyse decision-making contexts at an individual firm level or a wider, sector level. As Table 1.1 shows, each of these conceptual frameworks differs in emphasis and focus. Indeed the ‘Communities of Practice’ framework does enable us to look across the scales of building, company and beyond, and is perhaps inspired by other kinds of multi-level research including transition theory (Janda, 2013).

³ Although data is patchy it is estimated that in a typical city commercial offices can use 10% of a city’s water supply (EC, 2009)

Table 1.1 Examples of conceptual frameworks used in energy efficiency research in the non-domestic sector

Level	Conceptual framework	Authors	Comments
<u>'Organisation'</u>	Pro-environmental Policy Adoption	Pellegrini-Masisni et al (2012)	An office based study which uses investment decision-making based on cost-benefit analysis to understand occupier decision-making.
	Physical Technical Economic (PTEM)-based	DECC (2012)	A modified framework which recognises the critique of PTEM and places organisational behaviour in a context that recognises: social cultural domain; regulation and policy domain; material domain and market domain.
	Investment Decision	Cooreman (2012)	Recognises decision-making as a process within the organisation based on systemic steps from idea through to solutions, evaluation and choice and implementation.
	Communities of Practice (2012)	Axon et al (2012) Janda (2013)	Communities can act across scales and synthesise legal/property; policy context; and technology adoption/environmental performance
<u>'Sector'</u>	Technology Diffusion	Rogers (2000) Della Croce et al (2011)	Based on the concept of S-shaped diffusion curve with early adopters driving change.
	Technology Pull-Push	Gallagher et al (2012)	Based on (i) push which implies that technology is pushed through R&D, production and sales functions onto the market without proper consideration of whether or not it satisfies a user need; or (ii) market pull in which technology is developed by the R&D in response to an identified market need.
	Market Transformation	Killip ⁴ (2013) European Commission (2013a)	A strategic process of market intervention which aims to alter market behaviour by removing identified barriers and creating opportunities to extend cost-effective energy efficiency as a matter of 'standard practice'.
	Multi-Level Perspective (MLP)	Thakore et al (2013)	Uses a perspective which is based on a socio-technical framework which links landscape, regime and niche and is connected to transition theory.

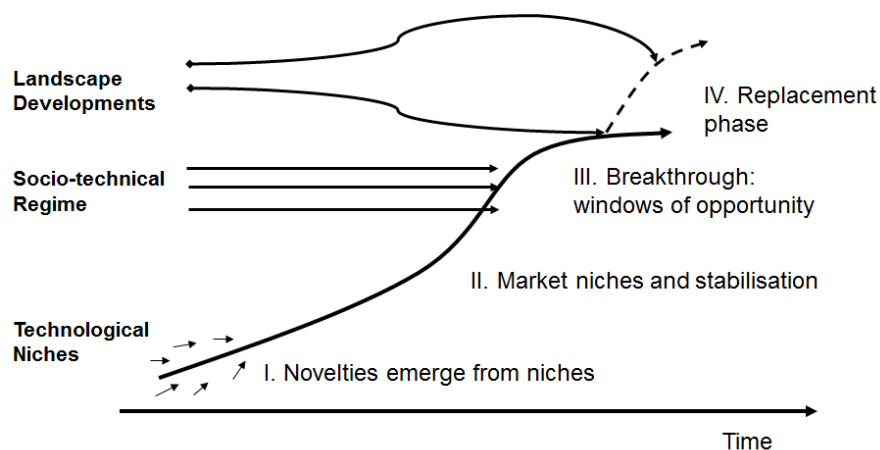
⁴ Killip's work also drew parallels between market transformation and transition management.

However, if we are to understand sector change we also need to understand temporal change and how the landscape of policy and regulations may or may not influence change in the sector. In this research therefore whilst we test out sector models we utilise the MLP because it offers the opportunity to assess changes over time and across scales.

Essentially the last decade has seen the emergence of the new interdisciplinary field of sustainability transitions research. Indeed, transitions theory, and the Multi-Level Perspective (MLP) in particular, has played a substantial role in helping understand the complex and multi-dimensional shifts needed to move societies to more sustainable modes of production and consumption in such areas as transport, energy, housing, agriculture and food (Coenen et al, 2011). Informed by insights from evolutionary economics, innovation studies, ecology, systems thinking and complexity theory, transitions theory assumes that large scale societal changes occur in a quasi-evolutionary fashion. That patterns in the dynamics of ‘systems innovations’, or ‘transitions’, occur as a result of processes of variation and selection driving the co-evolution of social and technological change. Transitions are understood as complex processes resulting from mutually reinforcing changes involving multiple societal actors, operating across multiple domains (science, technology, economy, ecology, institutions, culture, user-behaviours and expectations). Moreover, from historical studies we know that transitions are long term processes, with system-wide change typically taking decades (20-50 year) to occur (Dixon et al, 2013).

Transitions theory postulates that successful systems (or ‘socio-technical regimes’) comprising networks of artefacts, actors and institutions, become stabilised over time through the accumulation of processes promoting ‘lock in’ and path dependency (for example, sunk investments in skills, capital equipment and infrastructures, vested interests, organizational capital, shared belief systems, legal frameworks that create uneven playing fields, consumer norms and lifestyles). In this multi-level perspective (MLP) (Figure 1.3), ‘lock-in’ to existing systems is overcome and transitions occur as a result of experimentation and the emergence of new socio-technical configurations (innovations) within protected niches. These factors, combined with landscape pressures, destabilise and transform or replace the existing ‘regime’ (Rip & Kemp, 1998; Geels, 2004; Kemp & Loorbach, 2006).

Figure 1.3 Multilevel perspectives on transitions (adapted Geels, 2004)



Given their inherent complexity and uncertainty, it is argued that, socio-technical transitions cannot be ‘planned’ or ‘managed’ in the traditional sense. Instead, proponents of transition theory suggest that new reflexive, networked governance practices are required to align both the speed and direction of system change towards the goals of sustainable development (Geels et al, 2004; Rotmans, 2006).

MLP also connects with the concept of *emergence*, which is defined as the arising of novel and coherent structures, patterns, and properties during the process of self-organisation in complex systems (Goldstein, 1999). The common characteristics of emergence include radical novelty, integrated wholeness, dynamic evolvment and ostensibility (i.e. it can be perceived). In this report the concept of niche experiments and emergent practices is therefore a recurring theme.

Finally we also need to understand that if niches are to become mainstreamed in regime terms that transition management is needed to influence the existing structure in a more sustainable direction; in this sense a ‘transition’ is understood as a fundamental change in structure, culture and practices (Loorbach and Rotmans, 2006).

1.5 How the research was conducted

The research in this paper is based on 37 semi-structured interviews with key actors in the commercial property retrofit regime. A list of the organisations interviewed is in Appendix 1, but individuals cannot be named because of confidentiality. All interviewees were senior decision-makers in their organisations. All interviews were transcribed and coded. Table 1.2 summarises the groups.

Table 1.2 Summary of interviewee groups

Group	Number of interviews
Consultant (includes 3 architects and engineers)	10
Influencer	9
Investor/developer	5
Financier	4
Occupier (including retail)	3
Technology company	3
Corporate owner	2
Government	1
Total	37

2 Main Findings

2.1 Introduction

This chapter of the report covers the main findings from the interviews with key stakeholders. The chapter examines four main questions:

- **Who?** – identifying the main stakeholders in the commercial property retrofit regime and the main characteristics of the regime;
- **What?** – defining what is meant by retrofit in the regime and examining the key technologies being used;
- **Why?** – examining the key drivers and barriers for commercial property retrofit; and,
- **How?** – examining the institutional frameworks, legislation and monitoring/standards behind commercial property retrofit (including financing, assessment methods and monitoring and verification systems).

The chapter also examines issues of scale, particularly at city level (and also summarises the key challenges to retrofitting at city scale in the regime), and finally sets out insights for the future.

2.2 'Who'? - the main stakeholders in the commercial property retrofit regime and the nature of the regime

Key Messages:

- ***The Multi-Level Perspective (MLP) offers a helpful lens through which to view transition in the commercial property retrofit regime.***
- ***The regime is characterised by complexity, fragmentation and conservatism despite emergent niche experiments in commercial property retrofit.***
- ***Some interviewees felt the regime was 'London-centric' although this was not a universally held view.***

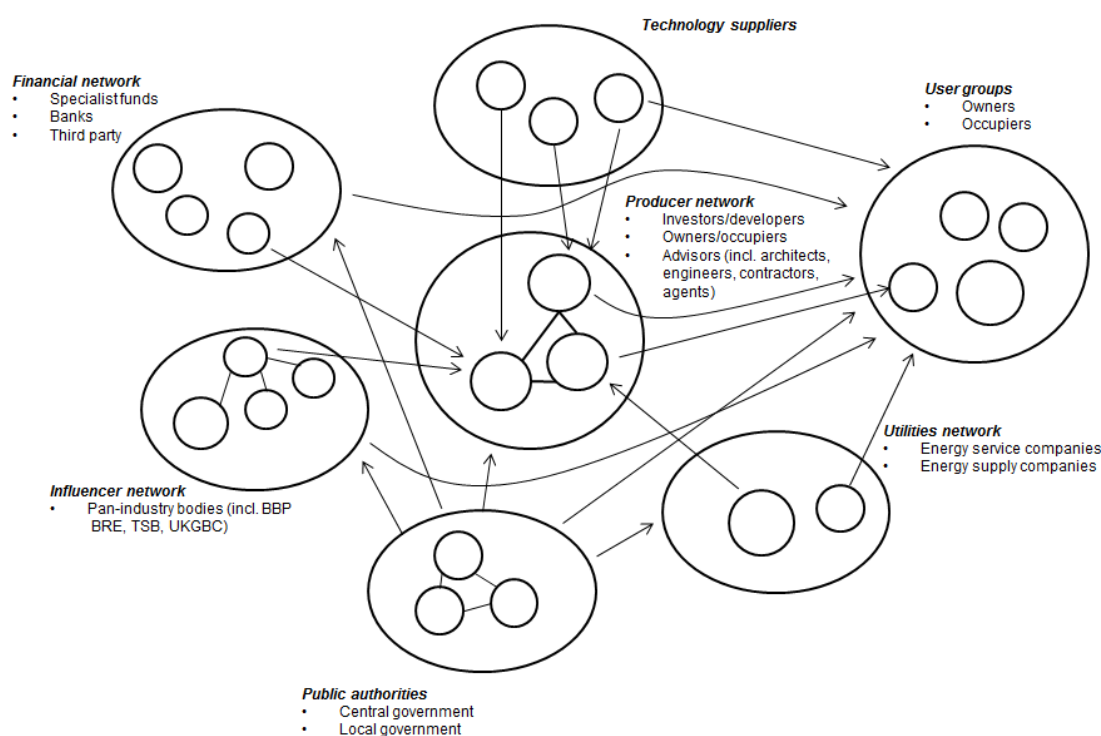
The commercial property retrofit 'regime' is made up of a complex array of stakeholders who interact in a variety of ways when a retrofit project is undertaken. In the interviews that we conducted the commercial retrofit projects were generally carried out at building level, and organised from within the company undertaking the project, although this can also occur at a wider, portfolio level if the organisation holds a number of property assets. These projects therefore were primarily 'driven' and 'led' by owner occupiers, or in the case of tenanted property, by landlord investors or tenants.

In this sense the term 'regime' is used to describe *'relatively stable but nevertheless dynamic configurations of buildings and infrastructures, networks of actors and*

institutions, technologies, policies and regulations, social norms, practices and shared expectations' (Eames et al, 2013: 509). Essentially this view, which builds on the MLP, sees the commercial property retrofit sector in the form of a 'socio-technical' regime, which sets the interaction of stakeholders within rules and regulations (for example the Climate Change Act, 2008 and the Energy Act, 2011), prevailing economic, social and cultural values, and the institutional and technological capacities relating to energy efficiency measures, and water and waste measures (all of which can form part of commercial retrofit activities).

The conceptualisation of the commercial property regime is shown in Figure 2.1 in more detail. This is based on the existing knowledge of the key stakeholders and further analysis of the interview transcriptions. This emphasises the diversity of interests in the regime and the way in which they interact. For example, the financial network provides finance in the sector to both producers and to users (because retrofit may be owner driven or occupier driven). 'Influencer' groups such as BRE and Better Buildings Partnership (BBP) also play an important role in shaping practice and 'niche' experiments in retrofit. These relationships are also bounded and linked with the regulations and policies and wider economic, social and cultural values that make up the socio-technical configuration (see section 2.5.2).

Figure 2.1 Conceptualisation of the commercial property retrofit regime



Note: Owners and occupiers feature in both producer and user groups because they may provide retrofitted buildings, or use them, depending on context.

The interviews with key stakeholders suggest that, despite emergent niche experiments by early adopters, the regime is characterised by three key characteristics:

- **Complexity:** the regime has a large number of stakeholders who interact at different stages of the retrofit project (Carbon Trust, 2009). This can be seen in 'upstream' terms with investors, developers and their agents commissioning retrofit projects to downstream stakeholders in the supply

chain, including designers, contractors, engineers and ultimately, the end users or occupiers of the buildings themselves. The commercial building stock itself also varies, ranging in the world of commercial property from offices through to retail and industrial premises, and this stock varies in age, size and tenure. Moreover, the stakeholders in the regime vary in their objectives with retail buildings focusing primarily on footfall or sales; offices on staff retention and productivity; and industry on productivity and cleanliness. Moreover, although many retrofit projects are considered relatively simple because they involve 'low hanging fruit' (for example, lighting), in reality retrofit is seen by some as complex in its own right. As one interviewee suggested:

'I go back to those myths: people calling it the low hanging tree. I think it's one of the worst things that people could have said about this industry because people go, 'well it's not a low hanging tree, because it's difficult'. So it just makes it a mockery. I think we need to acknowledge that it's difficult ... not worthwhile, therefore why would they do it?' (Financial expert).

- **Fragmentation:** whilst large companies are important in the regime, there are also a substantial number of SMEs in the retrofit supply chain⁵, and there is often a 'silo' mentality surrounding retrofit projects. Often agents came in for particular criticism in this respect. As one interviewee put it in relation to managing agents:

'In a sense that, you know, developers, advisors, product suppliers and manufacturers are trying to convince the market of the benefits of their ideas, their models, whatever, and usually they have to spend quite a lot of time convincing, particularly agents who act as the interface between the end customer and the supply side of the market; that these things stack up and make sense and deliver the right sorts of benefit for their... clients'. (Influencer).

Similar views were expressed by a financier in connection with other professionals in the retrofit 'supply chain':

'So there are well established M&V, measurement verifications and protocols. But you still have a situation where the estates director will not speak the same language as the finance director. And so the estates director goes along to the finance director and says: I've got these wonderful energy saving ideas. The finance director says... it's another one of your flaky schemes. So is energy efficiency being evaluated on the same basis as other potential investments that might be more to the core of an organisation's revenue base or core business?'

- **Conservatism:** Previous research has highlighted the fact that the non-domestic development industry has a conservative, risk-averse mind set. This is partly driven by the pragmatic need of property investors or developers to minimise costs and maximise returns. This conservatism plays out in relation to choosing commercially proven retrofit technologies, but also, in the wider

⁵ The RE:Start Local programme is a project part-funded by the European Regional Development Fund (ERDF) which aims to help SMEs secure local business opportunities developing from the increasing number of renewable energy and low carbon building retrofit investments in South East England (see <http://www.instituteforsustainability.co.uk/restartlocal>)

sense of decision-making, in undertaking large-scale retrofit projects. As one interviewee suggested:

'There's a lack of communication cross the supply chain in this particular industry, the construction industry... it's quite a conservative industry... there's a lack of willingness to handle larger scale products ... (or) ... innovate (in) products that ... come into the supply chain'. (Government)

These characteristics can have important consequences for **commissioning a retrofit project** and its ultimate outcome in terms of performance. As one interviewee suggested:

'There can be a design performance gap, a gap between what the designers in good faith think they have designed, and what actually gets built, and the users have to put up with. It's not just about an M&E 'bolt-on', it's actually getting the whole building to work right. I would put a lot of emphasis on commissioning a building, actually getting the kit working and persisting with it or pushing back on the suppliers until it is behaving as it should do... and be integrated with all the other equipment in the whole building' (Influencer).

In the bigger picture, commercial property retrofit activity is best seen as a measured response to the legislative drivers such as the Climate Change Act, Energy Act and Carbon Reduction Commitment. This also impacts on the **overall carbon reduction targets** being set by organisations seeking to be 'early adopters' in the sector. One interviewee suggested:

'They range from very conservative targets set by major organisations with strong corporate social responsibility, (and those) kind of brands- they could in theory, just sit on their hands and wait for the grid to be decarbonised by a few percent and then they've delivered their carbon targets; to others setting more aggressive targets who want to achieve a zero carbon state by 2030'. (Consultant).

Other interviewees spoke about a 20% reduction from a 2010 baseline by 2015 to 15% by 2020 against a 2010/11 baseline. Target setting was also being applied to water and waste. As one interviewee suggested:

'We've got a recycling target which is 72%, which is in line with mayoral targets for, I think, 10 years' time, but we've met those already. Our energy efficiency target now for the year just ended was 133 kilogrammes of carbon per metre squared. So we're doing CO2 per metre squared. And that obviously relates to the energy efficiency based on the latest energy factors. And water as well we do'. (Owner occupier).

Finally some interviewees spoke of a '**London-centric**' retrofit market with most major 'deep' retrofit projects as being seen as operating primarily in London. As one interviewee (investor/developer) commented:

'If you can test some of these technologies and get really very cost effective reductions then it pays them to be pushing at that edge, which ... if you were mainly doing refurbishments rather than new developments, obviously generally, particularly if you're outside London, you fall into a category where you're really only meeting building regulations so you're not having to push at that edge quite so much'.

But another interviewee said that whilst they felt that much of the retrofit sector was London-centric, this was counterintuitive:

'And say you're... paying £40, £50 a square foot in London and energy consumption or energy bills (are) £1 a square foot, it's a relatively small amount, but then outside London if you're paying £15 a square foot and energy's still going to be £1 a square foot ...it's a much bigger proportion of your operational costs. So you'd think that it would be a bigger area of focus but as far as I'm aware I haven't seen anything that suggests that companies are doing that'. (Influencer)

However, other interviewees operating in occupier or owner-occupier retrofit markets suggested this was not the case, because a range of retrofit projects can apply at a portfolio scale geographically across the UK (for example in retail and financial / business services).

2.3 'What'? – retrofit defined and the key technologies being used

Key messages

- ***There is a lack of consistency over the use of the term 'retrofit' within the commercial property regime. 'Refurbishment' seems to be distinguished in some instances from retrofit but may also be used instead.***
- ***Retrofit may be characterised by 'light' or deep' measures.***
- ***Key retrofit technologies include energy efficient lighting and controls, building services, and management systems and controls. These can reduce energy costs by 30-40% pa.***
- ***Where retrofit projects were carried out the primary focus was on energy, with a relatively lower degree of emphasis on water and waste, and with the latter tackled mainly through recycling measures.***
- ***There are examples of emergent niche experiments in commercial property retrofit at company and pan-industry influencer level. These relate to company practices, property portfolio approaches and policy and practice guidance as well as the use of 'test bed' technologies.***

2.3.1 A question of definition

In the interviews it was clear that the terms 'retrofit' and 'refurbishment' were used in one of two main ways:

- **A clear distinction:** where a building(s) could be refitted with relatively 'light touch' energy efficiency measures, for example, whilst a tenant was still in occupation, as opposed to the case of 'refurbishment' which entails a much

'deeper' level of alteration with changes to the internal and external fabric of the building, with the latter frequently occurring at lease renewal. It is also important to distinguish both terms from a 'refit'. For example, one interviewee commented:

'So fit out is basically interior, changes to the interior of a building, excluding changes to the shell and core. Refurbishment is changes to both the interior and the shell and core. And retrofit, I interpret as being deep retrofit and light retrofit, particularly focused on energy consumption, tending to look at how whole buildings can be retrofitted for improved energy efficiency, water efficiency, waste efficiency.... tends to be more of an engineering, and technology, and product led thing, than fit out and refurbishment, which is about construction activity, and interiors, and materials, and waste, and water, and so on' (Influencer)'.

- **No distinction:** where refurbishment is seen as synonymous with retrofit and may be used as a term instead. This can involve gradations of improvement to a building from 'light touch' measures to 'deep' measures. For example, as one interviewee commented:

'We don't really use that term much. We tend to focus on what we would call refurbishments more than retrofits. And so we refurbish, but to me they're fairly similar things. I'm not sure what anyone's description, like, dictionary descriptions, the difference is. But we go back into assets and either strip them out completely and then refurbish them, or in one case in an office building we took the whole thing apart, except for the structure and then re-clad the whole thing... That's a bit more of a major refurbishment....down to just where we're just adding a lick of paint almost to a building'. (Investor/developer)

The distinction between the two terms⁶ is underpinned by the way in which the Better Buildings Partnership (BBP), a pan-industry 'influencer', defines the term. As BBP suggests (BBP, 2010:6):

'Low carbon retrofit ... (comprises) incremental improvements to the building fabric and systems with the primary intention of improving energy efficiency and reducing carbon emissions. This definition excludes disruptive refurbishment that would require the building to be vacated for an extended time, behavioural training programmes and space rationalisation or utilisation'.

Nonetheless, despite the distinction, it was noted during the interviews that it was perfectly possible to see retrofit in 'light' and 'deep' terms. A number of generic examples of retrofit projects, based on these understandings, were highlighted as being important (Table 2.1).

⁶ At an EU level there is a strong focus on 'deep renovation' which implies a substantial improvement in the energy performance of a building. Indeed the most recent EU guidance on the subject suggests deep renovation means an improvement in energy performance in a building of at least 80% (RICS, 2013a).

Table 2.1 Variations in commercial property retrofit projects

Type	Status	Building works	Comments
<i>Deep Retrofit (or landlord/owner-led refurbishment)</i>	Vacant, and likely to occur at lease renewal or lease end.	Can involve fabric and interior.	Likely to include fabric/façade, windows, lights, building services and improved BMS
<i>Light Retrofit</i>	Occupied, with work likely to be carried out during tenancy by landlord/owner.	Likely to be interior works only.	Likely to include lighting and services to common areas, if multi-let.
<i>Tenant Fit -out</i>	Vacant, and likely to be tenant-led.	Likely to be interior fit out works.	Lights and interior fittings.

2.3.2 Key retrofit technologies

Interviewees were asked what they felt the key commercial retrofit technologies were currently. Responses indicate that the sector is focusing on **energy efficient lighting and controls, building services, and management systems and controls** (Figure 2.2) These types of measure are frequently referred to as the ‘easy wins’ or ‘low hanging fruit’, and include ‘commercially proven’ technology measures that are lower risk, create less disruption, and have a shorter payback time (usually 2-3 years or less). The ‘other’ category included measures such as interior fabric, water efficiency and behavioural change measures.

Typically these measures can achieve energy savings of 20-40% per annum. One investor highlighted an example of where a tenant had carried out retrofit works during the course of the tenancy and had achieved savings of 35% per annum (Figure 2.3). From an investment fund’s perspective, taking the lead on this type of retrofit makes economic sense:

‘But from the fund’s perspective the driver is if we can retrofit the lighting, they’re going to get two elements of value from that. One is that the tenant will stay in occupation or renew the break so they get an uplift in their capital book value from the lease extension or renewal What the fund is saying is ... the numbers stack up for us to give them a three month rent incentive but actually what we’d rather do is, rather than just give them the three month rent incentive why don’t we prove to the tenant that we’ll spend .. on upgrading the lights or ... we give them a one month rent incentive on top of upgrading the lights?’ (Investor/landlord)

In this way the interviewee suggested an investor is trying to work with the tenants to highlight the benefits to the tenant of lower costs with perhaps an additional ‘rent incentive’.

Figure 2.2 Key commercial property retrofit technologies

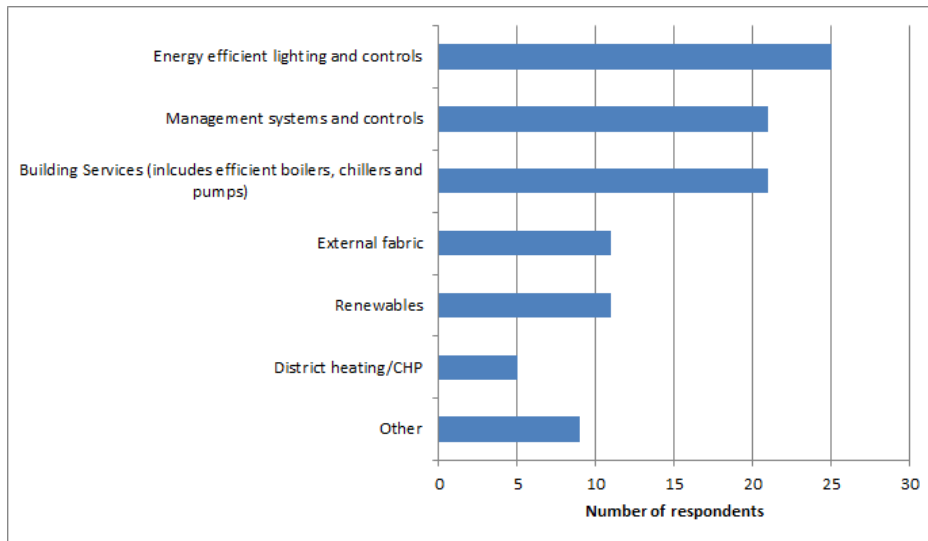
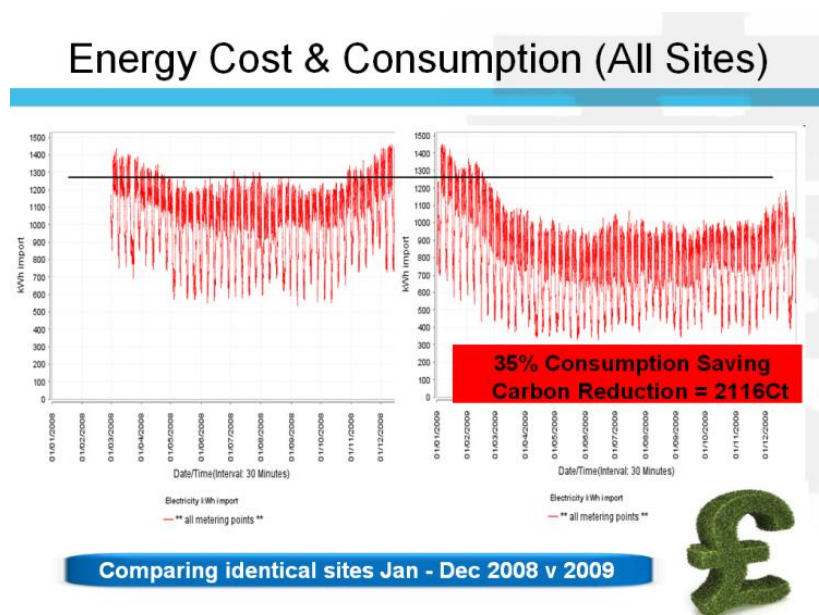


Figure 2.3 Example of tenant-led retrofit energy savings (source: Prologis)



Yet some felt that the commercial property market was being overly cautious in its approach. As one respondent put it:

'Our members are supposedly the leading organisations in this area yet they're all finding they're going to make at least 30% energy reductions in their buildings just by better management and turning things on and off when they're supposed to be used, tweaking controls, putting better systems in place. Then you've got the stage of actually replacing old, inefficient kit and putting new lighting systems in, lighting controls, replacing boilers, upgrading HVAC systems: really basic, not particularly interesting'. (Influencer)

This again reflects a 'low risk' approach so the industry continues to use technologies with which they are familiar. Beyond these 'lighter' measures, more resistance emerges:

'Now we're moving to a low carbon delivery programme, virtually nothing is familiar, within reason. And so therefore the minute you get into any sort of deep level retrofit beyond just easy measures, obviously there is a resistance because people genuinely do not know what the solutions are. And frankly ... there's not the verification processes to demonstrate that they do work yet. We don't have that evidence base'. (Influencer)

Moreover, for financiers supplying investment funds for retrofit, risk is also an issue:

'From an 'investability' point of view, tried and tested technologies are more attractive than riskier technologies. So they would tend to encourage people to go for the more tried and tested technologies' (Financier)

However, the choice of technologies also reflects the fact that from an investor's point of view, for example, they want to carry out works which do not cause disruption:

'What we don't want to do is disrupt the lives of our tenants and/or put in kit that is new, experimental, too complicated to use. And there have been examples of biomass boilers put into buildings ... it just didn't work so we had to retrofit a standard boiler. So we go the other way. We really just focused on the fundamentals...'. (Investor/developer)

In the interviews the case of **LED lighting** was raised by a number of interviewees, and is being used increasingly in the retrofit market, especially in retailing where energy consumption can be reduced by as much as 70% pa through the use of this technology (Box 1). One consultant stated that LED is now used as general lighting across office floors, but others suggested that they were not yet being universally used to replace all existing fittings. As one consultant commented:

'They're very interested in keeping an eye on LED lighting.....it's about to get to a tipping point where it has drastically reduced in cost and that payback's really there. There'll be LED spot lights featured in most projects, but LEDs are still too expensive to use for the entire main office floor - they're not retrofitting every single lamp to be LED lamps at the moment'.

Box 1 Light Emitting Diode (LED) Lighting



LED technology, which rely on semiconductors, benefit from rates of improvement dictated by Moore's Law, and software increases their value by adjusting their energy use based on required lighting levels. LEDs are a 'disruptive' technology in the sense that they occur at the margins of established markets. At first, disruptive products are ignored by the majority of the market, although some consumers buy them because they may like a distinctive feature, and in time these 'niche' markets may be extended, as quality rises and costs fall (Dixon et al, 2013). The decline in cost of LEDs is expected to render incandescent and compact-fluorescent bulbs obsolete by 2015, with LED's global share of the market expected to increase from 25 today to 30% by 2015 and 80% by 2020 (Rogers, 2011). Further technological development had led to the parallel emergence of Organic LED (OLED) based on a film of organic compound which emits light in response to an electric current.

There are also a significant number of organisations that are now focusing on adjusting and improving **building management systems and controls** and installing information management systems in order to improve the performance of their portfolios. This can lead to important savings in running plant and machinery more efficiently. One interviewee suggested that

'In the past, their engineers basically just kept the plant running, they just wanted to ensure they had a happy occupier and they didn't have any complaints coming from occupiers so no one was particularly focused on actually turning plant off when it wasn't required'. (Investor/developer)

Renewables also featured as part of the retrofit technology landscape, largely driven by FITs and the Renewable Heat Incentive. These included PV, solar thermal, air and ground source heat pumps and biomass boilers. Interestingly, although renewables were endorsed by a number of interviewees there was a group of interviewees who said they would not support their adoption, particularly from an investment position. As one investment manager commented they do not consider renewables as part of retrofit strategy *'as it is normally not the most cost efficient way to meet targets'*.

Another investor landlord commented:

'They think that they can achieve far greater impact through demand reduction, renewables don't provide the same financial returns and their

stakeholders, particularly investors, think it's not important to be focusing on. The only time that they install them is when we're required by planning'.

A financier had similar reservations:

'We're improving buildings but within the constraints of viability. We don't go anywhere near 'green bling' (i.e. renewables on existing buildings for existing investments) anyway. We might do on new build, but retrofitting renewables in existing buildings in our experience is not viable so we don't do it'.

On the other hand, one interviewee (consulting engineer) suggested that *'the most effective measures are PVs and solar thermal panels'*. Another landlord/investor commented that with solar panels:

'Even with the cutbacks on the subsidies you can probably show an eight year return depending on where you are in the country, and how good a site angle you can get for the ... optimum (position)'.

Responses suggested that there is less activity in respect of improving the **building fabric** to reduce energy demand. Whilst interviewees understood the important impact that such measures could have, and the need to get the thermal properties of the building right, some felt that it was complex and that:

'It's very difficult when a landlord has not got vacant possession of a building and, more challenging to make the business case for that to work because of the disruptive impact on occupational use of the building'.(Consultancy)

In addition, several interviewees highlighted the importance of **behavioural change and educating users** on new technologies. As one influencer suggested:

'It's not just about introducing new technical systems...the panacea is trying to actually get people to care, that buildings are more about social interactions than they are about the interaction of technical systems, if we're really going to get down to improving performance. Because ... that hidden deficit, (and)... that hidden performance stuff can be between 5% and 20%...This isn't... just received wisdom, it's stuff that we've observed, and our members have observed as well'.

2.3.3 What is the retrofit focus? : energy, water and waste

Where retrofit projects were carried out the **primary focus was on energy with a relatively lower degree of emphasis on water and waste**, with the latter tackled mainly through recycling measures. This varied between industries and occupiers, but lighting and therefore energy was a primary focus. As regards water, leakage issues were important to address but, as one investor/developer commented, water is relatively 'cheap':

'We've got some projects...we're looking at rain water recycling. But we're also looking at the fit out of several of our washrooms, toilets.... so upgrading those to reduce our water consumption. But the cost of water is so low that everything is so hard to make it stack up to a point where we

get within those three years. ... With waste it's a lot simpler... we've done a huge amount of work on waste in the last few years'.

Moreover, **embodied energy** was frequently not considered in retrofit projects. As an architect commented:

'You can reduce your water consumption fairly significantly by just choosing your appliances sensibly and having some control. So it's not a difficult thing to do. So there'll be a level that is achieved relatively simply without thinking it's just good, reasonable practice. But I think consideration of embodied energy, it's pretty advanced thinking. Not many people bother to think about it'.

2.3.4 Niche experiments

Our interviews showed that there is some interest amongst property owners in emerging technologies with a small number of organisations testing out new innovative approaches in their own buildings,. Moreover, some consultants are encouraging their clients to use their own portfolios as a catalyst for generating the market for the emerging technologies and products in which they may have investment interests.

By testing the technologies, owners can demonstrate the value in terms of improved performance of the building, and enhance the quality of the building. As one interviewee pointed out:

'The real opportunity is to push for the enhanced quality of the building. And that's what makes people take those risks, that's how new technologies get in to these iconic buildings, people see the value of doing it' (Financier)

Table 2.2 identifies some of the emerging technologies that the property sector is testing in their own buildings, or which have been tested recently by technology companies.

Table 2.2 Emerging retrofit technologies that are being tested or deployed by the commercial property sector

<i>Lifts with regeneration drives which recover energy that is usually discarded as heat</i>
<i>Voltage optimisation⁷</i>
<i>Phase change materials</i>
<i>Smart enabled devices with sensors e.g. daylight harvesting, heat sensor map, wireless pneumatic thermostats</i>
<i>Thermal server: an air source heat pump which has been modified for ground source and water source if necessary, or heat recovery.</i>
<i>Transpired Solar Collector</i>

In essence, these projects and the way in which certain companies and organisations are leading by example, can be thought of as 'niche' innovations or experiments. This has resonance with the MLP perspective and related transition theory discussed earlier in this report. Niche innovations are important because they are the seeds of

⁷ A number of respondents suggested that there had been problems encountered with this particular technology.

transitions, but it is the overall environment that provides context, and they are contingent on linking with user practices, infrastructure requirements and policies which support their development (Grin et al, 2010).

As one technology company respondent noted:

'I think whilst everyone would love to believe that the future of retrofit is going to be based on.....technology push and the market pull, I think actually it is going to be emergence in niche markets, and history has foretold that'.

This view was supported by a government interviewee:

'In between you've got these entrepreneurs who we're supporting as well, who could perhaps maybe more comfortably fall under that niche area. Because ... some of these technologies are pretty niche that we're funding and we don't know at this stage how successful they're going to be. so I guess government support ... falls under the social and technical regime .. And users and the wider context are also equally as important in that I don't think necessarily government could foresee all the disruptive technologies that have occurred'.

During the course of the interviews we sourced information regarding these niches and it is clear that they operate at different levels within different stakeholder groups. As Table 2.3 shows, firstly there are niche experiments at (i) organisation or company level; (ii) building level and property portfolio level within those same companies; and (iii) pan-industry 'influencer' level with the development of best practice guides and toolkits, for example⁸.

⁸ There was also clear evidence of niche experiments around financing models and lease structures and this is discussed in more detail in section 2.5.3 of this report.

Table 2.3 Commercial property retrofit: examples of emergent ‘niche’ initiatives (or ‘experiments’) at company and pan-industry level

Level	Organisation	Role	Details	Exemplars or Best Practice	Further Details
Company	Bruntwood	Manchester-based property company with 100 properties over 4 cities in UK	Working with Arup on major programme to retrofit buildings as part of asset management strategy	Manchester One, Manchester (offices)	http://www.bruntwood.co.uk/
	Deutsche Bank	Financial services group with a total of 4,000 office buildings, bank branches and other real estate properties.	Eco Program Management Office provides measurement and verification across all the Bank’s operations. Improved data acquisition means it can track key energy metrics in real time, identifying opportunities and problems and taking prompt, targeted action to improve performance. The Building Performance Dashboard allows facility managers to track the most important metrics including energy consumption, peak demand, and changes in occupancy and floor area, in over 2,700 of the bank’s facilities.	Deutsche Bank Towers, Frankfurt (offices)	https://www.db.com/cr/en/concrete-green-buildings.htm
	Land Securities	The largest commercial property company in the UK and a member of the FTSE 100. Founded in 1944, the company own and manage more than 26 million sq. ft. of property, from shopping centres to London offices.	Sustainable Development Brief for new developments. Low Carbon Fitout Guide for Retailers.	Bon Accord Shopping Centre, Aberdeen.	http://www.landsecurities.com/
	M & S	Major UK multinational retailer.	Plan A : launched in January 2007, setting out 100 commitments to achieve in 5 years. Now extended Plan A to	Large-scale low voltage lighting (LED) retrofitting of stores nationally. Green Lease Programme.	http://plana.marksandspencer.com/

			180 commitments to achieve by 2015, with the ultimate goal of becoming the world's most sustainable major retailer. Through Plan A, M & S are working with customers and suppliers to combat climate change, reduce waste, use sustainable raw materials, trade ethically, and help customers to lead healthier lifestyles. Part of this is a new Green Lease policy on new and existing buildings developed in 2013.		
	M&G Real Estate	A top 25 global real estate investment manager, providing integrated services for fund management, asset management and property management.	Sustainable Development and Sustainable Refurbishment Frameworks	Hollywood House, Woking (offices)	www.mandg.co.uk
Pan-industry ('Influencers')	Better Buildings Partnership	The BBP is a collaboration of the UK's leading commercial property owners who are working together to improve the sustainability of existing commercial building stock. The BBP is complemented by the Green500 initiative which helps occupiers find 'quick win' carbon savings in how they use their buildings. The two programmes work together by driving carbon savings in buildings both from the bottom-up and the top-down.	A range of toolkits have been produced focusing on a range of topics including: low carbon retrofit, green leases, metering, and building management.	Various retrofit case studies on buildings (see http://www.betterbuildingspartnership.co.uk/media/case-studies/)	http://www.betterbuildingspartnership.co.uk/home/
	BRE	A former UK government establishment (but now a	Focus on buildings of all types including commercial property.	Various retrofit case studies on buildings.	http://www.bre.co.uk

		private organisation) that carries out research, consultancy and testing for the construction and built environment sectors in the United Kingdom.	A strong emphasis on developing rating systems such as BREEAM.		
	Carbon Buzz	This is primarily a tool for architects which catalogues anonymous data from real buildings, making it easier for architects to understand building energy use statistics.	It allows practices to share and publish building energy use data, on an anonymous basis, in order to increase the evidence base for low energy design solutions. The platform presents a visual template for communicating energy use during design and post completion with a view to informing low carbon design and influencing future policy and regulation	Variety of anonymised case study buildings.	http://www.carbonbuzz.org/
	Carbon Trust	Not-for-dividend company that helps organisations reduce their carbon emissions and become more resource efficient. Its stated mission is to accelerate the move to a sustainable, low carbon economy.	Strong focus on advice, certification and development of new technologies.	Various guides on low carbon refurbishment for non-domestic buildings. Manages Energy Technology List on behalf of UK government.	http://www.carbontrust.com
	Low Carbon Innovation Co-ordination Group (LCICG)	Brings together the major public sector backed organisations that are supporting low carbon innovation in the UK.	Worked with partners on TINA for non-commercial buildings.	Technology focused market demand studies.	http://www.lowcarboninnovation.co.uk/
	Technology Strategy Board (TSB)	A UK public body operating at arm's length from the Government reporting to the Department for Business, Innovation and Skills (BIS).	The Technology Strategy Board supports the development of innovative technologies and products. It offers a range of funding programmes and works with businesses of every size,	Funded examples of technology deployment in buildings and at scale.	https://www.innovateuk.org

			universities and other organisations.		
	UK Green Building Council	A membership organisation campaigning for a sustainable built environment – one that aims to minimise negative environmental impacts while maximising benefits for people everywhere.	Strong focus on retrofitting in both domestic and non-domestic sectors.	A range of policy-related guidance and information has been produced.	http://www.ukgbc.org/

2.4 'Why'? – the key drivers and barriers

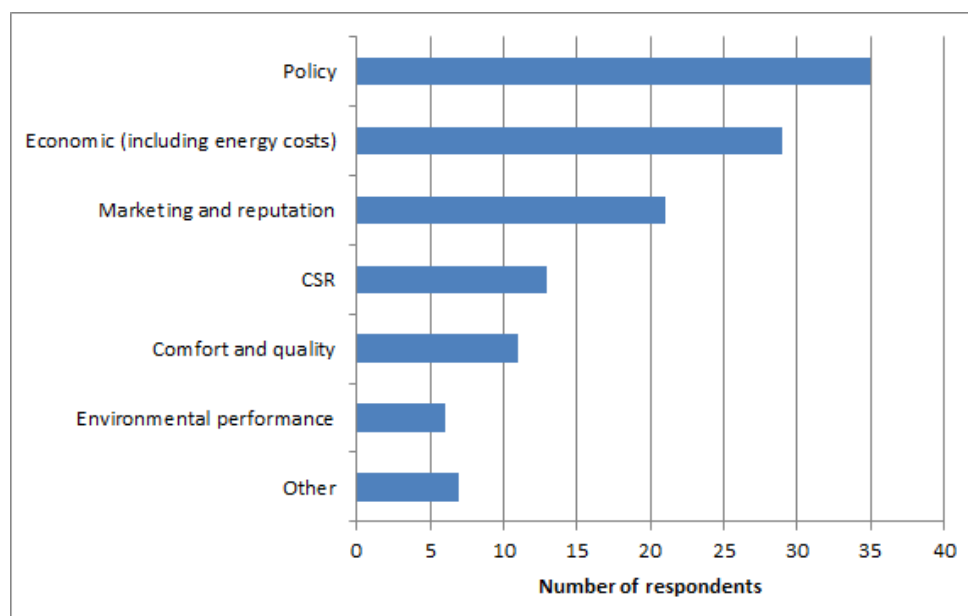
Key messages

- *The most important drivers in commercial property retrofit relate to policy, economic factors (for example rising energy costs) and marketing/reputation. These varied for owners and occupiers.*
- *The most important barriers relate to economic factors (overall cost and value impact), organisational issues and lease structures.*
- *Payback periods typically are a maximum of 5 years with 2-3 years more common. Declining lease lengths and risk aversion militate against 'unproven' technologies.*

2.4.1 Drivers

Interviewees were asked to identify the key drivers which influenced the decision to undertake commercial property retrofit projects. Figure 2.4 shows that **policy-related drivers were seen as being the most important for all stakeholders** (see Appendix 2 for a full list)⁹. Despite the criticism levelled against the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme by some interviewees, for example, it was seen as being important in driving change in organisations¹⁰.

Figure 2.4 Key drivers for commercial property retrofit



⁹ The 'Other' category includes contractual drivers and technology drivers.

¹⁰ Other relevant emerging policies include the Energy Savings Opportunity Scheme (ESOS), which under Article 8 of the EU Energy Efficiency Directive states that non-SMEs are subject to an energy audit.

Other important legislation mentioned included the Energy Act 2011, which from April 2018 will, under current proposals, make it unlawful to let residential or commercial properties with an Energy Performance Certificate (EPC) Rating of F or G¹¹; Building Regulations under Part L; and renewable grants, including the Renewable Heat Incentive (RHI). The latter was seen as being important, particularly from technology company interviewees, one of whom commented:

'I think 95% or 96% of the installations onto commercial buildings, incentivised under the Renewable Heat Incentive, are biomass and the rest are a very small amount of heat pump and solar thermal. There are some fantastic commercial buildings out there that would really benefit from solar thermal...'

In contrast, another respondent suggested that the **plethora of policies** were a barrier rather than a driver:

'I think at the moment ... there are so many different and disparate bits of policy that don't really connect together. So we've got CRC, we've got Climate Rate Change Levy, we've got EPCs, we've got DECs, (we're)... about to get carbon reporting, mandatory carbon reporting. And none of these really connect together....' (Investor/developer).

There was a strong feeling that **retrofit was landlord-driven**, particularly in relation to larger and 'deeper' projects, and in these instances there was a strong interrelationship with cost with a desire to reposition the asset(s) in the property portfolio. As one investor-developer suggested:

'Now the drivers for any change are quite complex. If ... we could ...improve the BMS or put in some lighting control system that is much more advanced than what was there previously that could save energy, and its payback would be two or three years. We'd have to go to the tenants and say look, we need to invest £10,000 this year but you'll get that money back. Your energy bills will go down and after year three you'll be saving £3,000 a year...So there has to be a business case ...(but) the more occupiers there are... (and) if somebody is on a two year lease you can imagine them saying, not that interested really, and somebody who's there for ten years might say, that's a good idea'.

Another investor developer suggested:

'The drivers are that we want to reduce carbon and we want to reduce cost for our occupiers, because the cost saving doesn't go back to us, it goes back to the occupier, so it means less of a service charge for them. It also means that we've upgraded the building, so it's running very efficiently, so we can market that if it's coming up for renewals'.

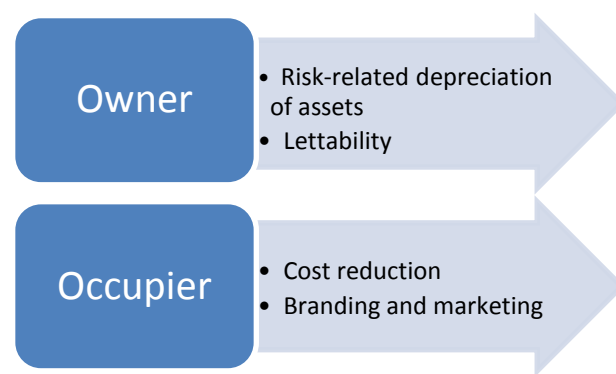
Additionally, for some businesses, energy savings of 10% could be quite significant on an annual energy bill of more than £10m, as a major retail developer suggested.

In this context a number of interviewees spoke about the **distinction that exists between the drivers for owners and occupiers** (Figure 2.5). For owners, the drivers often relate to what can be described as an energy-related risk factor associated with premature obsolescence, and a potential depreciation of assets from

¹¹ The Energy Act also introduced the legislation underpinning the Green Deal.

a future 'lettability' point of view. Owners are increasingly realising that higher energy performance standards are an essential part of marketing a property, and can be an enabler for commanding potentially higher rents. One interviewee suggested that environmental assessment rating systems are becoming more important in occupier choice of buildings. Others suggested that this demand is limited and in general the tenant demand in this area is weak. Interviewees felt that for occupiers the key drivers are cost reduction, branding and marketing.

Figure 2.5 Variations in drivers for owners and occupiers



Some interviewees felt that owners are now seeing **business benefits** in offering lower energy costs for occupiers, and this can help improve tenant retention. Driving down service charge costs and occupancy costs present opportunities to command more rent, but also can produce loyalty from the tenant. One interviewee commented that, for owners, there is:

'Generally the feeling that by having a good relationship with your occupier, being in a sustainable building and demonstrating you're a responsible landlord and building trust will increase occupier renewal rates, and you'll hopefully be able to let the space quicker which then has an impact on value'. (Influencer).

There were a small number of interviewees that felt there were important drivers around **delivering higher quality accommodation, improved comfort, health, wellbeing and productivity**. This higher quality environment could translate into actually charging more rent and attracting 'blue chip' occupiers.

Several respondents felt that **CSR** was becoming more important; however, one interviewer felt that it was very easy at the moment to portray yourself as very 'green', but in the absence of a common reporting system this often had very little meaning. Another commented that companies with a reputation to commit to reducing their emissions do so:

'Because it is good for business, saves money (implementing efficiency measures) ... and they want to be seen to be, and want to be known as being, sustainable companies'. (Influencer).

There were a number of interviewees who felt that **rising energy prices** are becoming a key issue. One interviewer (Influencer) suggested that: *'as prices rise so energy performance becomes more important, particularly for large property owners where they are in owner occupier situations'*, although they went on to suggest that for many, *'saving carbon is still not a driver, and saving carbon tends to be more for the public sector organisations that are being driven by government'*.

Another interviewee, when discussing the details of a particular retrofit project they had worked on, stated that *'what had started out as a carbon initiative actually became a cost-saving initiative'* (Investor/developer).

The concern over the potential future increases in energy prices and the prospect of more regulation to come might imply that there may be a shift in this sector towards thinking and planning for the longer term. One interviewee, however, did state that:

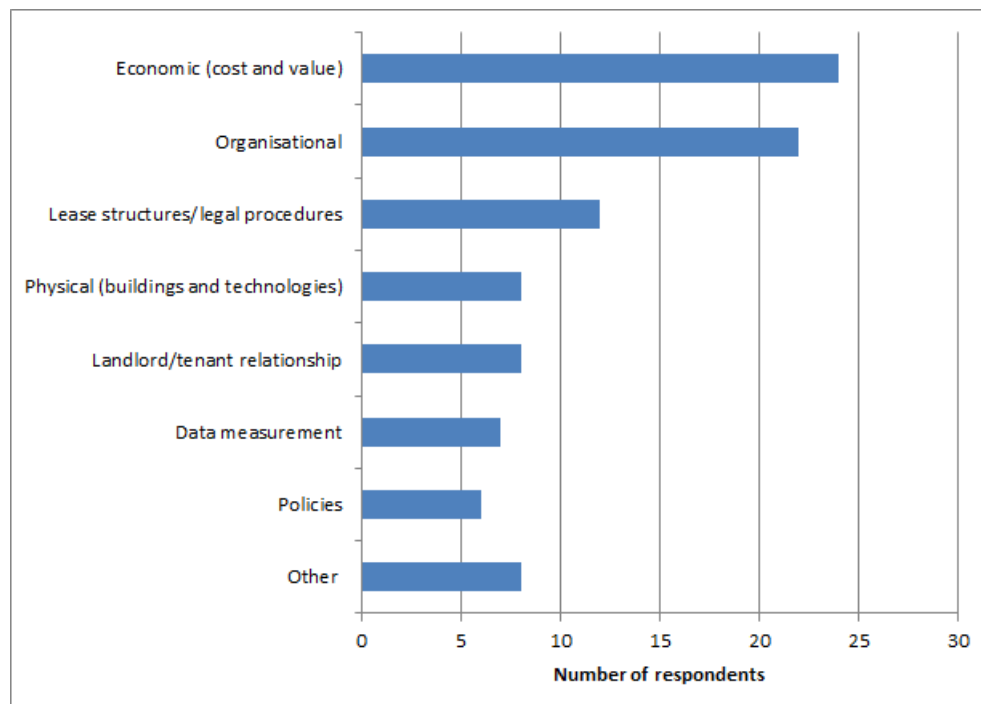
'There is still quite a range of disparity between some property companies who have really comprehensive retrofit agendas and others who have no agenda at all'. (Consultant)

2.4.2 Barriers

For some the term 'barriers' conveys the sense that, in some way, if these were removed, then energy efficiency would automatically act a precursor to 'rational' behaviour in the marketplace. However, this ignores the organisational context for decisions, and also ignores the interrelationship between the barriers themselves, and the fact that they should best be seen in the context of the socio-technical landscape and regime (DECC, 2012).

In this sense it is important to note that 'economic' factors and 'organisational' barriers were seen as being the most important by the interviewees (Figure 2.6)

Figure 2.6 Key barriers for commercial property retrofit



Amongst the key **economic barriers** interviewees felt that for some organisations, energy use was only a small proportion of their costs and might represent as little as 3% of their total bills, and so in comparison with some larger scale industries, there may be less of a motivation or incentive to reduce these costs (see comments regarding costs under drivers above). Interviewees also commented on the impact

that the recession has had on this sector, and that for many occupiers it has been more about pure survival, rather than concerns about energy efficiency, with some retailers struggling to stay in business. This was **particularly true of SMEs** who in any case had other issues to focus on in terms of energy efficiency and who found it hard to access capital for such projects. As one respondent commented:

'It's difficult for SMEs to find the money to employ someone specifically to work on energy efficiency particularly in the current economic climate: they're just in survival mode (Influencer).

There were a number of issues that interviewees commented on around the limitations that leasing arrangements imposed on pay back times. **Payback periods** in leased premises are required to be relatively short, and often limited to a maximum of 5 years, which restricts the type of retrofit measures that can be adopted¹². As one financier suggested, competing demands for capital can also be important:

'That capital expenditure decision or request will compete for capital with other forms of potential investment: core business, keeping people healthy or educated. Energy efficiency projects, if they are relatively large, and particularly if they are relatively complex, most often fail in that competition for capital with the core business...what we find is projects that have a relatively high capital cost.. and a relatively long payback period, meaning more than two or three years, often .. fail to compete successfully for capital with core business,'

Some interviewees suggested that major retrofit work would only be possible at the end of a lease, or if a building is vacant. There were also concerns over the complexities with leases in multi-let or multi-owned buildings. As one consultant commented:

'I think that's a good illustration of why, in our experience, this is still a fairly niche activity from a private perspective unless people have long term ownership of the building and are in it or are an enlightened landlord who recognise the client retention aspects to this and the future legislation impact in value. So I think the motivations here are still quite weak'.

This might mean that projects had to be dealt with as part of major retrofit/refurbishment works. The same interviewee continued:

'I think the trick with this is to do it when you're doing other work because if it's in complete isolation then you are condemned to doing just low cost measures, changing the lights. This has to be integrated into your asset management plan otherwise the barriers are frankly huge....You're either obsoleting kit that is still on the balance sheet or you're disrupting people..., so that, doing this at the wrong time is a huge barrier at multiple different levels'.

Opinion was mixed on whether there was sufficient evidence of a **proven business case for rental value premium** on retrofitted buildings in the UK. Much depends on the nature of the works, and it was felt that if there were a difference in rent it was more likely to be a 'brown' downgrade in value between new energy efficient and

¹² This is partly driven by perceptions of 'risky' technology requiring longer paybacks but also declining lease lengths in the sector.

retrofitted buildings and more traditional stock. Inefficient buildings were more likely to suffer accelerated depreciation, but as one interviewee suggested:

'I am incredibly sceptical of the idea of there is green premium somewhere, but I am more or less convinced, personally, that if you fail to mitigate environmental risk, at some point you will run the risk of, of financial risk or fiduciary risk in your assets...and both from a mitigation perspective and from an allocation perspective.'

The **split incentive** was also highlighted as a barrier which can cause problems in agreeing the decision to refurbish, and also what happens on renewal:

'This is the area where it, this landlord/tenant piece starts to make retrofit a difficult thing. It's easy, if the building's come back to us, it's empty, we're going to refurbish it and while we do it we change the boiler...If we're halfway through a lease it's very difficult to make the case for: 'let's invest a whole chunk of additional money to improve its efficiency' ... will the tenants pay any increased rent for that? Probably not'. (Investor developer).

The issue of **lease renewal** also created uncertainty where the retrofit was tenanted. As one retailer commented:

'As an occupier you have to justify to the landlord how you're going to drill 1000 holes in his roof to put the PV on, and the cost of potentially fixing the roof after that is gigantic. So then you get into the idea of, well maybe what we'll do is we'll leave them there so the landlord can inherit them, and then he says, well a ten year old solar panel is worthless because the technology is improving 5% a year, so they're not even worth having.'

To help in this respect, and to ensure fit-outs were agreed, **fit out guides** had been produced to help tenants navigate their way through product choice and arrive at best practice low carbon solutions (see section 2.3.4). Some of these energy reduction solutions are being made mandatory, particularly where owners are targeting a BREEAM excellent certificate. Another owner commented that they are holding workshops and:

'Opening up a dialogue with tenants to get them to look at their energy use, suggest having an EPC carried out and upgrade: for example, warehouse lighting to T5 type to save 40% energy use'

Other interviewees identified the barriers to be around **data measurement, particularly the lack of real energy data; benchmarking data; standardisation of performance measurement and overall transparency**. One investor/developer commented that:

'The building is hardly ever thought of as a whole in the property industry. It's always thought of as the common parts, and the landlord is responsible for the common parts, everything else is the occupier side. So they hardly ever collect information on what the occupier is using in terms of energy and water.'

The issue of data measurement was also highlighted by a government interviewee who felt there was a big role for public bodies and demonstration projects:

'To actually get, not a government but an in between body for industry and government, where you have this portal for data that people can actually use and for the development of their own products, but also when it comes to using that information on design models ... to improve their modelling on buildings design'.

Although this would potentially raise commercial issues and data protection issues it would enable greater consistency and better alignment of data.

The question of **who is leading and championing energy efficiency and retrofit in organisations**, and the way in which operations are incentivised, are also very important to consider. One consultant interviewee felt that organisational barriers were greater for occupiers than for owners, suggesting that for occupiers:

'Success is limited because it continues to come down to a winning hearts and minds... (and forming) a small group of people who own the project internally'.

For owners the same interviewee suggested that:

'The operational structure is less of a barrier as it's linked more to risk. The heads of fund management of some of the biggest institutional funds and equity houses are starting to take sustainability very seriously themselves and require their asset managers and their investment managers to be driving this agenda through their day to day decision making'.

Also as one investor developer suggested, **operational responsibilities and incentivisation** are important:

'What we're also finding is that within the structures of the organisation, the facilities manager on site, historically that's his electricity, his electricity bills and that's what his cost is for running that warehouse. It would really depend on that particular individual's objectives and whether he was incentivised by his employer or that business to try and reduce energy costs on site'.

Another investor/developer picked up on this point in relation to building engineers:

'I was surprised at really how little emphasis and ... incentive for the landlord (there) actually (is to) ensure that the building engineer is managing the plant effectively. The engineer is not going to try and drive the plant efficiently if they're not actually being charged to do so'.

Therefore the investor now has a policy in place to compare the operational efficiency of their portfolio and so:

'What I would say is yes, it's changed our operation. There's this focus on energy reduction (which) has significantly changed our operation in the way that we manage buildings and our whole mind set ...as I say, it's changed the culture of our building engineers'.

Another interviewee also suggested that within organisations the division into capital and operational budgets, and fragmented contracts and sub-contracts, also helped create **organisational barriers** to retrofit. This also reflects the 'poor cousin' nature of energy efficiency projects in some circles. As one major occupier suggested:

'So when a business moves or sets up a new office or new retail branch, those are the big capital programmes that get all the attention. Energy efficiency work is kind of a by-product of deferred maintenance or infrastructure planning, but even in that category it doesn't get its due consideration, because deferred maintenance capital planning looks at the remaining life of critical systems in our world, they're tightly connected to our power systems and risk associated with the business'.

The **type of property and its existing use** was also important to consider. This may be a barrier to retrofit in some sectors. As one investor/developer commented:

'So it's much more difficult, particularly with the retail; it's easier with offices. But with the retail to go and say, you've got to change this, you've got to do it this way, because then it becomes bespoke rather than the same as every other shop that they've got. So that's a big barrier'.

From a technology point of view, the **conservatism of the commercial property sector** has already been discussed (see section 2.2), but one technology supplier also highlighted the **perceived discrepancies between 'listed' technologies** and those that were not:

'So you automatically create a valley of death for any emerging technology, because you're trying to bring the cost down of the technologies that are inefficient, without supporting the technologies that are efficient, and that is absolutely wrong. We have to understand the dynamic that plays, because we have instances where a very large supermarket chain failed to meet its building regulation requirements for a building and the option they had was to include some PV panels, or include a solar collector, and the cost difference was £50,000 for a solar collector, or £700,000 for some PV, and because it was on the list, they went with the PV'.

Finally, in a comment on the **commercial property retrofit sector as a whole**, one occupier with international experience suggested the UK lagged many parts of the world:

'The UK has been interesting for me because it has all the right ingredients for better partnership and investment energy efficiency, but it doesn't, it hasn't had the same outcomes as other regions....So ... that's my view on the UK marketplace, so much promise and has yet to really execute at scale'.

2.5 'How'? – institutional frameworks, legislation and monitoring/standards

Key messages

- *Many in the 'producer', 'user' and 'technology supplier' groups saw the big picture as one of technology push with some degree of market pull.*
- *Other interviewees saw that the big picture was one of emerging niches within a landscape of wider policy and practices.*
- *Key challenges for emerging niches in commercial property retrofit were related to technology, and revolved around collaboration; alignment of the technology and development lifecycle; improving the evidence base; and issues around innovation.*
- *There is a need to recognise the importance of the complex relationships that exist in the socio-technical configuration of the commercial property retrofit regime. The influence of organisational level behaviour is significant.*
- *There is a range of financing models used in commercial property retrofit. The majority of projects are self-financed or paid through a service charge.*
- *There are a number of emergent and niche financing models in the sector, including Energy Performance Contracting (EnPC), alongside the emergence of specialist investment funds.*
- *There was a high degree of scepticism surrounding the Green Deal and its potential impact in the sector.*
- *Assessment, monitoring and verification in the sector are fragmented and lack consistency.*

2.5.1 Technology diffusion and deployment: 'from the inside looking out' versus 'the big picture'?

During our interviews we showed a number of diagrammatic models of technology diffusion to our interviewees to assess how they saw the commercial property retrofit technology market working in a general sense, and whether, for example, the market could be explained through a combination of demand 'pull' from companies seeking to install technology, and technology 'push' with technology companies setting the agenda. We also showed more complex models dealing with technology diffusion using 'early adopter' models, and a model based on the MLP (outlined earlier) which explored the concepts of 'landscape'; 'regime'; and 'niche'. In addition we also spoke with manufacturers and financiers to assess how technologies were brought to market and how technologies were diffusing in the market place.

A range of responses suggested that **the majority saw this as technology ‘push’ with some degree of ‘market pull’**. In other words, the majority of interviewees saw the market supplying technologies and users of technology responding to that push.

An investor/landlord suggested:

‘I don’t have very much real experience in this area but my sense is that the industry is not very innovative and that they actually need spoon feeding and I think that it’s more a push dynamic and I think in that sense regulation and legislation has a very significant part to play in ratcheting up standards and providing a trajectory that supply chain can actually work towards’.

A consultant also suggested in relation to PV it was a similar situation:

‘It’s probably a push that turned into market intervention by the government with the feed in tariff ... (so) that people saw a commercial opportunity to take it up, and so it happened. And at the same time, because the scale of use increased dramatically, and we had a recession, the Germans brought down their manufacturing costs, the Chinese got in on the market and generally the cost of the technology ...was pulled down very significantly, and we’re now starting to see major photovoltaic farms being actively considered for sites that might otherwise have been development sites’.
(Consultant)

In contrast, one technology supplier commented it was a market pull situation:

‘The technologies are all there and the thing that’s made PV much quicker and cheaper to install is ...(the) market pull which provided the demand to incentivise people, to innovate; and these innovations aren’t drastically exciting but they make a heck of a difference (through FITs)’.

However, several other interviewees also saw that **the bigger picture** was one of emerging niches within a landscape of wider policy and practices. A financier and influencer saw a narrow, ‘deterministic’ view of ‘pull-push’ as harbouring problems, and that the industry needed to see the full landscape:

‘So the challenge is to work out what are the drivers that are coming from the consumer side, the user side, the buyer side, and how can you pull together a different combination of technologies to provide answers to those questions....you’ve got to look at the whole thing, very often with the technology push people get obsessed about the stuff we’re using, rather than the system in which it’s used’. (Financier)

One respondent (influencer) felt that the recent TINA assessment for non-domestic property (LCICG/DECC, 2013) had also missed the big picture:

‘When we were working on the Technology Innovation Needs Assessments that DECC were trying to do, we got involved in those and it became so irritating that they kept wittering on about the technologies and not nearly enough about the system the technologies had to fit, or the problems that the technologies were trying to address. And trying to treat that in isolation is just a way to disaster.’

Several other interviewees also saw that the bigger picture was one of emerging niches within a landscape of wider policy and practices. As far as technology

suppliers were concerned, however, there were particular challenges that they faced in addition to the inherent conservatism of the commercial property industry:

- **Collaboration:** All manufacturers confirmed that they had sought to collaborate and interact with a range of public and private sector parties in the production and diffusion of their retrofit technologies. Collaborations were established with potential customers, suppliers, research institutions, UK government and European funding organisations, 'big brand' names, and other companies, to adapt and broaden the appeal of the technology and widen its potential market.
- **Alignment of the technology and development lifecycle:** All manufacturers interviewed stated that as their products were designed for specific users it was important that they really understood user needs and behavioural patterns. Moreover, the typical development period for new technology was at least 3-5 years, with some technologies succumbing to the 'valley of death' before they could reach implementation. Interestingly one technology company suggested it was using a disruptive model to innovate:

'In general we start off with an incremental development and we move towards disruptive technology based on that incremental development. Certainly if you were to try to take a truly disruptive model you would price it at a deficit to start off with until you're on the upward trajectory and then move up market. Our target is quite clear, because we would like to have every building as a power station, and that's a grand statement, but what we mean by that is every building has the ability to be self-sufficient and that starts with the building envelope'.

- **Improved evidence base:** There was a feeling from several interviewees that more technology demonstration projects are needed where data can be collected to identify what works, and what does not work. This then leads on to the issue of how to make data from commercial property retrofit demonstration projects accessible to the whole of the industry so that they can use it. A government interviewee supported this view:

'I would agree that I think the data point is really important ... if government is doing demonstration programmes then we need to make that data as transparent as we can, so that it's accessible to the industry itself, that they can use it. And I think this is just then on-going discussion on how best to get that data out there, bearing in mind commercial and sensitivity and data protection and various obstacles'.

This issue also relates to 'performance in use' of commercial retrofit technologies. As another interviewee suggested:

'The usual problem is evidence of performance in use. So if you look at technologies for improving performance of buildings going forward. If I'm a buyer then I have two real concerns. The first is: will it do what it says on the tin? The second concern is will it cause me any problems. And what is often missing is evidence that it works' (Financier/influencer).

- **Problems in innovation:** Inflexible regulations, the validating and approval process for new technologies, mandated lists of technologies, are all seen as factors that can restrict the entry of new products into the market. Payback

periods and contracting arrangements can also hinder innovation. As a technology supplier suggested:

'I think there is an innovation problem in building and it's driven by the procurement process whereby you specify the building in some way and then you just give it out to a design and build and that process creates the tick box culture. The problems in innovation seem to stem from the very rigid regulation of building products and materials and so on, which is necessary for lots of reasons but tends to create almost a culture where design is highly constrained by the regulations'.

The same respondent continued:

'In construction products it has become about meeting minimum requirements rather than exceeding them. There (are) no prizes for jumping higher than the bar so why not just 'jump just over the bar'... and that's the kind of attitude that seems to pervade the construction industry in a lot of places'.

Difficulties with the process of **validating and approving technologies** were also identified as being a problem. The lengthy time period for the development and validation process was raised as an issue in particular *'with the British Board of Agreement' (Financier/Influencer)*. The same interviewee also suggested that:

'The people who get to decide which technologies get used in a building are often the insurance companies: from the point of view of the insurance of the building in use, but also the insurance of the project. So they would look for something which is already passed BBA full approval, and has a 10 or 20 year guarantee and if you are a new technology that's a real barrier to entering the market because you have to find somebody who's prepared to take a risk on you'.

Other respondents spoke about how the **selection and procurement of technologies** can be limited by existing technology lists which permit tax breaks through enhanced capital allowances:

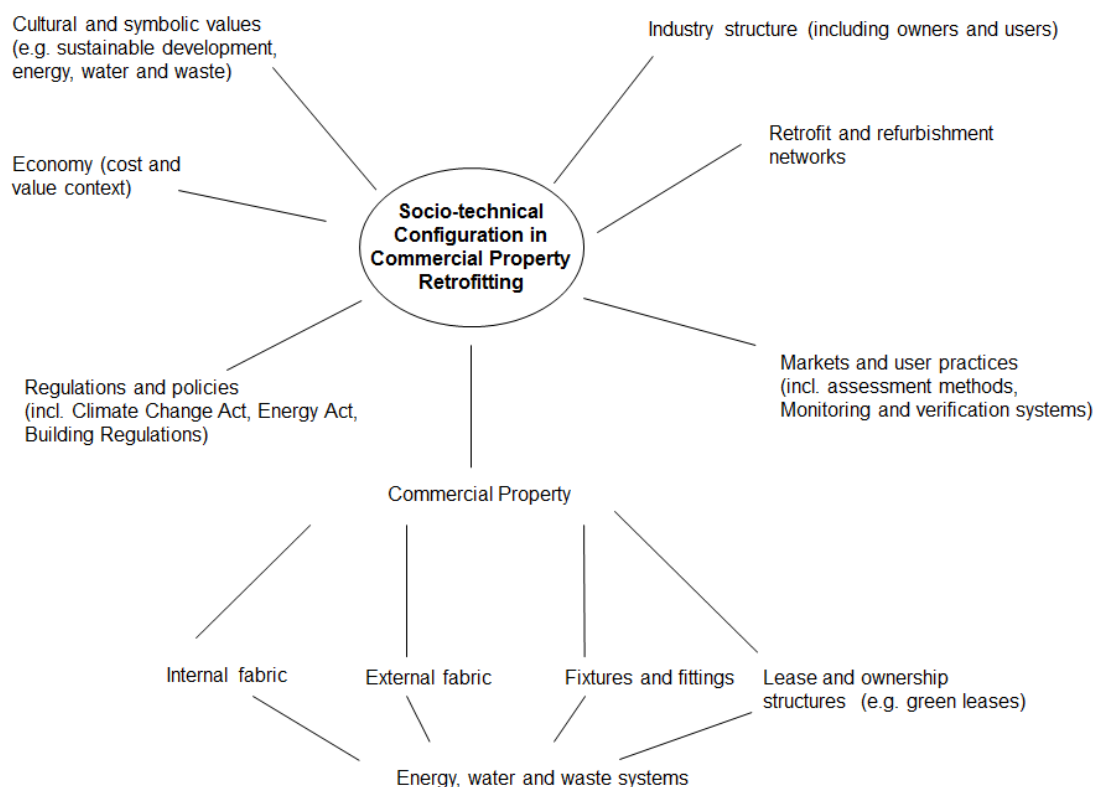
'(This becomes) sticky through certification schemes like BREEAM and SKA, if they're mandated through particular credits... But particularly from the Energy Technology List and the Water Technology List, (ETL and WTL). (These) ... are two lists or directories of energy technologies and water technologies that are maintained by HMRC and Carbon Trust ... if you select a product from the ETL or the WTL, not only would it allow you to get credit, individual credit or measure compliance in one of the schemes potentially. But ... the point about them is they attract enhanced capital allowances'. (Influencer).

In the view of the interviewee this could slow innovation because there is a lot of feedback from projects that items could be specified even though they are not on ETL or WTL, but are equivalent or better.

2.5.2 A socio-technical configuration: understanding regime and organisational context

The nature of the commercial property retrofit regime is determined by the 'configuration' (or alignment of activities and related networks) of the existing regime within a landscape of regulations and policies, user practices, and existing norms and values. This offers a powerful lens for conceptualising how technological innovation needs to be seen in the context of a socio-technical framework which recognises that simply overcoming 'barriers' in itself may well not result in a desirable outcome (Figure 2.7). The emphasis is therefore on seeing how a managed transition within the commercial property retrofit regime (if it were to occur) has to recognise complexity, fragmentation and conservatism.

Figure 2.7 Overview of the socio-technical configuration in commercial property retrofit



As was noted in section 2.4, policy drivers are vital to understanding change within the sector. The key legislation includes the Climate Change Act, which sets the target for national UK carbon emissions, as well as the Energy Act, 2011, and the CRC Energy Efficiency.

But we should also recognise that the organisational context of decision-making is important. Often a prescriptive, cost-based approach is adopted. As one consultant interviewee noted:

'Just going back to the low and zero carbon technologies, we tend to produce a table of the full range of likely candidates, and then we'll mark them up by what the payback is, what the impact is in the amount of carbon

reduction, the planning implications if it's a listed building, they could be quite significant if it's a conservation area, and so on. ...and we tend to traffic light them green, amber, red, and then we can... put a rationale for why we've included or excluded a particular technology, and we'll do a calculation ... to look at the payback and look at the amount of carbon saved and so on. And so we'll, and it's a similar sort of process with the other technologies, we'll do how effective are they? How well do they pay back? And what are the implications? What do they cost?'

There is a danger therefore that we see the retrofit process in linear and deterministic ways and not recognise the role of behaviour and existing practices. That is why the role of influencers is so important in shaping how the regime evolves. Organisations such as BBP and BRE work closely with industry in the production and user networks to develop 'best practice' and drive change, in accordance with their network's preferences and norms. BBP, for example, have developed a programme of research and development around '**green leases**' which consist of a standard form of commercial lease with additional clauses that encourage or require the landlord and tenant to reduce the environmental impact of the premises. As one influencer suggested, however:

'It's funny ... people always talk about green leases and how they can... change the market ... but from our perspective we just see green leases as just a tool for engagement with your occupiers for both parties to set from the beginning their aspirations for how they would like the building managed...setting principles. So you've got agreeing to share data, agreeing to sit down once a quarter to talk about environmental issues, to try and look to improve the buildings, there's more principles and you don't need a green lease to be able to do anything in a building and you can have the darkest green lease but if you don't talk to each other than you're not going to do anything.'

For this interviewee what were more important were the emerging **green building management groups** which brought owners and occupiers together:

'I think they've set them up in pretty much every owner occupied office they have and that's where it really starts in actually sharing information, getting all the occupiers in a room together and saying, look, we've done this, we've saved you this, we're using energy in this way, this is how the building operates, did you know that you've requested that the heating comes on at five in the morning but no-one comes in till seven?'

Transforming the existing or legacy stock of buildings therefor presents huge challenges in what is essentially a fragmented industry. A report from the WBCSD (2008) spoke of 'operational islands' in the construction industry; Janda and Parag (2011) point out the plethora of 'intermediaries' in the low carbon property sector; and the Carbon Trust (2010) highlighted the complex nature of the commercial property industry. Additionally, the success of any retrofit project is affected by a complex interaction between policies and regulations; client resources and expectations; key technologies; building information; human factors and other uncertainties, including finance (Ma et al, 2012).

2.5.3 Financing commercial property retrofit

Range of financial models

Given the strong focus on economic barriers in commercial property retrofit, we also probed interviewees on the nature of financing. In general, a variety of financing methods were used. However, self-financing predominated, particularly amongst larger organisations, because using other complex funding models could impact on any future plans to sell an asset. In contrast, for SMEs we found that access to finance is much harder and they may struggle to find access to funds for retrofit.

The type of financing used is therefore dependent on a number of factors including:

- The type of building;
- Whether the building is occupied or vacant ;
- The ownership of the asset (i.e. whether the asset is held as a joint venture, multi-let or single let property);
- Lease period and agreements;
- Payback time; and,
- The technology measures to be adopted.

Finding the best way to **share the cost and benefits of retrofit work** between the owner and occupier of a building in tenanted commercial property is a key issue therefore. For example, the tenant may argue that as the building is being improved so the owner should pay, whilst the owner may argue that the tenant is benefitting in terms of reduced running costs, so that they should pay.

Debates often surround the ultimate ownership of retrofit technologies under a Full Repairing and Insuring (FRI) lease. As previously identified in this report, therefore, large owner organisations are increasingly entering into a dialogue with occupiers to discuss these issues regarding the sharing of costs and benefits of retrofit work. Interviewees suggested that this process is an important part of negotiating any agreement. In terms of who pays for the works, it was suggested that projects like these could be funded in a number of different ways. As one investor/developer suggested this can occur through:

‘The landlord or through an energy performance contract or by tenant or by third party ...it’s about the business case and the commercial relationship between the landlord and tenant as to how it happens’.

Clearly **payback periods** are also important to consider; for example in the interviews, owners often talked about ‘acceptable payback times’ in relation to retrofit. Payback periods can dictate the technology measures adopted, and if these periods are short then the choice of measures is limited and will tend to be simple in nature (e.g. energy efficient light fittings or a new boiler). As one interviewee (owner occupier) pointed out, referring to performance contracting:

‘If you put too short a timescale on it, then you eliminate some of the better technologies’.

The limitations on technology selection were also mentioned by an investor who commented that:

'They don't go beyond a 10 year payback...so they can't do really deep retrofits. Their measures are more about window treatment than replacing windows'.

One consultant interviewee working on a 12 year project believed that the energy saving industry needed to get away from its obsession with payback times and suggested that:

'We as an industry need to shift away from that, because that's preventing people from taking up ambitious retrofit projects'.

Overall responses from interviewees identified a range of payback times from **2 years up to 12 years but predominately the 2-3 year payback time** was identified as the most common. One of the owner organisations had a three tiered approach to acceptable payback times which is:

'If a retrofit project pays back within 12 months costs are recovered through the service charge. If it pays back within 3 years we will forward fund the works and take money back from the savings. Greater than 3 years we will take a view on it: i.e. may do it ... if it is a corporate initiative or good for the community – it may not have any payback at all'.

This same owner spoke about the rates of return for energy efficient initiatives stating that:

'Most of our projects are up in the 20%, 25% range so there is no problem. However, a lot of work to date has been the easy wins and when you get into deeper retrofit the rate of return is a lot less'.

Another investor/developer commented that they would always try to recover costs from the occupier. If the payback was a maximum of 2 years in the retail sector, or 3 years for offices, then they would seek to recover the costs through the service charge. For any project where the payback is longer than three years they would:

'Look at building by building and consider what they think those occupiers are willing to pay and look at how they can fund these things'.

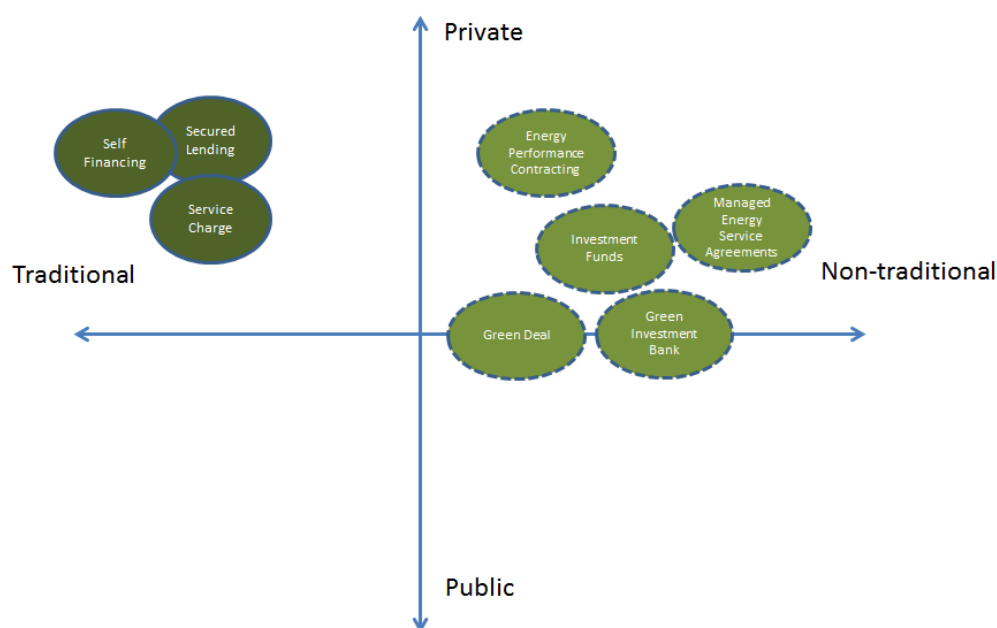
Figure 2.8 highlights **the range and scale of financing in commercial property retrofit**. These can be viewed in terms of two axes representing 'traditional' and 'non-traditional' modes and 'private' and 'public' sector modes, operating at a variety of scales from building scale through to portfolio scale¹³. These include:

- Service charge: where a landlord can claim the costs of retrofit back through the 'hard services' part of the service charge payable by a tenant.
- Energy Performance Contracting (EnPC)¹⁴: where retrofitting is financed through projected future energy savings. Typically an Energy Supply Company (ESCO) provides customised engineering, installation and maintenance with the guarantee of reduced energy consumption as a result of their work.
- Managed Energy Service Agreements: where the contractor takes over responsibility for the energy bill and manages the relationship with the utility provider(s) (ESCO). The building owner then pays the contractor the historical energy bills corrected for weather and other factors (or what they would have paid) (e.g. SciEnergy).
- Investment Funds: where specialist funders provide capital for retrofit. An example here is the Green Investment Bank's underwriting of the partnership between Sustainable Development Capital and BRE.
- UK Green Investment Bank (UKGIB): UKGIB became operational in October 2012, with £3 billion in UK taxpayer capital dedicated to its mission of "accelerating the UK's transition to a more green economy, and creating an enduring institution, operating independently of government" (UKGIB, 2013). The bank has so far backed 21 green projects and committed over £700 million, mobilising a further £2 billion in private finance.
- Green Deal: The Green Deal came into operation in October 2012 and is enshrined in the Energy Act 2011. The scheme provides for the repayment of 'loans' attached to a property, and the 'golden rule' states that repayments should not exceed the savings on an average energy bill.

¹³ Other city scale models have also emerged such as City Deals, Green or Climate Bonds and Tax Increment Financing, some of which attempt to engage with commercial property players. A recent report (Westminster Sustainable Business Forum/Carbon Connect, 2013) also highlights the importance of Enhanced Capital Allowances and the Carbon Trust/Siemens Energy Efficiency Schemes as further examples of finance to tackle the upfront capital costs of energy efficiency retrofits.

¹⁴ See also Box 2 in this report.

Figure 2.8 Commercial property retrofit financing: current and emerging niche models



Note: Dotted lines indicate more recent initiatives.

In the shorter term (say 3 years), aside from self-financing, capital costs for owners are often recovered directly through the **service charge**, but for the longer term projects, with occupiers in place, this can involve complex negotiations and agreements between owner and occupier about who pays for the elements of retrofit.

Recovering the capital costs of a retrofit programme will be built around a business case, which often incorporates short payback times that restricts the type of retrofit technology measures that can be implemented. The sector is generally unenthusiastic about entering into long term payback agreements and this approach can therefore significantly disadvantage the deeper retrofit projects, and result in the adoption of merely ‘easy win’ solutions. Furthermore some banks may not offer to finance technologies that are outside their range of acceptable ‘low risk’ commercially proven technologies.

At the time of the interviews there was still a lot of uncertainty over the **Green Deal** and how it will impact in commercial property. The majority of interviewees from all sectors believed that the Green Deal would be unlikely to make an impact in the world of commercial property amongst larger companies who could raise finance at lower rates of interest for retrofit, or self-finance the retrofit (see also APGEBE, 2013 and Westminster Sustainable Business Forum/Carbon Connect, 2013). Although the scheme might be suitable for landlords seeking to retrofit when a property is vacant, complexities could arise in a multi-tenanted period where void periods varied. However, there was possible scope in the **SME sector** for companies to use the Green Deal for smaller retrofit projects.

A more optimistic interviewee from the investor/developer sector suggested that the Green Deal might evolve over time:

'I think what might be interesting is whether the Green Deal changes the market view on having external financing attached to a building. I think that's not quite clear how that's going to play out at the moment, but obviously you can see one of the advantages is that becomes attached to the property, and if the market gets used to that, and it's technically cost neutral, it might make other financing mechanisms more attractive, as well, because that becomes market norm'.

It is also clear that there are several **new investment funds** emerging in this area. The UK Green Investment Bank is also active in this area and emerging specialist investment funds include:

- **Sustainable Development Capital:** Sustainable Development Capital was awarded a £50 million mandate by the UK Government's Department of Business, Innovation and Skills to invest in energy efficiency infrastructure projects in the UK in 2013 through the UKGIB. The fund, UK Energy Efficiency Investments, will co-invest alongside other sources of private sector capital in projects that reduce the demand for energy in non-domestic buildings, industrial facilities and urban infrastructure in the UK. Energy efficiency is one of UK Green Investments' five key target markets. As part of this partnership with UKGIB, SDC has also teamed with BRE to set up a Green Retrofit Investment programme which has up to £100 million (capital investment) available for investment in building retrofit projects and energy infrastructure projects, where clear energy and carbon emissions savings will result.
- **Equitix:** Energy saving investments (ESI) is a fund established in August 2012 by Equitix with UK Green Investment Bank (UKGIB) as a cornerstone investor. ESI has £50 million of capital to invest in projects in the Non-Domestic Energy Efficiency (NDEE) Sector and has made a number of investments.
- **Low Carbon Workplace:** Low Carbon Workplace is a partnership between the Carbon Trust, developer Stanhope and fund manager Threadneedle, to design, build and manage bespoke and contemporary offices for organisations committed to eco-friendly operation.

These can be seen as further examples of 'niche experiments' within the commercial property retrofit regime (see section 2.3.4).

However, an interviewee from the UKGIB suggested energy efficiency suffered from its perception within an organisation, and that policy changes were required:

'But I guess if you can increase the propensity of people...(and) if you can improve the economic case for such investment to take place then with a bit of policy push, and then making sure finance is available, I think it may be possible to close that gap. And ultimately where we'd like to get energy efficiency to is, it ought to be part of good business practice, (rather) than should it really be a separate asset investment class'.

Energy Performance Contracting (EnPC)

There is also a growing interest in **Energy Performance Contracting and ESCOs and bringing in third party finance**, but interviewees were divided on the benefits

of these arrangements. Some interviewees felt that these finance models offered the opportunity to reduce risk, in what is considered a risk adverse industry, by providing them with performance guarantees. But others were worried about the additional cost of this approach, with one owner suggesting that *'it would be the last option because it is more expensive to do...and they recover the costs more slowly'*. It was felt that the EnPC model works better in an owner occupation situation rather than a single tenant situation, and also where short lease length is not an issue. Moreover, in some instances, EnPC over short term horizons can still mitigate against innovation.

Some consultants are actually testing the Energy Performance Contracting approach on 'in-house' retrofit works on their own leased building with a view to recommending it to their clients for future projects. They believe that this form of contracting will enable them to proactively approach clients, and engage with them at an earlier stage, by initially offering clients an energy audit. For one technology supplier it was a matter of *'encouragement and enabling'* that was needed in order to release financing (for example, through Enhanced Capital Allowances).

Other interviewees mentioned the **RE:FIT** programme in London, which is based on a guaranteed savings EnPC model. However, this is designed for public sector buildings rather than commercial property (Box 2).

Box 2 The Energy Performance Contracting Model (based on European Commission, 2013b and Dixon, 2012)

Energy Performance Contracting (EnPC) is a form of financing for capital improvement which enables energy upgrades to be undertaken through cost savings. Under an EnPC, an external ESCO undertakes an energy efficiency or renewables-based project for a client, and the stream of income from the costs savings, or the renewable energy produced, is used to repay the costs of the project, including the costs of investment. Essentially the ESCO will not receive its payment unless the project meets its targeted energy savings. Contracting models are based on the transfer of technical risks from the client to the ESCO and is based on performance guarantees provided by the ESCO. Two models are common: a shared savings model where the cost of energy savings is split between the parties whereas in a guaranteed savings model, the ESCO guarantees a level of savings for the client.

The RE:FIT model is a guaranteed EnPC. The purpose of RE:FIT, which is currently run by the Greater London Authority, is to assist public bodies in London to significantly reduce carbon emissions from their buildings which will help London achieve its overall target of cutting carbon emissions by 60% by 2025 (as set out in the Mayor's draft Climate Change Mitigation and Energy Strategy). Public bodies use a framework of pre-selected energy service companies (ESCO) to retrofit energy efficiency measures in buildings. The ESCO guarantees a set level of energy and cost savings over an agreed payback period in the EnPC, thus providing a net saving longer term, and this produces cost and carbon savings. Funding is through a combination of existing funding and the London Green Fund (further information, see: <http://www.lda.gov.uk/projects/refit/>). Some commentators have argued the model could be adapted to fit commercial property (Westminster Sustainable Business Forum/Carbon Connect, 2013).

Some interviewees felt that EnPC only focuses on the 'easy wins':

'Because the energy costs aren't (high) enough to pay for the interventions within a reasonable time, and it just looks at controls and kit'. (Consultant)

The same interviewee believed that in some cases delivery companies have identified a potential market:

'It's all about selling better controls.....they can see an opportunity because the existing buildings aren't working very well, and by sticking better controls in they can very much control the return they're going to get'.

Others felt that owners prefer to operate managing services in-house, and not necessarily hand over to another company to take over the energy bill. One influencer suggested that the sector is:

'Not mad keen on getting somebody else involved in managing the services in the building; they would prefer to do it themselves in house'

The issue of responsibility and risk was also addressed by another interviewee who supported EnPC because it focuses on guaranteeing the performance of the measures. They commented that:

'I like the fact that it focuses on performance, not just promise, because that means there's a real discipline within the works that are undertaken' (Contractors)

The same interviewee did, however, stress that it is critically important that the client is very clear about what they want to achieve as too often:

'What they want does not get translated into the questions they then pose and procurement professionals make that worse.... you might think you want a lower energy building for the long term; what you can end up with is just changes to the lights at the lowest cost that gives you an extremely fast payback'.

In terms of ESCO finance one financier interviewee believed that this approach was still fairly rare and very complex, time consuming and expensive. They commented that:

'They're very complicated and the reason they say a minimum project size as £2 million is because they have lawyers, M&V consultants, banks, funders, it's such a complex thing to do... you've got to be pretty dedicated if you want to do it'.

On the other hand, another interviewee (technology supplier) believed that the ESCO-based model will be the increasingly important in the future, and suggested that:

'They are the ones best placed to give end users and markets an approach that makes sense, because they must ensure that the investment such organisations make will actually pay dividend'.

This view was supported by another interviewee (influencer) who believed that in the future, organisations may involve a third party like an ESCO to take the responsibility

and risk for more complex technologies and interventions, in return for which they would share in the benefits. In other instances there are also emerging examples of landlords 'bundling' energy supplies as part of their offer. As one interviewee (consultant) suggested:

'One of the things that they've done, for example, is in some buildings where previously each of the tenants had their own electricity meter ... (the owners) have taken the utility supply in hand and, and supply it as one of the services to the tenant, and secure energy cost at a lower price than the tenant would be able to get.... so not only is the, the tariff lower, but the actual consumption's lower as well....'

2.5.4 Assessment methods, and verification and monitoring systems

Assessment, monitoring and verification are important elements of the socio-technical configuration of commercial property retrofit (Figure 2.6). During the interviews it was clear that there was a lack of consistency in assessment methods and monitoring systems. As one interviewee (occupier) noted:

'When you start to standardise models of assurance, procurement, performance and energy audits then you can start feeding back how well you perform against targets, without that you have an open quality loop, and no idea how you are performing.'

The key issues relating to the use of such systems is now discussed and touches on four main areas.

Assessment methods: interviewees suggested that although both BREEAM and SKA rating systems were helpful in their respective contexts there was a lack of consistency in standards and direct relevance to the 'retrofit' market per se.

Commissioning and post occupancy evaluation: retrofit projects often underperformed their theoretical efficiency levels either because of behavioural factors, poor specification or inaccurate modelling. This was not helped by the fact that Display Energy Certificates (DECs) were still not mandatory in the sector. Some interviewees felt that a 'soft landings' approach for larger and deeper retrofit projects would be helpful although there was a potential cost issue. This issue was highlighted by one interviewee (corporate occupier) who suggested:

'So one of our retrofit projects now where we've retrofitted controls in our head office building, we've got a maintenance contractor doing one thing, and the retrofit controls, because they're not properly understood and not commissioned, so it's partly commissioning, partly building information, which is really poor in the manuals, that means that we've got problems.'

Metering, monitoring and verification: The installation of smart meters and accompanying monitoring of energy use is becoming more of a business priority within larger organisations as it allows owners, for example, to begin the process of managing energy reduction across their portfolios. One owner stated that they had been measuring energy consumption in their portfolio since 2002, on a quarterly basis by using manual readings:

'It was not until we had systems in place, looking on a real time basis at energy consumption in our buildings that we started to take action to reduce and that didn't start taking place until 2010'.

Metering (which may also be monthly) provides landlords with key information on areas over which they have influence (e.g. energy) and this can relate to both common parts and the buildings themselves. But occupiers, and particularly retailers, were using monitoring to drive down costs, set against KPIs. This market is also being penetrated by independent verification companies who offer a monitoring and benchmarking service for clients, although strong leadership in client organisations is needed to make such systems work.

Again **standardisation is important** and is seen as a potential problem. One consultant pointed out that:

'Greater consistency, is what the market needs, in terms of what one does with data and information.... standardising the information about outcomes of projectsand that those responsible for procuring energy saving measures, don't have a standard way of understanding what success looks like, or for comparing and contrasting the performance of different technologies and services... which means that everybody's kind of got their own way of doing it'.

One influencer suggested there should be a growing recognition of **the International Performance Measurement and Verification Protocol (IPMVP®)** which defines standard terms and sets out best practice for quantifying the results of energy efficiency investments and/or investment in energy and water efficiency, demand management and renewable energy projects. As they suggested:

'That's... to do with energy performance contracting (and) the importance of being able to demonstrate savings on a project and that's an international standard in how you measure and verify energy savings in buildings...that's the standard that we promote that anyone doing this kind of work should require consultants or service providers to measure performance and verify it using that standard approach'.

Benchmarking and reporting: The aim of energy benchmarks is to provide representative values for common building types against which a buildings actual performance can be compared. Although targets are important, benchmarking can be an additional and useful tool, because performance can be measured against national standards rather than relative to past performance, which may be poor.

A small group of interviewees reported that benchmarking within their organisations is carried out against their own database, with the intention of improving on the previous year's performance. Others use a system of benchmarking against similar sized commercial property owner organisations through networks like the Better Building Partnership (BBP); FTSE benchmarking; or benchmarking as part of the IPD property database.

2.6 Further issues: A question of scale? The key challenges to retrofitting at city level

Key messages

- *The diversity and heterogeneity of commercial property presents challenges in large-scale retrofit.*
- *As a result, the commercial property sector does not necessarily take a city scale view of retrofit projects—in this sense it is ‘city-blind’. The focus is more likely to be on individual building or property portfolio level.*
- *‘Sticky’ infrastructure projects such as district heating schemes could, if accompanied by mandatory measures and incentives, provide opportunities for the sector to take a different view.*
- *A clear vision with local authorities leading at city level is needed for the commercial sector to engage.*
- *Improved data access and more information on actual energy performance of buildings at city level are needed.*

Interviewees were also asked about their perceptions of the extent to which the commercial property sector was operating (or could operate) at a city scale. There was a consensus view that this was difficult because of **the nature of the sector**. To begin with, many players in the commercial sector (although this did not necessarily apply to retailers) did not necessarily see themselves as part of the ‘community’. As one consultant put it:

‘Landlords don’t see... that their buildings are part of the community and they have a pivotal role in terms of impacting the community in terms of ... sustainability ... but I think in the city, where there is a geographical split between residential and corporate office areas, then it’s difficult.’

Investors and landlords did not necessarily **take a city scale view** of the world, although investment decisions may be driven by city choice. As one investor/developer suggested:

‘We are kind of city blind. We do look at our portfolio, from a retrofit point of view we’ll look at our portfolio and say, OK, where can we get best bang for buck, if you like? We’re trying to reduce our carbon emissions there’s no point in us concentrating on the lowest carbon emitting building in our portfolio. We’ll go and concentrate on the biggest one, and ... can we actually do to it? The only time that cities come into it is through either the legal requirements of that particular city, if we’re doing developments in that city or something like that’.

In this respect investor/developers tended to focus on **asset management** rather than geographic city level engagement. The **diversity and heterogeneity of**

commercial property also presented challenges in large-scale retrofit. As one influencer suggested:

'I think that ... part of the issue here is that there's an assumption in the question, and that is that you have the same level of homogeneity ... (as)... domestic property. With a three bed semi there's...not a huge amount of imagination to understand what you probably need to do to that semi to improve its energy performance. So in terms of retrofit, it doesn't take a genius to go in there and actually do the work. With a commercial building ... the fact that the tenant tends to organise their own fit out means that you can have quite a diversity in otherwise seemingly similar looking buildings, and that... I think is, is the problem. Doing sort of a community level retrofits in terms of a square mile, I think you'd find that it would... soon get quite difficult'.

However, '**sticky infrastructure**' retrofit projects at scale, such as district heating schemes or combined heat and power schemes, could (if accompanied by mandatory measures and incentives) help provide the 'glue' for commercial property retrofit players to play a bigger role in community and city-level projects. As one corporate owner suggested:

'I guess the thing you can look at on a citywide scale... (is) whether you start looking at decentralised networks and sharing loads. It makes a lot of sense to have mixed use developments where excess heating is supplied to the domestic (stock)... from a commercial building and things like that, but it's very hard, it has to be done on an individual project level basis'.

Another investor/developer suggested their company was already involved in this kind of project:

'We're part of the district system in Southampton. There's a district system going into Birmingham. And we're talking to those guys at the moment. So a district heating system for us is not hugely advantageous. But if you combine it with say 'resi', a cinema and a theatre and something, you get this load profile that starts to flatten out a bit, then you can put CHP in, you can run it at a constant. You get better performance out of it'.

It was also highlighted that **other cities outside the UK** had been successful in this kind of project. As an investor/developer suggested:

'Lots of European countries have citywide heat networks, particularly Scandinavian countries. They have found a way of making it work, we haven't. So if the signal from government was that's what they wanted, and they incentivised that area, there are massive investments that could be made to create that utility which would produce a new, income producing asset, which would... drive jobs and growth, and at the same time reduce the carbon footprint ... (and) reduce the reliance on centrally derived energy'.

This point was also made by a financier, who saw fragmentation at government level as a major issue:

'London is a major global city. It's much easier in a small city like Copenhagen or Stockholm where they've done it very well and successfully. The fundamental problem with London and this country is

government and the way it's structured and you've got CLG, Defra, BIS, DEC and of course Treasury all having different agendas around this particular topic and there's little wonder you get ...disjointed and complex policy, and you get mixed messages. And at the moment it's all being driven by Treasury which is understandable in a recession, we've got to cut the deficit. But it's certainly not helping the agenda'.

Despite these benefits, however, there could still be challenges particularly around **partnering**. As one retailer suggested of the Southampton scheme:

'You can see some of the problems they've had in Southampton: they've got a geothermal system near the port and their nearest obvious market was the Dalton shopping centre. So they approached the shopping centre management and said, 'do you want some free heat', and it was incredibly difficult to stitch the deal together whereas on the face of it, it should have been: 'it's free heat for everyone what's not to love'? And yet they still couldn't make it happen, so I don't know what it is: there's a combination of behavioural or embedded uncertainty or something that just makes people not connect with these ideas yet. It's coming, whether it's too little too late is a different question'.

Moreover, this kind of partnership would only work if there was a **clear vision at city level**. As one financier suggested:

'So I think the, so the vision we would have with district heating is you would have that sort of development capacity in there: people who do (the) deals. But first of all you need a sensible heat map and an overall heat strategy and a vision in, into which all of this can fit'.

This would also mean that **legislation should underpin action at city level**. As one influencer suggested:

'You can only really be influenced at a city scale by legislation and...in this country you can't set regional legislation that will impact on energy efficiency or environmental regulations really, unlike America. So I'm sure the Mayor would love to require all buildings in London to report energy consumption for example but there's no way he can bring in anything like that. So it's quite hard. It's only at planning level that they really can have any influence, which is why decentralised energy targets in London ...or redevelopments, will probably have onsite generation and CHP probably because of the London plan'.

Moreover this could take the form of further **incentivisation for district heating**. As one financier put it:

'Do you...need some form of tariff or feed, a feed in tariff equivalent for the heat networks? If you look at some of the heat networks that were built, why does Sheffield have the most developed heat network in the UK? It's because, I guess, the city fathers back in the '70s decided to put a heat network in to support the, a large block of social housing'.

This view was supported by a consultant who suggested:

'I think if you had incentives...with the talk around allowable solutions under Part L... you might start to see more innovative ways of saving carbon on a

wider scale than just at the building level. So I think it's two prong: regulation plus incentives I think'.

Policy change was also needed on the technology supply side. As one technology supplier put it, as far as technologies reaching the marketplace at scale it was a question of:

'Policy, policy, policy, is the simple answer to that. We, particularly in the UK, actually have quite a convoluted journey in trying to apply technologies to anything larger than a building scale. So if you're going to a community district, or city scale, you always will have individual owners, or occupiers that do not want to either invest, or do not want a certain technology, or have an opinion of aesthetics that will overcome any vision to apply retrofit solutions to a large scale'.

Moreover, **local authorities (and public agencies) needed to take the lead in this sort of activity.** For a number of interviewees the key to up-scaling retrofit in the commercial property sector is through leadership from local authorities and public bodies, who are able to lead as 'champions for change' in their own property portfolios, and also create and support initiatives. For some, there was a belief that local authorities could be proactive and generate projects by firstly promoting and publicising the benefits of a local low carbon economy, and then through finding a delivery partner. There is also the potential to de-risk projects by using assets that they own. One consultant interviewee suggested that:

'Public bodies could act as key 'anchor customers' within a neighbourhood or city centre scale retrofit programme, by them being very visible and transparent about their approach and the benefits they think it's going to deliver can begin to attract other players in the market to join forces with them'.

This view of the world also played out to the increasing concerns over energy supply. As one influencer suggested:

'I think that (the) whole new energy ecosystem for cities is a really interesting area for the deployment of technologies, because ... it's a whole bunch of things ... coming together to create a big difference. And are cities interested in this? Absolutely, quite a few cities have been involved in our programmes (and are) really quite worried about the lights going out and looking at what can we do as a city to make sure that our lights don't go out? And that means generating energy locally, because we may not be able to trust the grid to supply us under extreme conditions'.

There are examples of a number of initiatives at city level by public bodies that are attempting to expand the low carbon economy by engaging the commercial property sector. The Association of Greater Manchester Authorities has a programme to develop a pipeline of investment grade retrofit and energy projects that will be 50% jointly funded by the Green Investment Bank (GIB). In order to assist with development expertise the GIB is exploring the potential of creating a project development and investment vehicle model with Greater Manchester which could be adapted and replicated across the UK.

However, **data access was also a problem in cities.** If cities had better data access for energy performance in properties, there might be a better chance of success. One corporate owner suggested:

'Part of it comes down to publicising things on a city level... I think lots of people don't know how good or bad their buildings are. So why would you do something if you don't know that there's a reason to do it? .. I suppose in, the health analogy ... some people ...just exercise because they think it's good. But lots of people need to be told, you're a bit unfit, you need to exercise. And so unless you can do that on a city scale by having either benchmarking or building certification (it won't work).'

Another interviewee stressed the emergence of the **Smart City concept** in the UK and how integrating all elements and fully understanding what goes on between buildings in terms of communities and infrastructure was important. One influencer commented:

'The data to knowledge space at a city level is seen as having great potential and commercially viable for companies such as Microsoft, Cisco, IBM who can produce apps informing on technologies, transport, environment, lifestyles, and habits'.

2.7 Insights for the future: changes to the landscape?

Key messages

- ***The commercial property retrofit sector is a growth market opportunity.***
- ***A balance of incentives and regulation is needed in the sector to enable change.***
- ***DECs should be mandatory.***
- ***Proving the 'business case' is seen as vital in terms of the economic viability of commercial property retrofit projects at scale.***

2.7.1 Balance of incentives and mandatory policy and standards

The majority of interviewees who offered insights suggested that the way to address patchy progress in the sector towards regime change was through a better balance of incentives and mandatory policy and standards. As an occupier stated:

'I think it's a combination of regulation plus reforms to finance and standards for disclosure and you put those three together'.

This view was supported by a consultant:

'So I would hope to see a much more effective, much more coherent and much more effectively applied and enforced regulatory and fiscal environment for retrofitting. That would be my number one thing. And I think that ultimately that will be the most significant driver of the market. I don't think this is a free market driven agenda. Any time soon, with a few exceptions maybe, I think this is much more of a regulatory play and a positive fiscal policy which kind of supports and incentivises that activity'.

2.7.2 DECs

A number of interviewees suggested that mandatory Display Energy Certificates were needed in the sector to drive change, as was the case with the NABERS scheme in Australia. As a financier suggested, this could be powerful, if incentives were also part of the package:

'So what we need is DECs introduced across the sector, not just public sector but private sector and that would give tenants, and tenants' representatives, real hard data as opposed to EPCs which are theoretical as we all know. They could then beat up the landlords. The landlords in return would have to respond and actually a combination of carrot and stick. If there were DECs and if there were some form of rating incentive or penalty, i.e. the rateable value is linked to your DEC: that would be a real game changer'.

Another respondent suggested that allowable solutions could be a force for change, particularly at city level:

'Actually one of the ways the government could stimulate ... this market ... on an area by area basis, for example, would be by the allowable solutions framework ... under zero carbon. So the idea that once you've got as far as you can with energy efficiency, and once you've got as far as you can with on-site renewable heat and onsite renewables, you can give the remainder of your carbon by almost a Papal indulgence, by paying into a local fund. And then that local fund can then be used for various purposes, like boosting renewable energy capacity, and why not, why not community retrofit? Why not put that, put that money to work... but clearly a lot of work needs to be done on this and, and I haven't yet had the hours in the day to explore it further'. (Influencer)

2.7.3 Looking ahead: future markets

In terms of the future market the commercial property retrofit sector was seen as a key growth area. However, there was a limited window of opportunity as the lifecycle of buildings was important to bear in mind. One consultant suggested that:

'But I think you've got to face the fact in the next 50 years most people will have been around the retrofit one, at least one if not two cycles and the old technologies will be ceased to be manufactured. So everyone in terms of new build will be buying the right products in the first place, or at least the

product which suits the requirements at the time. So I think we've got a window of opportunity in retrofit over the next certainly 30, maybe 40 years, beyond that who knows'.

A number of interviewees saw proving the 'business case' for retrofit in property value terms as critical. As an influencer suggested:

'I think a lot more work could be done on the value to be generated. I think if we can demonstrate the value people will be more willing to try things out. So we need to generate, to show the value in terms of the improved performance of the building and the improved desirability of the building.'

Interestingly an influencer suggested that we may in danger of creating too brittle a system by over-specification without a loose fit for buildings which could be 'reused':

'One of the big problems with both new build and retrofit commercial building cities is that we strive for too much efficiency and end up creating brittle systems. And somebody introduced me to the phrase of you need buildings, if buildings are going to have longevity, if buildings are going to be reused, if buildings are going to be modified throughout their life, they need to be slightly over engineered and then loose fit. If you try and go for the maximum efficiency all the time, what ends up happening is you create buildings that have to be knocked down every 20 years, because they can't be modified ... Those buildings have been up for 200 years, 250 years, gone through very significant reuse and modification, bits tacked on the back, all the rest of it and that's because they can stand it. They are resilient to those kinds of improvements and modifications and that's what we need to be aiming for because a city is an organic thing and we don't know what those buildings are going to be used for in the future, but it's probably going to be used by different people doing different things'.

3 Summary and Conclusions

3.1 Introduction

This section draws the main findings together and outlines the policy and practice implications of the research before addressing the implications of the research for the future development of the commercial property retrofit regime.

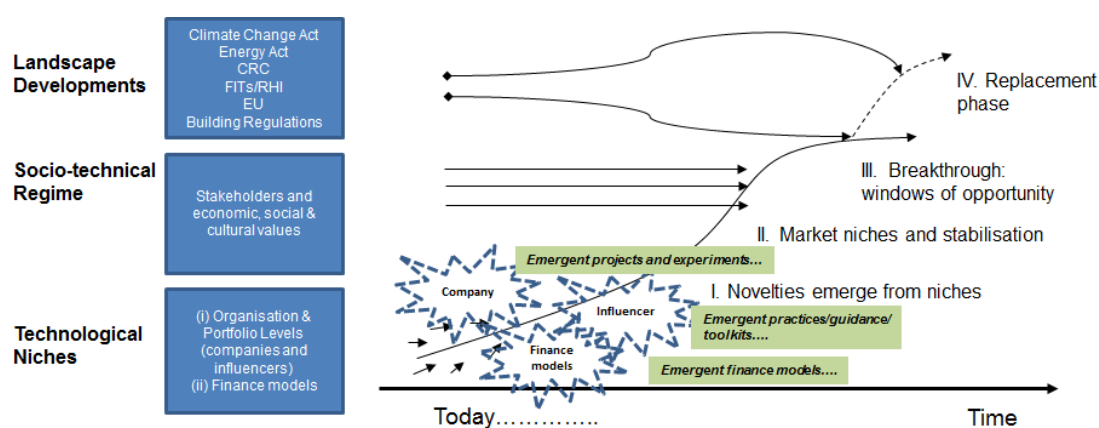
3.2 'Niche experiments' in commercial property retrofit: a multi-level landscape?

The MLP offers a helpful perspective through which to view emergent practices in the commercial property retrofit regime. It is clear that a number of niche experiments have been emerging at company level (for example, through the producer network and the user network), and that these relate to company-level practices through such examples as the development of sustainable development briefs; company-wide sustainability plans; and asset management strategies (see Figure 3.1).

We are also seeing further development of emergent practices at pan-industry influencer level with best practice guides, toolkits and other guidance around, for example, 'low carbon retrofit', 'green leases' and 'green building management groups'.

Finally, a further set of niche experiments relates to the development of specialist funds and financing models for commercial property retrofit.

Figure 3.1 Emergent practices in the commercial property retrofit regime: a multi-level perspective



We need to understand these experiments within the context of a complex set of relationships between key actors/stakeholders in the regime, founded on a cultural values, market and user practices, and regulations and policies.

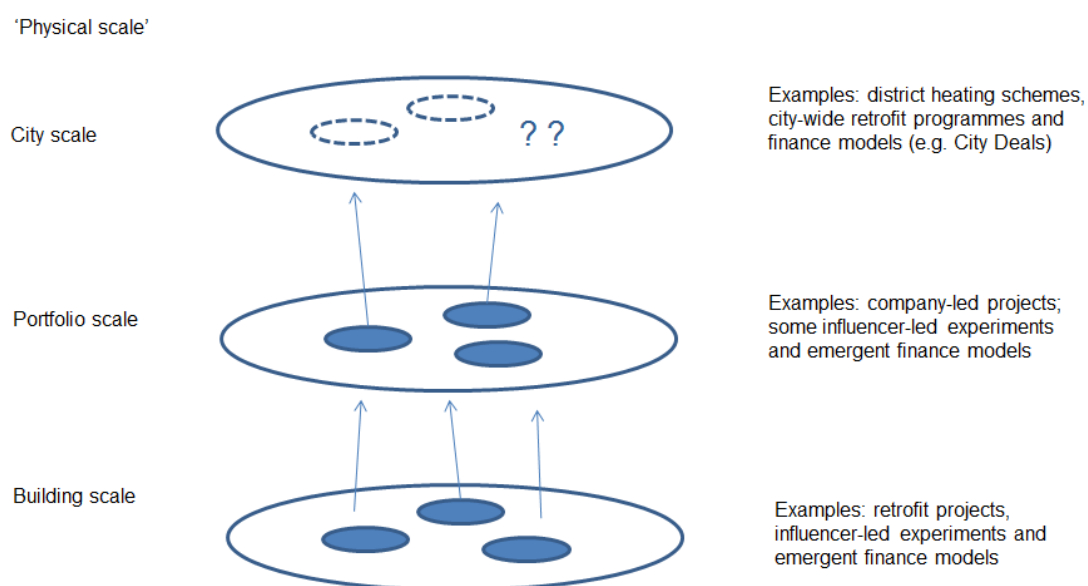
Despite the emergence of these experiments and the importance of policy as a key driver (for example, the Climate Change Act, Energy Act and CRC), the sector remains one which is conservative and risk-averse in nature. This is hampering

whole-scale transformation of the sector and the roll-out of retrofit in the sector at city level.

We should therefore understand that complexity and fragmentation are also key characteristics of the sector which make it very different from, for example, the domestic property sector.

We can therefore see niche experiments operating at a range of scales but with the greatest levels of activity in the regime occurring at building scale and portfolio scale (Figure 3.2).

Figure 3.2 ‘Multi-scale’ commercial property retrofit niche experiments



That is not to say that city-level experiments are unimportant: further research (see for example, Dixon (2012) and Dixon and Wilson (2013)) suggests that city level experiments have, in some instances, started to engage more directly with the commercial property sector and vice versa (see Figure 3.3). But these niche experiments remain patchy at best.

Therefore as scale increases to city level, the sector becomes ‘city-blind’. Why is this? It is partly the nature of the regime itself (diversity and homogeneity of building stock, for example), and partly also a focus on asset management per se: so there is less necessity or desirability to look to a city-scale context when it comes to retrofit, because this takes the regime’s key actors into territory which they do not perceive as relevant.

‘Sticky’ infrastructure projects, such as district heating and combined heat and power projects, can provide opportunities for the regime to connect with other stakeholders at community and city levels, but these projects are currently few in number. This is because local authorities and the private sector often find it hard to partner in these projects at scale.

Although some argue that local authorities are key actors in this space, many cities have faced severed pressures in an era of austerity, and public sector cuts have hampered climate change/low carbon teams. Central government no longer monitors any targets that local authorities decide to retain, and the national indicator set, which previously included National Indicator (NI) 185, NI 186 and NI 188 carbon emission target measures, is now replaced with a single 'data requirement list' for local authorities, which no longer includes these carbon emissions targets (Dixon and Wilson, 2013). Although it can be argued that in England the establishment of 37 Local Enterprise Partnerships (LEPs) (which are designed to bring local authority and other public sector partners together with private sector partners in order to create local economic growth) create opportunities to tackle city-wide activities, these have added to the complexity of the current multi-governance system. Some 29 of the LEPs refer to the 'low carbon economy' or 'climate change' (for example, setting emissions reduction targets or elaborating on how they plan to realise their low carbon ambitions (Green Alliance, 2011)), but the jury is still out on the extent to which they can act in a coherent way to promote economic growth and help drive the low carbon agenda¹⁵.

Figure 3.3 Examples of city level niche experiments (adapted from Dixon (2013))



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¹⁵ In parallel with this there has been a drive from the UK Government to devolve powers to English city regions through mayoral elections and City Deals, the latter of which are designed to build economic capacity and in some instances, link with a low carbon and green growth agenda (Green Alliance, 2012).

3.3 Policy and Practice Implications

For the commercial sector and other players to engage at city level requires change at two levels: (i) city scale; and (ii) commercial property retrofit regime.

3.3.1 City scale¹⁶

At city scale therefore there is a clear need for UK cities (and their constituent local authorities) and national government to take the following actions.

UK cities should....

- *Do more to develop fully integrated low carbon plans and strategies.* Although there has been progress towards implementing low carbon plans and strategies, cities need to do more to:
 - Work with government to introduce low carbon visions which tie in with national carbon emissions targets.
 - Ensure the low carbon agenda is fully developed and integrated with wider climate change plans and strategies and that the linkages with good sustainable local and national planning principles are fully developed.
 - Ensure carbon emissions targets are realistic and challenging.
 - Integrate sector-based carbon emissions targets within their plans which includes commercial property.
 - Use proper measuring planning and monitoring techniques to ensure change happens.

- *Help play a leading role in developing and promoting a low carbon economy.* The role of the new Local Enterprise Partnerships (LEPs) and how these work together will be critical. It will be important for LEPs to 'mesh' together with the existing Local Strategic Partnerships. Cities will need to be proactive in driving change but may well require further resources from national government to be able to do so effectively.

- *Help develop networks to ensure best practice, through such bodies as the Local Government Association (LGA) in UK and ICLEI.* Global initiatives are helping provide cross-boundary knowledge and learning, and UK cities need to work together more closely to share best practice, within a more fully developed, national 'low carbon city' framework supported by government, building on the initial work of the Carbon Trust and DECC in this area.

¹⁶ These recommendations also draw on Dixon (2012) and Dixon and Wilson (2013).

UK government should...

- *Develop a new policy framework which recognises the role of cities in the climate change and low carbon agendas.* The majority of the UK's population lives in cities, and they are vital in providing a focus for tackling climate change and responding to the low carbon agenda through technology deployment and access to finance. A new 'low carbon city' framework, which builds on the existing DECC low carbon pilots, should be developed and the concepts of 'low carbon city' and 'low carbon society' should be clearly defined within this framework.
- *Help support the development of low carbon visions for cities.* The government should work with local authorities to help support the development of low carbon visions for cities in the UK.
- *Use the UK Green Investment Bank (UK GIB) to assist in funding city-based low carbon projects.* The government needs to take urgent action to address the funding crisis for low carbon projects. Problems with the Green Deal, the reduction in FITs, and the 'under-powering' of the UKGIB have led to further uncertainty (see below).

3.3.2 Commercial property retrofit regime

In policy and practice terms if commercial property retrofit is to be rolled out at scale, and the transition management structures for this scaling up are to be strengthened, then policy and practice needs to be adjusted in a number of ways. In **policy** terms, the current research suggests that¹⁷:

- *A balance of incentives and regulation* is needed in the regime to increase the rate of retrofit in the commercial property regime.
- *Improved joining up of thinking* is needed around retrofit across all relevant government departments.
- *DECs should be mandatory across the sector.* The draft carbon plan proposed extending the current requirement on public buildings to publish DECs to all commercial buildings by the end of last year, but this was thrown out by the Treasury in 2011 despite support from within the commercial property sector. DECs need to be underpinned by incentives linked to stamp duty and business rates reductions for more energy efficient properties.
- *The Green Deal needs to be re-structured* to make it more attractive for SMEs and others in the sector. This requires a reduction in the interest rate and much clearer signposting of how the Green Deal can be used in the run-up to the implementation of the Energy Act in the sector by April 2018.
- *The role of the UKGIB needs to be strengthened* and more capital provided to help support commercial property and city-level retrofit projects (see above).
- *There needs to be improved frameworks for the R & D of emerging retrofit technologies in the regime,* and a reduction in the lifecycle time for approval

¹⁷ As APGEBE (2013) points out, a major, independent study is now underway into whether the Government's energy and carbon policies are having the desired effect on the property sector. The Government-led Green Construction Board has joined forces with the Green Property Alliance, a group of the UK's leading property organisations, to commission Deloitte to carry out the study. A recent study (Westminster Sustainable Business Forum/Carbon Connect, 2013) also made a number of policy recommendations for the commercial property sector particularly around the Green Deal.

of emerging technologies, without prejudicing the need for testing and verification.

- *There should be a clearer and more powerful role for local authorities leading the retrofit agenda at city level, underpinned by stronger legislation to act and to help in the deployment of decentralised energy projects (see 3.3.1 above) (for example, through improved incentivisation for the private sector with more attractive tariffs/subsidies for district heating).*

Box 3 A question of definition?

Understanding how retrofit can be distinguished from refurbishment is important in developing a common understanding and framework. For example, the RICS Guide on Sustainability and Commercial Property Valuation (RICS, 2013) does not define retrofit. Based on interview material and other sources the table below offers distinctive definitions.

Retrofit	Refurbishment (or renovation)
Literally: ‘add (a component or accessory) to something that did not have it when manufactured’ (OED).	Literally: ‘renovate and redecorate (something, especially a building) (Renovate - restore (something old, especially a building) to a good state of repair’ (OED).
Commercial property retrofit	Commercial property refurbishment (or renovation)
The process of making planned interventions in a building to install or replace elements or systems which are designed to improve energy and/or water and waste performance.	The cyclical process of improving a building above and beyond its initial condition in order to increase asset value. The focus is on systemic upgrading and renewal of building elements, finishes and mechanical services, with a potential impact on energy and/or water and waste efficiencies.
Characteristics	Characteristics
Typically non-intrusive whole system upgrades, or new elements added to existing systems.	Major alterations to fabric and/or services at a systemic, whole building level.
Carried out during lease or during ownership.	Carried out on lease renewal (or lease end) or on a cyclical basis in owner occupied property.
	May also include ‘retrofit’ measures.
‘Light retrofit’ will include making changes to existing energy, and/or water and waste systems.	
‘Deep retrofit’ will include a whole building approach to upgrades of energy and/or water and waste systems (and may equate to ‘refurbishment’).	

(Adapted from research interview and email material, and Dixon and Eames (2013))

In terms of **practice** the research suggests that:

- *There should be a clearer definition of retrofit and consensus in the regime as to what the term constitutes (see Box 3 above). For example, although the RICS provides guidance on sustainability and valuation the guide does not define 'retrofit' and 'refurbishment' explicitly (RICS, 2013b).*
- *It is also important to recognise that commercial property retrofit is not just about energy efficiency: it is also about water and waste efficiency.*
- *Proving the 'business case' is vital in terms of the economic viability of commercial property retrofit projects at scale. More research is needed to address this issue.*
- *An approved products and suppliers list in commercial property retrofit should be developed which should also have regime-level support. There also needs to be clearer information on what makes a good technology with better access to performance in use data.*
- *There should be a wider acceptance of monitoring, 'soft landings' and POE in commercial property retrofit programmes.*
- *There need to be a clearer consistency in assessment standards around BREEAM, Ska Rating and other related standards¹⁸.*
- *There should be consistency in monitoring and verification standards, perhaps around IPMVP.*
- *There should be improved communication between key actors in regime and a greater willingness to engage at city and community level. At company level this requires the development of a specific 'retrofit strategy' and strong championing. This should also be supported by clear monitoring and assessment measures and the use of innovative stakeholder groups—for example, green building management groups.*

3.4 Future of the commercial property retrofit regime

It is clear that the commercial retrofit property regime offers substantial growth potential. It is likely that we may see increasing levels of activity around the Energy Performance Contracting (EnPC) sector and that we may also see the growing importance of ESCOs with perhaps an increasing emphasis on 'bundling' services as mergers and acquisition activity increases in the market. This would be predicated, however, on transforming the policy and practice landscape as was suggested above.

Ultimately, partnerships and stronger governance systems are needed to underpin transitions. As one retailer put it:

'I don't think that we need to wait and hang around for the next big thing, I think it's there, I think it's about people collaborating together, whether that's developer, tenants or whether that's whole neighbourhoods or whether that's retailers joining hands. We need to get together to put some scale into it and once we put some scale into it that'll add, that puts demand into it, which should reduce the price...I think for, to make the quantum leap that we need to, I don't think we can do that without some mandate, some mandatory actions primarily by the government'.

¹⁸ A new BREEAM Non-Domestic Refurbishment 2014 will be released in 2014. Currently BRE recommend the use of BREEAM 2008 for fit-out and refurbishment or BREEAM New Construction 2011 for major refurbishment.

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5 Appendices

Appendix 1 List of Organisations Interviewed

ARUP
BBP
Bennetts Associates (Architects)
BRE
British Land
British Property Federation
Carbon Trust
Carillion
Climate Change Capital
Carbon Consultant
DECC
Deutsche Bank
Deloitte
EEVS (Energy Efficiency Verification Specialists)
Greater London Authority
Hammerson
Institute for Sustainability
Land Securities
Lush
M&S
Marksman Consulting
Max Fordham
Morgan Lovell Philips
Prologis
Prupim (now M & G Real Estate)
RICS
SIG
Sustainable Development Capital
Sweett Group
Tata Steel Colours
The Crown Estate
Transport for London
TSB
UKGBC
UKGIB
Viridian Solar
Wilmott Dixon

Appendix 2 Examples of Key Drivers

Policy
CRC
Energy Act and minimum energy performance standards
Regulatory driver - regulation not specified
Building Regulations
Landlords fear of legislation, seeing where regulation of policy is going
Corporate target to reduce carbon emissions
Enhanced Capital Allowance
DEC
FTSE reporting changes
Economic
Energy prices are rising
Reduced operational costs for landlords
Landlord seeing business benefits in offering lower energy costs for occupiers.
Upgrade of property by developer to increase rent and impact on rents in neighbourhood
Depreciation of assets
Reduced costs for occupiers
Large retailers are looking to save money on energy
Overall project costs for remodelling can be half that of new build (although construction costs are similar)
A big shift from CO2 reduction to cost reduction
Rationalising estate and improving performance of retained assets
Investors are demanding it
Marketing and reputation
Landlords increasingly seeing this as an essential part of marketing a property and able to command higher rents by demonstrating it has a higher environmental standard. Rating systems are now much more important
Reputational benefits for retail and offices
Perceived Value
Seen to be addressing the carbon reduction issue
Showing off attaining best practice to staff
Tenant retention and improved leasing spec
Retail industry - may have rolling refurbishment programme
Social responsibility
CSR
Company Ethos
Large retailers demanding CO2 reduction initiatives from their suppliers
Seen by investors as responsible companies
Environmental performance
Reduce carbon
Occupiers asking more about environmental performance
Narrowing perception of gap between new build and existing in portfolio
Installing metering and understanding data to provide insights into energy reduction opportunities
Resilience to systemic failure e.g. lights going out
Comfort
Workplace productivity and occupant health + well being

Overheating in buildings
Comfort
Poorly performing buildings e.g. cold
Quality
Better quality of workplace
Operational excellence and higher level of standardisation + quality
Contractual
Energy Performance Contracts becoming more popular
Availability of a standardised model with selected suppliers e.g. RE-FIT
To test demonstrator longer term projects with a service provider ESCO in place- off balance sheet
Trigger points e.g. expiry of lease and need to let again and ensuring that any refurbishment work improves energy efficiency.
Technological
Limited capacity of electrical connection to the site
Inefficient plant
City Level
Cities have targets for 2015, 2020, 2025

Note: In the main body of the report some of these drivers have been reclassified into similar groups.

Appendix 2 Examples of Key Barriers

Organisational
Retrofit initiatives are often seen as not being a priority or their core business
Internal capacity, leadership and operational structure within occupier organisations.
Larger organisations don't know how to streamline/standardise the approval process for retrofit works
The way in which people do cost management and value engineering
Not quite talking to the person you need to in order to get things moving.
Lack of someone who has the overall responsibility and knowledge to carry it through.
Difficulty making changes within organisational structure even within big companies.
Retrofit is not integrated into a company's asset management plan, therefore reducing it to just low cost measures
Not a priority for occupiers compared to other economic concerns and drivers
Lessons learnt are not passed onto next retrofit project
Lack of resources
The division into capital budgets and operational budgets causes a lot of problems
Project managers lack of engagement with long term energy efficiency strategies
Economic
Energy costs are still a relatively small proportion of overall occupational costs.
Not good enough business case
During the recession, it has been more about survival for the occupier
Energy is too cheap
There's an attitude for returns on investment being over a relatively short period e.g. 3 years
Showing an acceptable commercial payback period.
Biggest barrier is the economic one.
Lack of access to finance for SME's
The market isn't yet developing a significant pipeline of investable projects.
Difficult for SMEs to finance employing someone to focus on energy efficiency.
Lease structures and legal procedures
Leasing arrangements are often restrictive, as they are only short term
Difficulties with leases in multi-let or multi-owned buildings
Has to be end of lease or vacant building for any serious retrofit work to be undertaken
Break clauses in leases are something like 4.8 years –so pay back will never be more than 5 years -
Shopping Centres/ multi user buildings – tenants are tied down to the shopping centres management systems already in place.
The way that Professional Liability Insurance works
Standard operating procedures on the part of valuers, particularly on the legal side.
A lease clause that says you have to return everything to its original state
Landlord/tenant relationship
Overcoming the landlord/tenant split and improving the relationship to bring about energy reduction.

Landlords are a barrier to tenants e.g. when trying to install PV's
Tenant fit outs in retail sector can lower a buildings overall EPC rating
Data measurement
Lack of real energy data to create level playing field e.g. Display Energy Certificates
Lack of data
Not sufficient benchmarking
There is no standardisation of performance measurement and reporting which results in inconsistent information across the market.
Lack of transparency about data
The building is rarely thought of as a whole in the property industry. Only thought of as common parts, everything else is the occupier side
Policies
Lack of clear short term policy drivers + policy impetus between now and 2018
Legislative process has been stop and go and hasn't created clear signals around energy efficiency in buildings.
No buildings minister just a housing minister
Non-domestic buildings tend to be lumped into the industrial sector which leads to confusion of policies and lack of targeted policies
Planning
Lack of mature European legislation/UK legislation around water
Buildings
Heterogeneous stock
Difficulties transferring solutions asset to asset
Technologies
Technologies not achieving claimed expectations
Sound technologies are poorly installed
Lack of expertise
Hard to cut through the green wash of products to get to the individual solutions.
Behaviour/attitude
Not caring is a common theme
Designers find refurbishment work uninteresting- tedious standard process
Lack of trust, especially with Energy Performance Contracting
Value
Apportioning value to sustainability
'The value of green' is still not embraced in UK
Energy savings don't account for enough to improve capital value or improve rents, generally just service charge savings
Operational
Fear by landlords of disruption to tenants
Infrastructure
Lack of supply of facilities to recycle or re-use food waste, e.g. anaerobic digesters
Branding
Main motive for some retailers is just to refresh the look
Environment
For many saving carbon is still not the driver

Note: In the main body of the report some of these barriers have been reclassified into similar groups.