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Retrofit Briefing

European Court of Auditors calls €5 billion energy efficiency spend into question

€5 billion of European Union funding support for energy efficiency projects may not have been spent wisely, a report by the European Court of Auditors (ECA) has concluded.

The European Court of Auditors assessed whether cohesion policy co-financing investments in energy efficiency since 2000 have been cost-effective. Its report, published this month, finds that the projects selected by member state authorities for financing did not have rational objectives in terms of cost-effectiveness, ie, cost per unit of energy saved.

Their objectives were to save energy and improve comfort, but they were not selected for financing on the basis of their potential to produce financial benefits through energy savings. Instead buildings were typically regarded as being 'ready' for funding if they were in need of refurbishment and their documentation complied with requirements.

Focus of the audit

The audit was carried out in the Czech Republic, Italy and Lithuania, which received the largest contributions from the cohesion fund and the European Regional Development Fund (ERDF) for energy efficiency measures for the 2007-2013 programming period, and had also allocated the highest amounts to projects in 2009. The audit included an examination of four operational programmes and a sample of 24 energy efficiency investment projects in public buildings.

The planned payback period for the investments was 50 years on average and in some instances it was up to 150 years.

Energy efficiency a "secondary concern"

Harald Wögerbauer, the ECA member responsible for the report said, "None of the projects we looked at had a needs assessment or even an analysis of the energy savings potential in relation to investments."

"The member states were essentially using this money to refurbish public buildings while energy efficiency was, at best, a secondary concern."

The court recommends that the European Commission ensures that cohesion policy funding for energy efficiency measures is subject to proper needs assessment, regular monitoring and use of comparable performance indicators, as well as the use of transparent project selection criteria and standard investment costs per unit of energy to be saved, with a maximum acceptable simple payback period.

The report, *Cost-effectiveness of cohesion policy investments in energy efficiency* includes the European Commission's response to the findings. The report is available [here](#).

Editor's welcome



Welcome to the launch issue of Retrofit Briefing, a new regular e-publication providing news, analysis and data on the building retrofit and refurbishment market.

The retrofit and refurbishment sector is developing rapidly as a result of a string of global economic and environmental pressures. That in turn is driving new policies, standards, innovations and opportunities for investment. Our new publication aims to provide decisionmakers with key facts and figures for doing business, both in the UK and overseas. We hope you find it useful.

Jo Smit, Editor

Upgrade for rail

Network Rail has set out proposals to upgrade key stations under a £37.5 billion five year investment plan. The business plan, which runs from 2014 to 2019, sets out proposed measures to grow the network's capacity to cope with demand, providing 170,000 more commuter seats at peak times by 2019.

Network Rail has also recognised the need to increase capability to withstand increasing climate volatility. A document released alongside the plan, called *A better railway for a better Britain*, points out, "Many of our structures are over 100 years old and it is important that we adapt infrastructure and operations to make them more resilient to future changes in the climate."

Index reports on global investors and risks of climate change

An Australian initiative is scrutinising the way in which the world's biggest investors manage the risks posed by climate change. The Asset Owners Disclosure Project (AODP) has released its first Climate Investment Index, which has been developed with the aim of prompting investors to pursue low carbon opportunities.

The index covers the world's 1,000 largest asset owners, including pension funds, insurance companies, sovereign wealth funds, and foundations and endowments.

It focuses on five key reporting categories:

- transparency
- risk management
- investment chain alignment
- active ownership
- low carbon investment

Findings of the 2012 index

Asia Pacific and European funds rated best in terms of disclosure, with performance in the former being driven by Australian funds, which have gained experience from a three year trial of the AODP.

Europe also had the highest participation rate in the three key green and responsible investment initiatives: Carbon Disclosure Project, Principles for Responsible Investment and Global Investor Coalition on Climate Change. The index found that 37% of asset owners are a member of at least one of the initiatives.

The best rated asset owners in each of the main pension/superannuation markets within individual countries were:

UK:

- Church of England Pensions Board
- BT Pension Scheme
- Environment Agency Active Pension Fund

France:

- Amundi
- Natixis Global Asset Management
- Macif Gestion

Germany:

- Hypo Vereinsbank
- MEAG Munich Ergo Asset Management
- Bayerische Versorgungskammer

Netherlands:

- Stichting Pensioenfonds Zorg en Welzijn (PFZW)
- APG Groep
- Pensioenfonds van de Metalektro

The AODP Global Climate Index 2012 results are available on The Climate Institute [website](#).

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BRE Retrofit Briefing is published 10 times a year by BRE. To subscribe to this title log on to [www.building4change.com](#) and click on the link on the right hand side of the page.

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Office-to-residential outlook remains bright

Ongoing decline in the values of secondary commercial property in England's regions looks set to add further impetus to the office-to-residential conversion market. Values of secondary commercial property have taken a tumble as investors remain concerned by risks in finding tenants and the fitness for purpose of building stock.

Many regions have seen values for secondary stock slump to a new low of more than 50% below their pre-recession peaks, and declines have shown no sign of abating in the last year. The worst hit secondary market, South West offices, has recorded a fall of more than 65% from the market peak in the second quarter of 2007.

London's prime assets have held their values but those in many other areas of the country have been slashed, and over the last 12 months have recorded falls of more than 12%, according to the Regional Yield Quartile Analysis for the third quarter of 2012, published by real estate analyst [IPD](#). Its report highlights the disparity between prime and secondary assets, London and the rest of the UK, and the safest and least secure areas to invest.

However, London also saw a record number of planning permissions for office-to-residential conversions last year on the back of its healthy residential market, according to property consultant [DTZ](#). In its *Insight* report on London office to residential conversions, published last October, it recorded 2,197 planning permissions already for the year, exceeding the 2011 total. It forecast that the trend would continue with the number of conversions rising by 12% in 2013 to some 1,350 homes, with 2014 seeing 18% growth to 1,600 homes. Ben Burston, head of UK research at DTZ, said, "Average West End residential values range up to £3,250 per square foot (psf) in St James, compared to prime office values of around £2,100 psf". This value divergence would drive activity into the future, said the report.

Sustainable property fund launches

European Investors Incorporated (EII) has launched a fund that will invest in environmentally and socially sustainable real estate investment trusts (REITs) and property companies. EII will work with sustainability rating agency Oekom Research on the Global Sustainability Property Fund.

The fund aims to take advantage of growing investor interest in environmentally and socially sound companies. The focus will be primarily on global equities of companies involved in owning, managing, developing and financing commercial and residential properties that strive to meet sustainability requirements.

The German domiciled UCITS fund was launched with an institutional share class with annual dividend distribution. It is managed by a New York, Singapore and Amsterdam based investment team.

How England's cities are gearing up for the green deal

City authorities are putting partnerships in place to improve the energy efficiency of affordable and private housing stock.

England's major cities are preparing for the roll out of the government's home retrofit strategy at the end of this month, as our snapshot survey shows. Early indications from the survey are that local authorities are showing a clear intention to tackle both affordable and private housing in area-wide initiatives, with improvement interventions focusing on insulation, including external wall insulation.

A number of local authorities are engaged in 'go early' pilots of the green deal, the government backed finance framework that will provide homeowners with upfront capital to carry out energy efficiency

improvements to homes and pay for them through their energy bill.

Local authorities are looking to the launch of the green deal and the energy company obligation (ECO) to help deliver large-scale local regeneration and energy efficiency improvements in conjunction with existing funding streams. ECO, which will be launched alongside the green deal, requires energy suppliers to promote installation of energy saving measures in low income and vulnerable households, replacing the carbon emissions reduction target (CERT) and community energy saving programme (CESP) which ended in December 2012.

Last month think tank the [Institute for Public Policy Research \(IPPR\)](#) published a report, *Energy efficiency: Who pays and who benefits?*, which was critical of the ECO, saying that the policy would not do enough to address fuel poverty. IPPR associate director Will Straw said: "Funding local authorities to get involved and piloting a new area-based approach are both ways of improving the scheme." England's key cities appear already to be leading the way.

City	Name of initiative	Partners	Home numbers and tenures	Likely retrofit actions	Current status of initiative	Average domestic gas and electricity bill*
Birmingham	Birmingham Energy Savers	Birmingham City Council is leading. Carillion Energy Services is preferred bidder. BRE and Groundwork West Midlands working on pilot	15,000 private and affordable. To extend to 200,000 in 2026	Insulation, photovoltaics (PV)	Go Early pilot is testing how community can promote green deal, with 20 community groups targeted initially	£725 + £449 = £1174
Bristol	Home Energy Upgrade	Scheme is managed by the Centre for Sustainable Energy	600 mixed tenure	Internal and external wall insulation	Officially launched on 3 December	-
Greater London Authority		GLA is working with Energy Saving Trust and Marksman Consulting on a pan-London approach to green deal delivery	2.9 million mixed tenure homes by 2025	-	Varying views among 33 London Boroughs to risk and willingness to commit resources has led to development of three models: 1. Producer: led by GLA 2. Promoter: trialled by Sutton supported by Croydon 3. Provider: Led by Islington and Harringay Pan-London model will seek to: - create leads for green deal and ECO funding streams - procure a delivery partner to help generate leads - procure a panel of providers to fund installer measures	£735 + £452 = £1187
Greater Manchester	Go Early pilot in advance of launch of main scheme in 2014	Manchester City Council, with councils in Bolton, Bury, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan	Pilot focuses on improvements to affordable homes	-	In process of determining delivery partner	£718 + £452 = £1170
Leeds	Green deal pilot	Leeds City Council, with councils in Barnsley, Bradford, Calderdale, Craven, Harrogate, Kirklees, Selby, Wakefield and York	650 mixed tenure	Pilot focuses on solid wall insulation	Pilot being rolled out	£717 + £437 = £1154
Liverpool	Project Viridis	Liverpool City Council and six councils and registered social landlords	100,000 affordable homes	Insulation and PV	Trialling options under a Go Early green deal pilot	£718 + £474 = £1192
Newcastle	Warm Up North	Newcastle City Council, with councils of Darlington, Durham, Northumberland and South Tyneside	15,000 mixed tenure in first three years	Mainly insulating solid walls. Some other works e.g. boiler upgrade	Delivery partners bidding are: British Gas; Carillion Energy Services; Keepmoat, EDF Energy and Gentoo; Kier Services and Jewson; Mears Group; RWE nPower plc and Wates Construction; Scottish Power Energy Retail; SSE. Scheme due for launch in 2013	£712 + £440 = £1152

*UK average domestic gas and electricity bill: £798 + £478 = £1276

Key reading

Demand for **smart glass** in the buildings, automotive, aerospace and marine sectors will rise from 110,000m² per year in 2012 to 3 million m² per year by 2020, according to Pike Research's report *Smart glass*. The report is available from www.pikeresearch.com.

Cloud-based **building energy management systems** (BEMS) may hold promise for the future, but the industry is in the nascent stage, says GlobalData. The global cloud BEMS market recorded modest revenues of US\$142 million last year, with the US accounting for 60% (US\$85 million) of the total. The report, *Building energy management systems (BEMS) – global market size, market share and competitive landscape analysis to 2020* is available from www.globaldata.com.

Market & Customer Insight has published an analysis of the **external wall cladding** market, which includes a detailed five year forecast. The *Market & Business Development UK External wall cladding market research report* is available from www.mbdltd.co.uk.

A study from IMS Research, forecasts that the global market for **smart home devices** will more than quadruple to 2017. A key driver for 'smart home' adoption is the increasing number of service providers branching into the managed home control sector. US telecoms companies and security providers, such as ADT, Verizon, Comcast, Rogers Communications, Time Warner Cable and Cox Communications are offering smart home solutions via a cloud-based managed service. Similar offerings are also available or in the pipeline for European counterparts, such as Swisscom and Bouygues Telecom. In the European market, energy management is set to be the key driver of managed home system deployments, with devices such as smart plugs and HVAC controls. The report, *Connectivity Opportunities in the Smart Home – World – 2012 Edition* gives projections for the uptake of 14 connected home devices in four key application areas: energy management, home monitoring, lighting and other home automation.

Guidance for CRC energy efficiency scheme: Assessing qualification for phase 2 – the Environment Agency document summarises the anticipated revised criteria for phase 2 of the scheme, which runs from 1 April 2014 to 31 March 2019. Environment Agency guidance on the CRC energy efficiency scheme is available [here](#).

European think tank the Building Performance Institute Europe (BPIE) has established the **BPIE data hub for the energy performance of buildings**, an open access portal giving policy information and data on Europe's building stock.

Collective bargaining for energy supply takes off

Manchester City Council has launched an initiative to negotiate best deals on energy supply for residents. The council is working with local authorities across Greater Manchester to encourage households to register to switch collectively to the lowest-cost energy supplier, and has attracted interest from more than 7,000 residents within days of the launch.

The initiative echoes one launched by Peterborough City Council, which has so far attracted the interest of more than 16,000 households. Peterborough City Council is working with 11 local authorities across the UK to harness the power of collective bargaining to secure the best deal for consumers in their areas. The 11 local authorities working with Peterborough are: Blackpool, Cheshire West and Chester, London borough of Havering, Hertfordshire, Hull, Luton, Great Yarmouth, Wiltshire, South Holland, Waverley, and Northumberland.

The Peterborough and Manchester initiatives are both being organised by specialist business iChooser, which operates collective switching schemes for communities in the Netherlands and Belgium. Oldham Council launched its own collective switching initiative last autumn, attracting more than 8,000 residents.

Registration for the Peterborough-led domestic scheme closes to householders on 28 January. The following day energy providers will be invited to participate in a reverse auction with suppliers competing to offer the lowest price and best deal. The public will have the final say on who is awarded the contract. The Greater Manchester scheme also has a 28 January closing date.

Peterborough is set to launch a dedicated scheme for SMEs imminently and also plans to launch a second phase for domestic customers.

Who are green deal's early adopters?

The Green Deal Oversight and Registration Body (GD ORB) has approved 23 companies as green deal providers to date. Providers approved in the scheme's run up to opening to the public later this month include established energy companies like British Gas, and bespoke players like Network Green Deal as well as affordable housing provider Keepmoat.

GD ORB has approved 36 assessor names so far, including specialist national installer the Mark Group and many businesses already active in surveying for energy performance certificates and the Code for Sustainable Homes.

To date, some 500 companies have signed up to become green deal installers. The list is currently dominated by regionally-based home improvement contractors, with exceptions including St Helens based affordable homes provider Helena Partnerships, and national contractors Higgins Construction and Kier.

For latest listings at GD ORB, go to its [website](#).

€100,000 grant to develop internal wall insulation

United House has won a €100,000 grant under the European Union Eracobuild initiative to develop its WHISCERS™ internal wall insulation process in Europe over a three year programme. The contractor is teaming up with the Vienna University of Technology and Athens University to trial the low-carbon retrofit technique in Austria and Greece.

WHISCERS™ (which stands for whole house in situ carbon and energy reduction solution) uses laser scanning to measure the dimensions of a room, allowing insulation boards to be cut off-site and installed quickly while residents remain in their homes. United House will work with the universities to test the technique for insulating against solar gain and for thermal insulation. The projects will use locally sourced eco-friendly insulation materials in Austria and phenolic board in Greece.

Tracking down the retrofit spenders

As the government's green deal opens to homeowners this month, Brian Green looks at a source of data that could help identify those most likely to spend on retrofit.

Concerns are growing that the UK's grinding downbeat economy is stifling efforts to boost the efficiency of the nation's homes. Meanwhile, increasing government ineptitude in pushing through big policy initiatives like the green deal appears to be causing more grief than relief. And sure enough, the broad data on housing repair, maintenance and improvement (RMI) from the [Office for National Statistics](#) (ONS) suggest the sector is struggling.

It is reasonable to assume that those spending heavily on housing RMI could also have a higher propensity to spend on retrofitting to improve the environmental performance of their homes. Sadly housing RMI from the ONS construction statistics shows a sector (public and private) that was worth £20 billion a year in 2003 but is now valued around £16 billion. But before getting too despondent, it is worth noting that there are opportunities even in the grimmest of times.

The family way

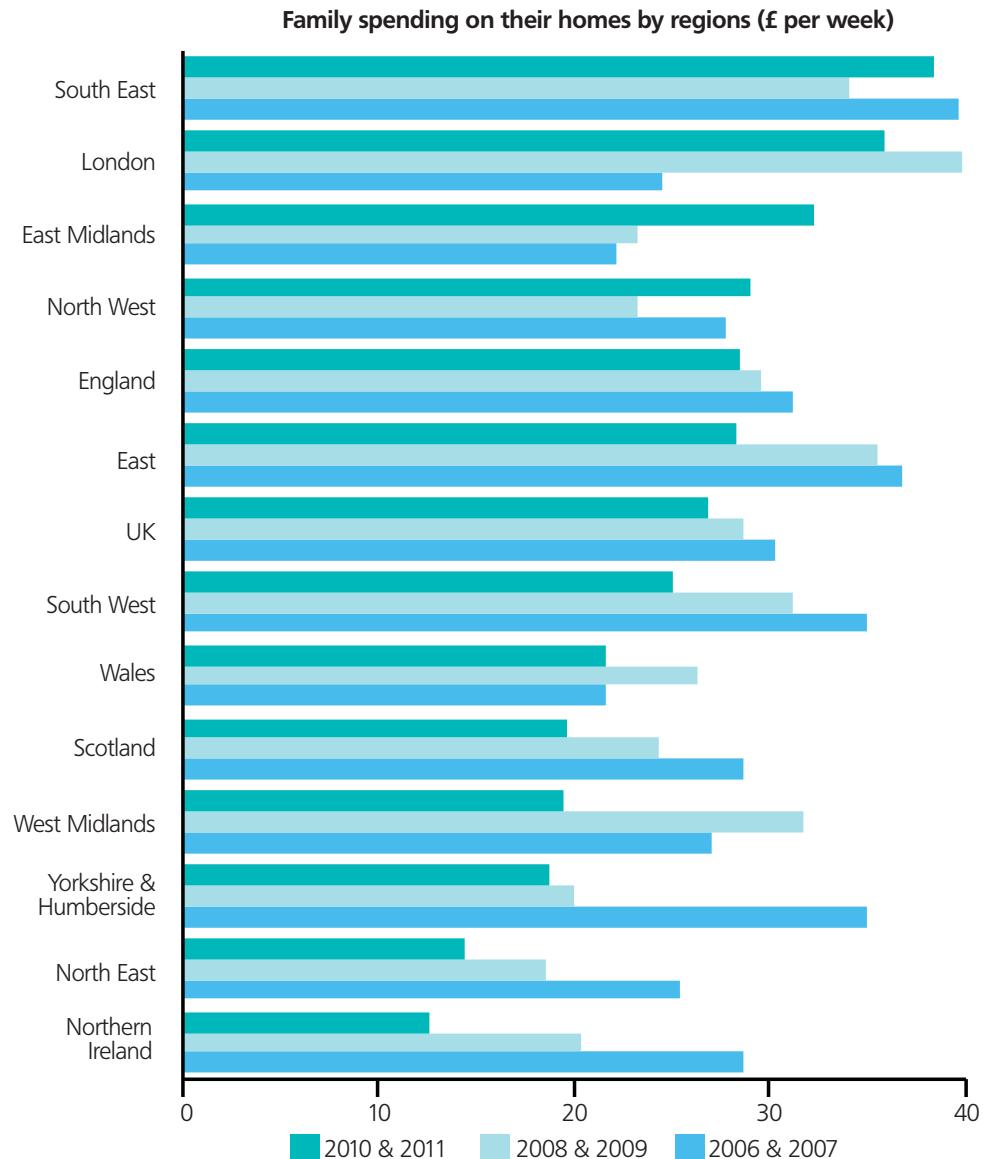
It is tricky finding solid data on the market for the retrofit technologies on offer to people keen to improve the environmental performance of their homes. But for those eager to tease out prime targets for retrofit technologies there is an official source that's worth exploring – the ONS family spending data.

The 2012 issue was released in December and covers spending in 2011.

Okay, it doesn't pull out spending on external wall insulation, photovoltaics or biomass boilers, but it gives a pretty good clue as to who's spending how much on improving where they live. Much of it probably fits very neatly with the clichéd view. If you want to find people spending on their homes look south and to the rich.

Two broad spending categories in the survey are worth looking at – "maintenance and repair of dwelling" and "alterations and improvements to dwelling".

According to the family spending data the average UK family spends £27.30 per week on these goods and services. That amounts to £713 million a week, which puts the annual spend at about £37 billion. But that sounds rather high. Did the nation really spend £4.5 billion in 2011 installing and maintaining central heating boilers?



In a sense the actual quantum isn't the big issue. The distribution and changing pattern of spending is more important. Here the data provide scope for exploration.

To smooth out the rather bumpy figures, it's worth comparing average spending for the years 2006 and 2007 with that of 2008 and 2009, and of 2010 and 2011. This reveals a steady decline in spending on these selected goods and services.

Ups and downs

The average weekly family spend over those three periods fell from £30.31 to £26.90. It's within the detail, however, that we may find the gems. Looking at London, spending is practically at boom levels, with the average family there spending a third more than the average UK family. But more intriguingly there was a rapid rise in spending in the East Midlands in 2010. Here average family spending on their homes over 2010 and 2011 was 20% up on the UK average.

Not surprisingly, the richest 10% of families

spend on average about three times the national average and the poorest 10% spend less than a fifth of the average. And the figures suggest that spending on housing maintenance and improvement among the rich held up far better during the recession than the UK average.

People under 50 have cut back pretty dramatically, but the 30 to 50 age bracket still contains the biggest spenders. Those dependable families with kids spent an average of £41 a week in 2011.

But if you want to find a household that is expanding its spending on improving the home, then the data suggest you should look for a retired couple. They have increased spending on average by 25% over their pre-recession level.



Brian Green is a construction industry analyst and commentator.

Legislation drives LED market to develop brighter and cheaper products

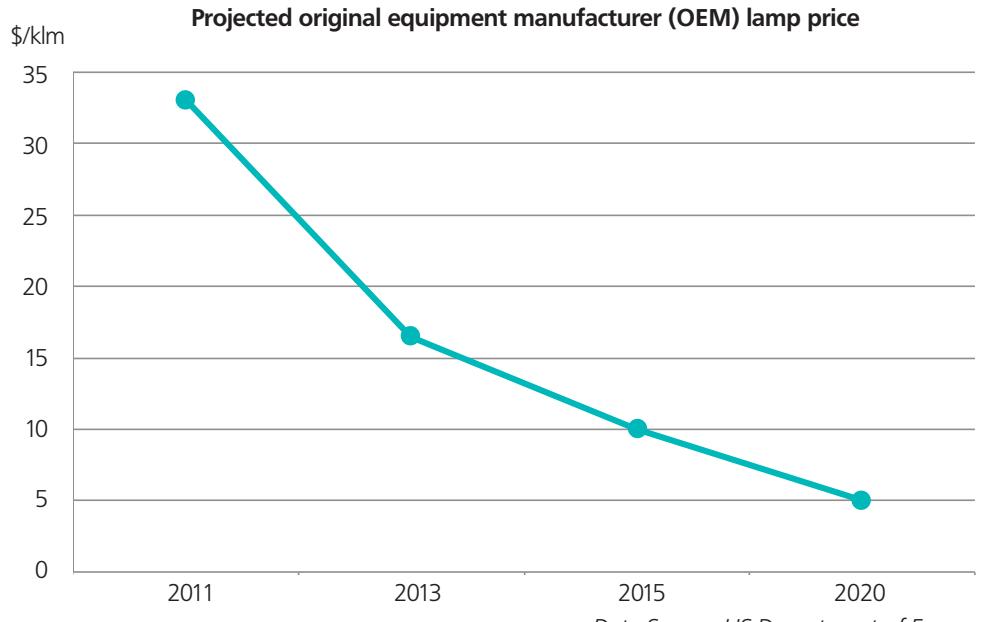
Output and cost have been barriers to the uptake of LED lighting, but manufacturers are resolving the issues, writes Andy Pearson.

The revolution in LED lighting technology is gathering pace. Driven by legislation that will eventually phase out inefficient incandescent lamps, ever increasing energy costs and CO₂ reduction activities, the number of applications for LEDs is growing rapidly. According to the report *Lighting the way: Perspectives on the global lighting market*, LEDs' share of the general lighting market is expected to increase from 7% in 2010 to 40% by 2016 and 64% by 2020.

LEDs (Light Emitting Diodes) are semiconductor elements that directly convert electrical energy into light through electro-luminescence. Compared to most other lamps, LEDs are robust with a high luminous efficacy and a long life. Many LEDs are claimed to have a lifetime of 50,000 hours which, in some cases, is a longer lifespan than the fitting in which they are installed.

Until recently the biggest drawback to fitting LEDs was that they are still considered expensive for high brightness applications. However, with advances in LED technology the situation is changing rapidly with ever brighter lamps coming to the market. For example, a 6 Watt LED can produce more than twice as much light as its equivalent could a year ago.

Lamp efficiency is improving too. Many LEDs now deliver a light output in excess of 140



Data Source: US Department of Energy

lumens/Watt with Cree, a US manufacturer, recently making claims for prototypes delivering outputs in excess of 170 lumens/Watt. By comparison, a conventional 60 Watt incandescent light bulb will emit around 15 lumens/Watt and a standard fluorescent lamp emits about 100 lumens/Watt.

Cutting the costs

Light output and cost have been the key factors in limiting the use of LEDs in general lighting applications. However, outputs are continuing to increase and within the next decade LEDs are expected to become cheaper than traditional light sources.

According to the US Department of Energy's 2012 solid state lighting R&D manufacturing roadmap, the prices of lamps are expected to drop by about 30% a year up to 2015 and by about 13% a year from 2015 to 2020, see graph. Or, put another way, the price of an LED in 2015 will be less than a third of its 2011 price and by 2020 it

will be less than a sixth of the price.

One of the biggest challenges facing those interested in specifying LEDs is that the rapid development of the technology means that products with improved performance are coming on to the market all of the time. As a result there are very few actual examples of LED installations utilising the latest technology. One way to safeguard the performance of an LED installation is to ensure LED luminaire specifications are measured in compliance with the new International Electrotechnical Commission's Publicly Available Specifications for LEDs:

- IEC/PAS 62717 Performance requirements – LED modules for general lighting
- IEC/PAS 62722 Performance requirements – LED luminaires for general lighting

Together these documents provide the definition of a set of quality criteria related to the initial specifications of a product, and a standardised description on how to measure these quality criteria. Further help for specifiers is available from the document *Guidelines for specification of LED lighting products 2012*, which has been produced by the major UK lighting organisations.

Want to know more?

[Lighting the way: Perspectives on the global lighting market](#)

[Cree raises industry standard with new 170 lumen-per-Watt prototype LED light bulb](#)

[US Department of Energy solid-state lighting R&D manufacturing roadmap](#)

[International Electrotechnical Commission](#)

[Lighting Industry Association Guidelines for specification of LED lighting products 2012](#)



Singapore searches for a greener future

Scarce resources should be driving Singapore into the arms of sustainability, but does that apply to its property sector? Jo Smit reports.

Singapore's buildings may be concentrated on less than 700 sq km of land, but the location has been identified by forecasters as a hotspot for green retrofit up to 2015. McGraw Hill Construction and United Technologies' smart market research study (*World green building trends: Business benefits driving new and retrofit market opportunities in over 60 countries*) says Singapore ranks second only to the UK in the number of firms planning green renovation projects.

The retrofit focus in a location that has traditionally promoted demolish-and-rebuild is being driven both by market forces and by a growing awareness of environmental profligacy and the need to conserve natural resources, reinforced by policy. Singapore lacks viable sources of renewable energy and is already drawing nearly a quarter of its water from non-conventional sources, such as desalination and water reclamation.

The country's main standard for green buildings, both new and existing, is the Singapore Building and Construction Authority's (BCA) Green Mark, a voluntary rating scheme. In September 2012 the government announced a building control act, due to come into force in the second half of this year, which focuses attention on the 30-50% of total building energy consumption that goes into keeping occupants cool. The move is intended

to help the government towards its target that 80% of existing buildings should achieve at least a Green Mark Certification rating by 2030, as set out in its 2030 green plan.

Policy versus business drivers

There are many refurbishment projects, or asset enhancement initiatives (AEI), in progress in Singapore, particularly in the hotel and retail sectors. The Suntec City Mall and its accompanying Suntec Singapore International Convention and Exhibition Centre are going through a S\$410 million AEI that will include new facades, technology and other improvements, while the S\$34.7 million AEI of the 42-storey landmark Raffles City Tower concentrates on such occupier attractions as refreshed common areas and new CCTV systems. But there is little apparent focus on making such buildings more sustainable, apart from physical greening in the shape of landscaping or a rooftop garden.

That's because the driver for refurbishment remains money, says Alan Cheong, head of research and consultancy at property consultant Savills in Singapore. "Landlords of existing buildings are trying to keep abreast of the latest new builds in order not to fall behind in their ability to exact the highest possible rent. Many shopping centres are owned by listed real estate investment trusts (REITS) and strong incessant shareholder pressures to maintain the highest income payout keeps many landlords on their toes." Less than 20% of Singapore's total gross floor area has the Green Mark standard.

Sustainability has to fit into the business dynamic, and that is difficult because of the nature of REITS, adds Cheong: "Given the presence of REITS, short-termism may come into play as a developer of a commercial building is not a REIT. In that case, the

SINGAPORE ENERGY FACTS

Electricity consumption:
41.2kWh (2010 estimate)

Installed electricity generating capacity: 10.47 million kW

Electricity from fossil fuels: 99.98%

Natural gas consumption: 8.4 billion cu m

Carbon dioxide emissions from energy consumption: 172.2 million Mt

All figures are based on estimates for 2010.

Source: Central Intelligence Agency World Factbook

developer would want to keep or warehouse the commercial building for as short a holding period as possible before flipping it to the REIT. If the savings from 'greening' a building take too long time to realise – say significant cost saving starts from the tenth year onwards – the developer would rather not invest in it as his objective is simply to stabilise the rental yield to the REITs hurdle rate before offloading it."

The Singapore government may need to exert legislative pressure to ensure its green plan is delivered, but Cheong says that the supply chain also has a key role to play in helping to make the case for green retrofit: "Improving technology, building, mechanical and electrical and construction material suppliers that offer straight off significant benefits would entice developers from a financial standpoint."

Want to know more?

[McGraw Hill Construction](#)

[Savills Singapore](#)

[Singapore Building & Construction Authority](#)

The Retrofit Briefing 10: share prices of technologies players

Company	Country of Origin	Retrofit Technology	Share Price at 14/12/12	Share Price at 14/1/13	Change
BASF (€)	Germany	Insulating materials	71.94	71.57	▼ 0.37
Canadian Solar (\$)	Canada	Photovoltaics	3.08	4.48	▲ 1.4
GE (General Electric) (\$)	USA	Lighting and wind turbines	21.62	21.16	▼ 0.46
IBM (\$)	USA	Intelligent systems	191.76	192.78	▲ 1.02
Johnson Controls (\$)	USA	Intelligent systems	28.20	31.52	▲ 3.32
Mitsubishi Electric (Y)	Japan	Air conditioning and intelligent systems	708	770	▲ 62
Philips Electronics (€)	Netherlands	Lighting	20.1	20.89	▲ 0.79
Rockwool International (DKK)	Denmark	Insulating materials	615	676.50	▲ 61.5
St Gobain (€)	France	Lightweight construction and insulating materials	31.695	31.845	▲ 0.15
Trina Solar (\$)	USA	Photovoltaics	2.63	5.59	▲ 2.96

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