Financing Energy Efficient Building Retrofit

EuroPHit Workshop
16th September 2014
Introductions

- **Adam Robinson**, Building Futures Group, BRE
- **Gilli Hobbs**, Strategic Director, BRE
- **Georg Kraft**, KfW
- **Jules Bickers**, Project Director, RE:NEW
- **Steve Groves**, Portsmouth City Council
- **Meredydd Hughes**, Portsmouth City Council
- **Joe Richardson**, RE:FIT Programme Delivery Unit
Welcome

Aim:
• Explore the financial models and solutions required to drive energy efficient refurbishment

Objectives:
• Share knowledge of EU financial models
• Share lessons from case study projects
• Discuss financial barriers to undertaking retrofits
• Explore new/alternative technical and financial models
• Identify where further industry work is required
## Agenda

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<th>Time</th>
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About BRE

- Formed in 1923, privatised in 1997
- Owned by the BRE Trust
- HQ in Watford with numerous other satellite offices
- A research based organisation, developing products and solutions to drive change in the built environment
  - Consultancy
  - Testing
  - Certification and approvals
  - Accreditation
  - BREEAM
  - Academy
  - Events
BRE and Retrofit

• Strategic:
  • National Refurbishment Centre (joint venture with EST)
  • Centre of Refurbishment Excellence (principle partner)
  • Empty Homes Nationwide initiative

• Technical:
  • Specification preparation
  • Costs and payback periods for improvements
  • Energy modelling and consultancy
  • Whole house solutions
  • Airtightness testing
  • Infra-red thermography
  • PassivHaus training and consultancy
  • In-use performance analysis
Context of Domestic Refurbishment
The UK Housing Stock

- Housing energy use is responsible for 27% of CO2 emissions
- Government commitment to reduce carbon emissions by 20% by 2020, 80% by 2050
- Old building stock
- Majority of current housing stock will still be standing in 2050
- 6.8 million solid wall homes
- Annual new-build rate <1% of existing stock
- Rising energy prices
- 700,000 empty homes
Retrofit Opportunities

- Reduce health impacts of poor housing
- Economic impacts on investment, growth and job creation
- Extend the building’s useful life
- Alleviate fuel poverty
- Reduce emissions
- …
Retrofit Challenges

- Finance
- Owner/resident attitudes
- Lack of confidence in retrofit technologies
- The performance gap
- Number of skilled professionals
- …
EuroPHit Project
Policy Background

We are here

2012
EPBD - National implementation
NZEB - MS report on progress
EED - Entry into force

2013
EPBD - Application between 9/01/2013 and 9/07/2013
EED - National implementation

2014
EPBD - MS list of measures and instruments
RES Directive - Minimum levels of RES
EED - Assessment of national transposition

2015
NZEB - MS report on progress

2017
EPBD - MS updated list of measures and instruments

2018
NZEB - All new public buildings
NZEB - MS report on progress

2020
NZEB - All new/refurbished buildings

2013
EuroPHit project starts

2016
EuroPHit project ends

2020
Strategic objectives

Co-funded by the Intelligent Energy Europe Programme of the European Union
Reduce consumption!

how to get there?

EU’s 2020 objective:

All new/refurbished buildings as NZEBs (Nearly Zero Energy Buildings)
About EnerPHit

- “Quality-approved energy retrofit with Passivhaus components”
- Based on Passivhaus methodology, with 20 years of experience
- Detailed planning and modelling, still using PHPP software
- High quality building components
- Airtight construction, ventilation with heat recovery, avoidance of thermal bridging
- Low and predictable energy usage (80-90% reductions possible)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Passivhaus</th>
<th>EnerPHit</th>
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<td>Specific Heat Demand</td>
<td>≤ 15 kWh/m².yr</td>
<td>≤ 25 kWh/m².yr</td>
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<tr>
<td>Primary Energy Demand</td>
<td>≤ 120 kWh/m².yr</td>
<td>≤ 120 kWh/m².yr *</td>
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<td>Limiting Value</td>
<td>(n_{50} \leq 0.6^{-1})</td>
<td>(n_{50} \leq 1.0^{-1})</td>
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\* \(PE \leq 120 \text{kWh/m}^2\text{.yr} + ((\text{SHD} - 15 \text{kWh/m}^2\text{.yr}) \times 1.2)\)
All at once...

Building stock

Complete retrofit

There will be challenges:

- competence
- motivation
- financing
- lifecycle of existing components
- disturbance of inhabitants

NZEB
Overall refurbishment plan

...or Step-by-Step

EnerPHit + RES

- dissemination
- suitable products
- financing instruments
- pilot projects
- criteria and software tool

Building stock
Key project outcomes

- Criteria and certification scheme for retrofits aiming for the EnerPHit Standard over an extended period
- Financing models and market incentive programmes tailored to step-by-step retrofits
- Design concepts and sound guidelines for the development of suitable, high performance building components
- Training materials and workshops focusing on the specific needs of step-by-step refurbishment
- Building case studies showing the way towards an increasingly high quality, energy efficient building stock.
Example of step-by-step retrofit?

Building stock

Insulation windows, airtightness & ventilation

RES & heating system
Improving the energy performance of step-by-step refurbishments

paving the way to the EU’s 2020 objectives by enabling and inspiring building owners, planners, craftspeople and financial institutions to make the right decisions on step-by-step energy retrofitting with long-lasting benefits.

**EuroPHit is facilitating the transition to a Nearly Zero Energy society by:**

- Making step-by-step refurbishment plans, implementing them and documenting the findings for case studies across the EU
- Adapting training for designers and craftsmen on step-by-step retrofit and deep energy refurbishment
- Building quality assurance and certification infrastructure for step-by-step retrofits
- Stimulating demand for highly efficient refurbishment with financial and one-stop-shop solutions
- Driving the development of suitable products, materials and design concepts

**Poor efficiency building stock**
Thank you

Any questions at this stage?
Financing of Sustainable Housing Retrofit
Guidelines for Financial Institutions

Friedrichsdorfer Institut zur Nachhaltigkeit IzN e.V
Georg Kraft
To improve energy efficiency of buildings, we need to achieve a successful mix:

- of regulatory policies
- promotional schemes
- market based instruments
German strategies to lower energy demand

Law, Regulatory Policies
- Energy Saving Act, Energy Saving Ordinance, tighten the requirements step by step
- Renewable Energies Heat Act: Mandatory use of Renewable Energies of about 15 p.c. for new buildings
- Heating Costs Ordinance commits owners of buildings to charge tenants with energy costs depending on individual consumption

Promotional Systems, Financial Benefits
Promotion by KfW via financial intermediaries

Market Based Instruments, Prices, information, transparency in the market, best practice projects, energy certificates,

Research
The system of promotion of energy efficiency

- Promotion
- Efficient Technologies
- Energy Saving Ordinance
- Energy Experts Auditors
- Information, best practice projects

Co-funded by the Intelligent Energy Europe Programme of the European Union

- Application of minimum requirements for new buildings and existing buildings for primary energy consumption and energy losses

- Energy certification of buildings

- Member States shall have regulations and administrative provisions to comply

- Member States: Energy Saving Ordinances

Energy Performance Certificate

- Provides more transparency in the real estate market for tenants, buyers and owners
- Provides reference values to promote CO2 reduction and for the design of credit programmes
- Information on the thermal characteristics and energy performance (energy need, energy consumption)
- Reference values such as current legal standards and benchmarks
- Recommendations for the cost-effective improvement of the energy performance
Germany: Energieausweis

Obligation to present an energy certification when dwellings and buildings are being let or sold.

Together with the energy certificates, modernization recommendations have to be presented if possible.

So prospective tenants and purchasers of buildings and dwellings will also be able to take energy efficiency into account.
Established and internationally acknowledged promotional system

Principles

- Promotional criteria and Building Code are consistent. EE-requirements are more ambitious than legal requirements

- Using energy auditors and calculation tools as for the energy certificate, Mandatory requirement of qualified engineers and architects (quality assurance)

- Promotional incentives correspond with achieved standard
How does the promotional scheme work?

1. Owner
   - Get information (www.energiesparen.kfw.de)

2. Energy consultant
   - Concept/plan for refurbishment activities
   - Check if suitable for promotion (online tool)

3. Owner’s bank
   - Check/decide on creditworthiness
   - File application for promotional loan

4. KfW
   - Loan commitment and disbursement

5. Carry out refurbishment project

6. Up to EUR 4,000 extra promotion available for supervision
   - Ongoing consultancy/supervision
   - Confirm energy efficiency level reached

7. Confirm that promotional loans has been used in compliance with promotional loan conditions

8. Partial debt relief is booked according to energy efficiency level reached

Co-funded by the Intelligent Energy Europe Programme of the European Union

www.europhit.eu
The benchmark is the legal requirement

Retrofitting step by step
The EuroPHit Project

The EnerPhit Standard
Financial Instruments for Energy Efficiency Investments in Buildings

*Debt financing, Credit lines, Revolving funds, ESCO financing, Leasing*

Public Finance Mechanisms, Policies and Programs

- *Preferential Soft loans*
- *Grants - Redemption grants*
- *Guarantee schemes*
Financing the retrofit of buildings


<table>
<thead>
<tr>
<th>Document title</th>
<th>Financing the energy renovation of buildings with Cohesion Policy funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Number</td>
<td>ENER/C3/2012-415</td>
</tr>
<tr>
<td>Prepared by</td>
<td>Julien Paulou (ICF International), Jonathan Lonsdale (ICF International), Max Jamieson (ICF International), Isabella Neuweg (ICF International), Paola Trucco (Hinicio), Patrick Maio (Hinicio), Martijn Blom (CE Delft), Geert Warringa (CE Delft)</td>
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<tr>
<td>Checked by</td>
<td>Jonathan Lonsdale (ICF International)</td>
</tr>
<tr>
<td>Date</td>
<td>14 February 2014</td>
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</table>
EU Funding for Energy Efficiency in Buildings

http://www.buildup.eu/financing-schemes/
ELENA - European Local ENergy Assistance

EIB ELENA
Big investment projects
> 50 million €

KfW ELENA
investment projects
< 50 Mio. €

CEB ELENA
Social investment projects
< 50 Mio. €

EBRD ELENA
Focus on municipalities
< 50 Mio. €

Several facilities
The ELENA grant can be used for the preparation and implementation of the Investment Projects.

<table>
<thead>
<tr>
<th>Eligible costs</th>
</tr>
</thead>
</table>
| › Feasibility studies
| › Energy audits
| › Implementation of tender procedures
| › Contractual arrangements
| › Hiring or training of staff (e.g. project implementation unit) |

<table>
<thead>
<tr>
<th>Amount of grant</th>
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<tbody>
<tr>
<td>› amounts up to 5% of Investment costs</td>
</tr>
<tr>
<td>› covers up to 90% of eligible costs</td>
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</table>
ELENA – Eligible Investment Projects

› Increase of energy efficiency in public and private buildings
› Integration of renewable energy sources into the built environment and in urban transportation
› Investments in renovation, extension or new district heating/cooling networks
› Municipal programmes for energy-efficient equipment and appliances in SMEs and private households
### Partnering Banks, Final Beneficiaries, Investors

<table>
<thead>
<tr>
<th>Partnering Financial Intermediaries (PFIs)</th>
<th>Final Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>› Banks operating in the EU member states, Norway, Iceland, Liechtenstein or Macedonia.</td>
<td>› local or regional authorities (incl. members of the Covenant of Mayors) or associations of such bodies</td>
</tr>
<tr>
<td>› Banks receive global loans from KfW to fund the financing of investment projects of Final Beneficiaries / Investors.</td>
<td>› other Public Bodies, created by a public authority, with a public service mission, with more than 50% funding from public sources.</td>
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</table>

<table>
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<tr>
<th>Investors</th>
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<tr>
<td>› Local or regional authorities or other public bodies</td>
</tr>
<tr>
<td>› Private investors</td>
</tr>
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</table>
Specific aspects of KfW ELENA Facility

Global loans to local financial intermediaries

Global loan for the Investment Programme
[+ ELENA Grant]

[Larger part of the ELENA grant for in house capacity building in the municipality/region and/or consultancy services]

Final Beneficiaries: Municipalities, Regions, ESCOs

Private Investors: Housing Assoc., Healthcare Org., ESCOs

Individual loans for the Investment Projects

KfW

Partnering financial intermediary

[Smaller part of the EU grant for system building in the banks through technical assistance]
### KfW ELENA  Examples of Investment Programmes

<table>
<thead>
<tr>
<th>Bank</th>
<th>Country</th>
<th>Programme Description</th>
</tr>
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<tr>
<td>BPCE</td>
<td>France</td>
<td>programme for local and regional energy efficiency projects for individuals and private housing co-ownership, especially one stop agencies and public guarantee funds in order to lower financial risk in loans to housing co-ownership</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>Germany</td>
<td>programme for energy efficiency and renewables for municipalities, municipal owned companies and ESCOs</td>
</tr>
<tr>
<td>Erste Bank</td>
<td>Austria</td>
<td>new programme for energy efficiency and renewables for municipalities, including marketing and sales concept for a regional coverage throughout the country</td>
</tr>
<tr>
<td>Kommune-Kredit</td>
<td>Denmark</td>
<td>new programme for promoting energy efficiency and renewables investments by municipalities and regions</td>
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</table>
### KfW ELENA Facility

#### Next Steps

- **Internal decision of the Partnering Financial Intermediary**
  - Market analysis
  - Interest of the bank for this type of programme
  - Evaluation of the needs (volume of grant / volume of global loan)

<table>
<thead>
<tr>
<th>ELENA Grant</th>
<th>Global Loan</th>
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<tbody>
<tr>
<td>Preparation of the application (information on the applicant, the targeted region, the volume and use of the grant, the types of Investment Projects, the schedule of implementation, …)</td>
<td>Negotiations with KfW about the financing conditions (volume, term, interest, collateral, etc)</td>
</tr>
<tr>
<td></td>
<td>Preparation of a Term Sheet</td>
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Special Aspects

- Co-operation
- Comprehensive Programs
- Viability and Feasibility
  (technical solution - energy audit – loan conditions)
- Know How (energy advisors)
- FaQ
Thank you
The Mayor has set a **60% CO₂ reduction target for London by 2025.**

**36% of London’s CO₂ emissions are from housing**, over 80% of this is from space and water heating.

**80% of buildings in use today will still be standing in 2050.**
RE:NEW Phases

Phase I & II
2009 - 2014
Area-based delivery

Trial, demo, and rollout

• > 100,000 homes
• > 22,000 annual tCO₂

Phase III
2013 - 2017
Strategic delivery

RE:NEW Support Team

Interim team supported (2013 – 2014)

• ~ £17.8m capital expenditure
• > 6,000 homes
• > 3,400 annual tCO₂

Full support team (2014 – 2017)

• 90% EIB* and 10% GLA funding
• £352m capital investment
• 175,000 homes
• 93,000 annual tCO₂

* Funded through the ELENA facility under the CIP-Intelligent Energy Europe Programme.
RE:NEW Programme – Work streams

• Support Team (core service) – active support to landlords

• Enabling projects – tools to make retrofit easier
  • Procurement framework
  • New resources and guidance (planning, technical issues)

• Innovation Unit – structured approach to overcome challenges and undertake retrofit at scale:
  • Tackling the private rented sector
  • Strategic business case tool
  • Energiesprong – pre-fabricated solid wall insulation solution

• Marketing & Communications – promoting RE:NEW Service and retrofit generally

MAYOR OF LONDON
RE:NEW Support Team – Services

- Designed to increase scale, speed and value of domestic retrofit
- Support plan tailored to needs and progress of each organisation
- Community of Practice
- Expert team with broad skill set
- Free support

**Services:**
- Opportunity Analysis
- Strategy Development Support
- Technical Advice
- Funding and Finance Support
- Training and Coaching
- Programme Optimisation
- Planning Support
- Marketing and Engagement Advice
- Procurement Support
- Support during Project Delivery

MAYOR OF LONDON
Description: RE:NEW will help organisations to identify and secure the right mix of funding and finance for retrofit programmes.

Support available to RE:NEW Community Members:
- Engaging providers of ECO and gas network funding – soft market testing;
- Supporting funding applications;
- Business case development to help secure internal funding;
- Liaison with external funders and brokerage;
- Identification of commercial opportunities to fund retrofit;
- Development of innovative approaches to financing retrofit;
- Making the case to health providers for funding – ‘insulation on prescription’
Genesis Housing Association

- Currently developing 4 year planned maintenance programme (kitchens, bathrooms, windows, heating)

- GHA’s sustainability team keen to improve energy efficiency across stock by tackling worst performing dwellings (SAP rating of below 65)

- RE:NEW Support Team is working with asset management and sustainability teams to:
  - Identify additional work requirements, e.g. Solid wall insulation
  - Identify properties with a SAP of below 65 that are not included in the programme
  - Coordinate delivery of works at the household level to minimise disruption and costs
  - Coordinate delivery of works at the area level to minimise costs
For more information

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kore.mason@london.gov.uk

Jules Bickers
RE:NEW Programme Director
Capita
07983 639111
Jules.bickers@capita.co.uk

MAYOR OF LONDON
Break
Resume in 15mins
Agenda

- Portsmouth City Council (PCC) Housing Stock
- Wilmcote House Details
- Wilmcote House Demand
- Project Options
- Wilmcote House Project
- Research Evaluation
- Why EnerPHit?
- Portsmouth CC Funding
- ECO Funding
PCC Housing Stock

• **Stock size**
  – 15,000 HRA & 2,000 leaseholders

• **Asset type**
  – residential & commercial assets, traditional & non-traditional

• **Age of stock**
  – predominantly post war (1950 – 1970)

• **Tower blocks**
  – 13 tower blocks (10 storeys and above)

• **Repairs & Maintenance budgets**
  – £46 million annual repairs & maintenance budget (2014/2015)

• **Asset management strategy**
  – demand led planned maintenance programme, no repair backlog
Wilmcote House Details

Construction

- Large Bison REEMA concrete panel construction
- 11 storeys & built 1968
- Average SAP 55
- 100 x Three bedroom maisonettes
- 7 x One bedroom flats
- Area Housing Office located on ground floor
- Previous major schemes & estate regeneration early 1990s
Wilmcote House Demands

- Electric heating cost excessive for residents
  - Fuel poverty
  - Somerstown deprived area of city
- Maintenance costs significant
  - Condensation reported by a third of residents
  - Window repairs reported by 80% of residents over a 2 year period
  - Water ingress issues to properties and communal stairwells
- Windows and roof at end of serviceable life
- Concrete repairs required to maintain life of structure
- Decorations to communal & external areas failing
- Security to communal areas ineffective
- Area Housing Office relocating to new community hub
Project Options

• Do nothing
  – Life of building 15/20 years

• Refurbish elements adhoc over a period of time
  – Not resolving problems and no economies of scale for separate schemes

• Whole building approach – EnerPHit
  – Preferred option for life of building and resident lifestyle

• Demolish and rebuild
  – Most costly direct and indirect costs, impact on asset strategy
Factors Against Demolition

- Demolition costs
- Disturbance allowances & home loss costs
- Rebuilding costs including fees
- Rent loss during decant and rebuilding phases
- Site footprint physical constraints and planning requirements within area
- Decant impact on PCC waiting lists & demand for three bedroom properties
- Demolition impact on residents and community
- Financial cost appraisal supported refurbishment
- Asset management strategy impact on other high rise and non traditional buildings over next 30 years
Wilmcote House Project

Project Overview

- Insulate external envelope with cladding EWI
- Replace roof and insulate
- Triple glazed window replacement
- New hot water cylinders & install electric showers
- Mechanical Ventilation Heat Recovery (MVHR) units
- Extend living areas and create sun room
- Enclose communal walkway, create additional entrance
- Introduce restrictive access doors
- Convert office into 4 additional flats
- Structural concrete repairs & decorations to external/communal areas
- **Replace electric heating**
Research Evaluation

• Energy benefits
  – Initial research indicates more than half the properties fail to achieve the recommended indoor temperatures
  – Reassess temperatures, demand for electricity & costs post scheme to address fuel poverty

• Health benefits
  – Health of residents before, during and after scheme

• Social benefits
  – Impact on residents lives before, during and after the project
  – Use of building and controls by residents post work

• Asset benefits
  – Impact on PCC asset management strategy for other high rise and non-traditional properties
  – Costs of work (direct & indirect) versus alternative asset management strategy options such as demolition or traditional schemes
Why EnerPHit?

- Residents improved living environment
  - Fuel poverty & cost of heating
  - Health and social benefits
  - Effective management of property systems & controls

- Informing asset management strategy
  - Future proof against government energy standards for housing (U Values & SAP Ratings)
  - Future proof energy prices with strategy to insulate & reduce demand for energy
  - Reduce D2D maintenance demand in non-traditional stock
  - Learning from ‘actual’ complex large exemplar scheme informing strategy of all 17,000 PCC housing stock & not just Wilmcote House

- Priority is building performance versus certification
Portsmouth CC Funding

- Investment in housing stock for 20 years
- Self financing settlement
- 30 year financial plan
  - Major schemes to tower blocks planned
- 7 year capital budget plan
- 2014/15 annual budget agreed residents & councillors
Portsmouth CC Budget 2014/15

Expenditure
– Supervision & Management £12.5M
– Special Services £11.8M
– Response Repairs £23.5M
– Rev Contribution Capital Work £16.0M
– Debt & interest Costs £10.2M
– Other Costs £3.1M
£77.1M

Income
– Supporting People Tenancy Grant £1.0M
– Rents & Charges £78.5M
£79.5M
ECO Funding

• ECO Funding for Wilmcote House
  – July 2013 £880,000 ECO funding available
  – Sept 2014 NO ECO funding available

• ECO Funding issues
  – uncertainty with changes to criteria and estimated funds available
  – unrealistic timescales at commencement of project for procurement and planning
  – client input limitations regarding design and specification

• Additional funding would enable capital programme to be achieved over a shorter timescale
Thank You
Questions

• What are the opportunities and challenges perceived?
• What partnerships and collaborations are needed?
• Is step-by-step a viable solution?
• Appropriateness of policy?
• What do residents need/want?
• Level of energy efficiency?
Feedback
Lunch

Resume in 45mins
Commercial Property Session
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Context of Commercial Refurbishment
The UK Commercial Building Stock

- Commercial buildings are responsible for 20% of CO2 emissions
- 1.8 million commercial buildings in the UK
- 70% of existing stock will still be standing in 2050
- Two thirds is rented, one third is owner-occupied (inverse of residential statistics)
- Average lease of 4.8 years
Retrofit Opportunities

• Annual refurbishment rates are between 2% and 8%
• Estimated total market investment potential of £9.7 billion
• Potential energy savings of £1.6 billion
• Reduced risks due to future energy cost and supply uncertainty
• Potential to extend the useful life of buildings
• Meeting regulations and technical standards
• Better environment for users
• Demonstrating corporate responsibility
• …
Retrofit Challenges

- Number of fiscal incentives already in place, not maximised
- Complexity of existing financial schemes
- Perceived level of financial risk
- Perceptions of having debt attached to an asset or balance sheet
- Short-termism
- Targets set in Regulations
- Levels of knowledge and available skills
- Split incentive between landlords and tenants
- Little desire to carry out retrofits on occupied buildings
- …
Retail Market

Top 3 motivators behind undertaking refurbishment:

• Need – creating an environment that attracts shoppers and displays the retailer’s products as favourably as possible

• Competitor actions – reacting to portfolio refreshments by competitors to prevent loss of sales

• Return on investment – generating additional sales. Any expenditure needs to contribute directly to the bottom line within an acceptable payback period.
Retail Market

Other common drivers behind a retail retrofit programme include:

- Increasing the sales area of units
- Implementing a rebranding exercise
- A change in the client’s management board
- As part of an expansion programme
- In response to declining share performance
- The implementation of measures to ensure compliance
- The introduction of technology to offer shoppers new experiences or to derive greater operational efficiency

Lots of factors to consider – energy efficiency is just one part of a complex picture
Potential Solutions

1. Define corporate retrofit goals
2. Designate appropriate roles, responsibilities and processes
3. Prioritise the portfolio
4. Occupier engagement and relationship management
5. Agree financing arrangements
6. Selecting appropriate technology
7. Delivery
8. Evaluation
Questions

• What are the opportunities and challenges perceived?

• How do we meet the challenge and deliver successful outcomes?

• Suggestions for overcoming short-termism?

• What partnerships and collaborations are needed?

• Appropriateness of current policy?

• How can the perceived risks be alleviated/managed?
Feedback and Summary
Thank you for your attention

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