Welcome to YEPG
Rethinking Energy Performance

Retrofits: Going Beyond a Facelift?
To become an official member of the group - please email groups@cibse.org stating that you would like to join the Young Energy Performance Group.
6.30pm Welcome
6.35pm Summer Series Sum-Up
6:45 Our Speakers
7.30pm Discussion
Networking & Drinks
Summer Series Sum Up

1. User Behaviour
2. Performance Gap
3. Future Proofing
4. Building Management
5. Simulation
6. Retrofit…
Richard Holland
Technology Strategy Board
Retrofits – Going beyond a face lift?

Rick Holland, @RickTSB
CEng, MCIBSE, PhD
Lead technologist, Technology Strategy Board
Building services representative on the 2050 Group
Areas of exploration

1. Do retrofits reduce CO$_2$ emissions?

2. Are retrofits affordable?
Retrofit for the Future

- Technology Strategy Board funded
- c.100 properties
- Whole house retrofits
- 80% CO₂ reduction target
- Works completed in 2011
- Measured performance since
So how did they do?

Retrofit for the Future Properties

c. 80% reductions

c. 50-70%

c. 40%

http://www.retrofitanalysis.org/
How did they achieve that?

Pre and post retrofit air tightness

http://www.retrofitanalysis.org/
There’s more to it than air-tightness...

Carbon dioxide emissions plotted against air-tightness post-retrofit

http://www.retrofitanalysis.org/
They’re also great homes to live in

http://www.retrofitanalysis.org/
And cheaper to heat and power?

UK average fuel bill ≈ £1,400 /yr
UK average house size ≈ 90 m²
UK average energy costs ≈ £16 /m²/yr

http://www.retrofitanalysis.org/
Affordable fuel & power

The money saved will be spent elsewhere. What’s the CO₂ impact of that?

Source: Living Costs and Food Survey - Office for National Statistics
What’s the impact of spending elsewhere?

“in the case of an individual household, savings that are made through, for instance, improved insulation, release money that will be spent on other goods. These will entail some energy consumption, creating a "rebound effect" in practice the money that has been released, which was previously being spent essentially on either primary fuel (e.g. gas or oil) or on electricity, is unlikely to be spent on anything equally energy intensive. [30]”

Select Committee on Science and Technology Second Report
Do retrofits reduce CO₂ emissions?

Source: Living Costs and Food Survey - Office for National Statistics
Are retrofits affordable?

<table>
<thead>
<tr>
<th>Costs</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>Capital</td>
<td>Energy bill savings</td>
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<tr>
<td>Maintenance costs of new technologies</td>
<td>Comfort</td>
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<td>Disruption during works</td>
<td>Property value</td>
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<td>Loss of internal space</td>
<td>Crime reduction</td>
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<tr>
<td>Other costs</td>
<td>Mental well-being</td>
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Q: Can these → be used to finance ← these

Ref: NCH and Nottingham Trent University *Decent Homes impact study*
Are retrofits affordable?

**Finance sources**
- Green Deal
- Property owner
- Ad-hoc grants

**Costs**
- Capital
- Maintenance costs of new technologies
- Disruption during works
- Loss of internal space
- Other costs

**Benefits**
- Energy bill savings
- Comfort
- Property value
- Crime reduction
- Mental well-being
- Education standards
- Physical health
- Local employment
- Other benefits

**Other costs**
- Energy bill savings

**Other benefits**
- Comfort
- Property value
- Crime reduction
- Mental well-being
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- Local employment
- Other benefits
Are retrofits affordable?

- [www.cse.org.uk/projects/view/1199](http://www.cse.org.uk/projects/view/1199)
- Online case studies

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In summary

1. Do retrofits reduce CO₂ emissions?
   – Up to 80% at the level of an individual property
   – Exploration needed on the macro effects to other sectors

2. Are retrofits affordable?
   – Not currently at scale
   – The TSB competition ‘Scaling Up Retrofit’ is supporting new technical solutions that reduce capital costs
   – Might social investment take off in this sector?

P.S. I’m sticking around and glad to discuss the new ‘Future Energy Management for Buildings’ call

Thank you to the YEPG
David Adams
Willmott Dixon Energy Services
CIBSE Young Energy Performance Group

Retrofit - Going beyond a facelift

David Adams
Technical Director
Willmott Dixon Energy Services
August 2013
Willmott Dixon

- Major construction company
- Established 1852
- Privately owned
- £1bn turnover (2nd largest private construction Co in UK)
There’s plenty of opportunity......

Private E,F,G

Social E, F,G

Number

15.0m

3.6m

1.8m

2.0m

DCLG English House Condition survey 2009-10
High cost....

BEFORE

AFTER
Insulation to be carried through floor zone

Floor boards cut back to 1st joist to facilitate insulation to be installed through floor zone

New skirting to match existing

Vapour barrier fixed with s/s staples and taped (Proclima tape) to existing solid timber joist.

Ensure any pipes, cables or duct penetrations through the joist are sealed to prevent water vapour which could condense on cold surfaces

Existing ceiling left in place

12.5mm Plasterboard & Skim

Vapour barrier behind as specified by the IWI system designer, lapped and taped to service penetrations to ensure full vapour seal

95mm Earthwool EcoBatt, water repellent glass mineral wool slab fitted tightly between Ecostuds (Thermal conductivity 0.032 W/mK)

This standard detail sets out the principles of our approach, and is intended for guidance only. The IWI system provider must take full design responsibility for each project and specifying the vapour barrier.

NOTES FOR INSTALLATION

DO:
- Remove picture rails, skirting's and dado rails before installing the IWI (Internal Wall Insulation) system so as to prevent the Ecostuds being fixed tightly against the wall.
- Use Knauf multi purpose sealant to seal electric socket against the plasterboard, as well as all gaps around plumbing service penetrations.
- Seal all joints at the perimeter of the plasterboard using Knauf Multi Purpose Sealant to prevent air movement behind the IWI System.
- Fix all Ecostuds to the existing wall using screws and suitable universal wall plugs.
- The minimum fixing penetration of 48mm is required into the existing masonry wall (excluding thickness of plaster).
- Position the fixings at 600mm maximum centres and 75mm from the end of each stud.
- Ensure all joints, nos. tears and penetrations through the vapour check membrane are sealed prior to the installation of the plasterboard to avoid interstitial condensation.

DO NOT:
- The extruded polystyrene content of Ecostud should not be subjected to temperatures in excess of 70°C.
- Do not cover or block the supply of air to combustion appliances, for more information refer to the Building Regulations approved document J.
- Do not route cables where they will be covered by thermal insulation. If cables need to be located within insulation, they should be run in conduit and possibly increased in size.
- PVC-insulated cables should be located in suitable conduit to avoid being in direct contact with extruded polystyrene insulation in order to prevent plasticiser migration which can cause loss of protection to the conductors.
- Do not fix radiators to plasterboard alone without first installing nogging.
Measuring Performance
Retrofits: Going Beyond a Facelift?

How important is retrofit?
Are we any good at doing it?
Can the Green Deal work?
Please follow us for future events

Website: cibse-epg.org/yepg/index.html
Linkedin: www.linkedin.com/groups/CIBSE-Young-Energy-Performance-Group-4512475/about
Twitter: twitter.com/CIBSEyepg
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