

European Retrofit Network

Retrofitting Social Housing Methodology Report

Presentation: 'Training for Retrofit', Brussels

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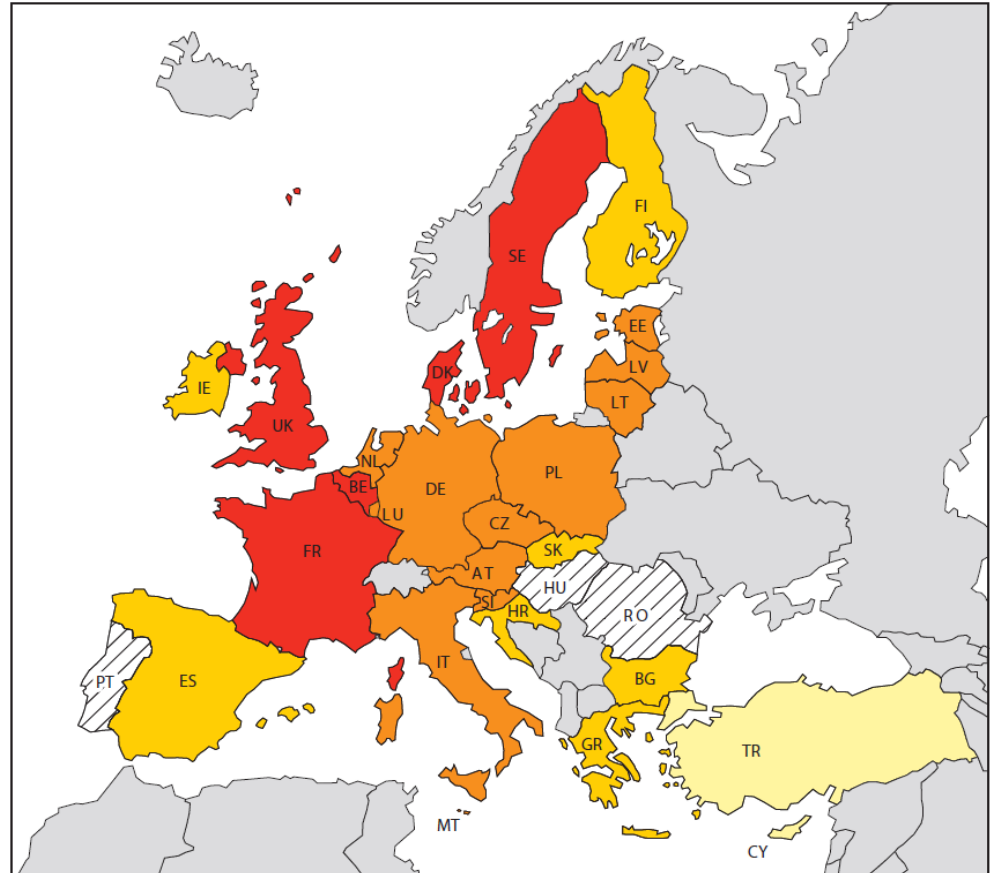
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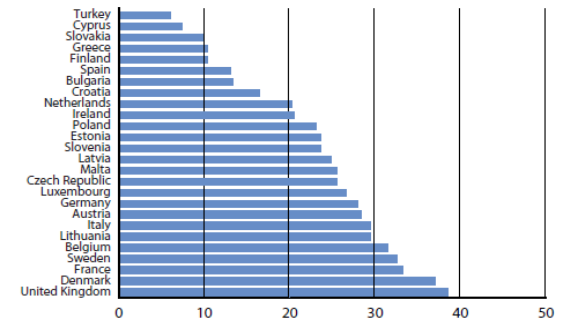
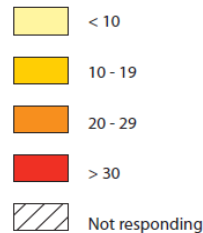
ERN Initial outcomes

- Green Deal - ‘One building per minute to 2050’
- Retrofitting interventions – what can be done
- Skills requirements
- Costs
- ‘Value Carbon’ € / kgCO₂
- Shallow, mid-level (C60), deep retrofit (C80)
- ‘Tipping point’
- Decanting occupants?
- Disruption to occupants!

EU dwellings built before 1945 generally “Hard to Heat”



Dwellings built before 1945 (%)



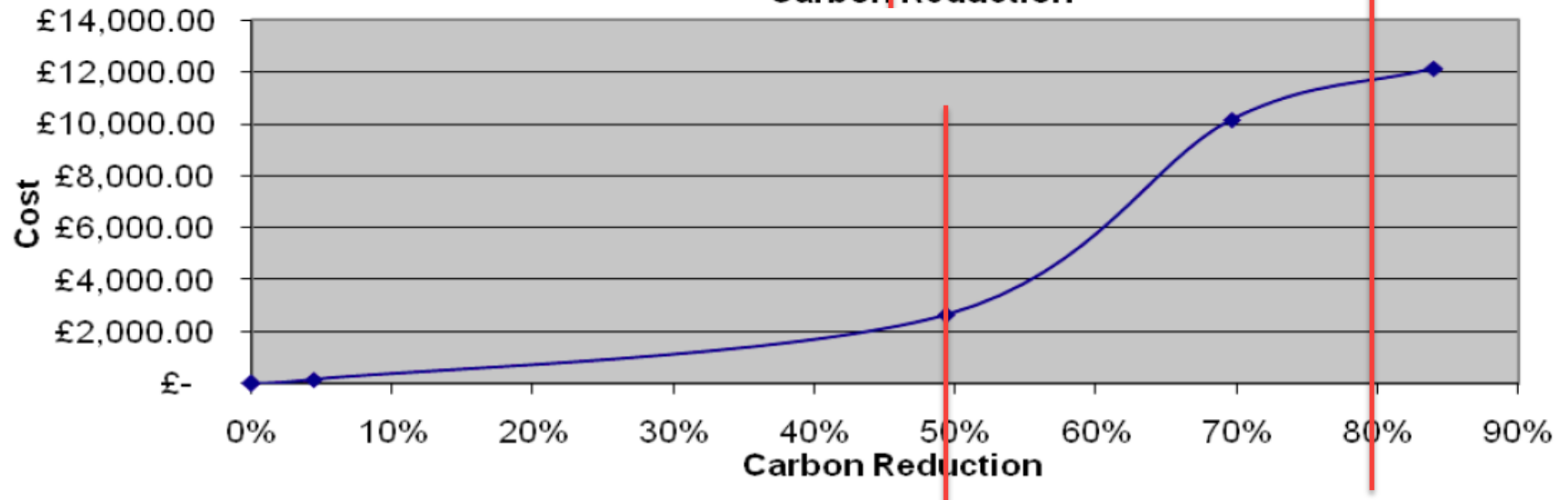
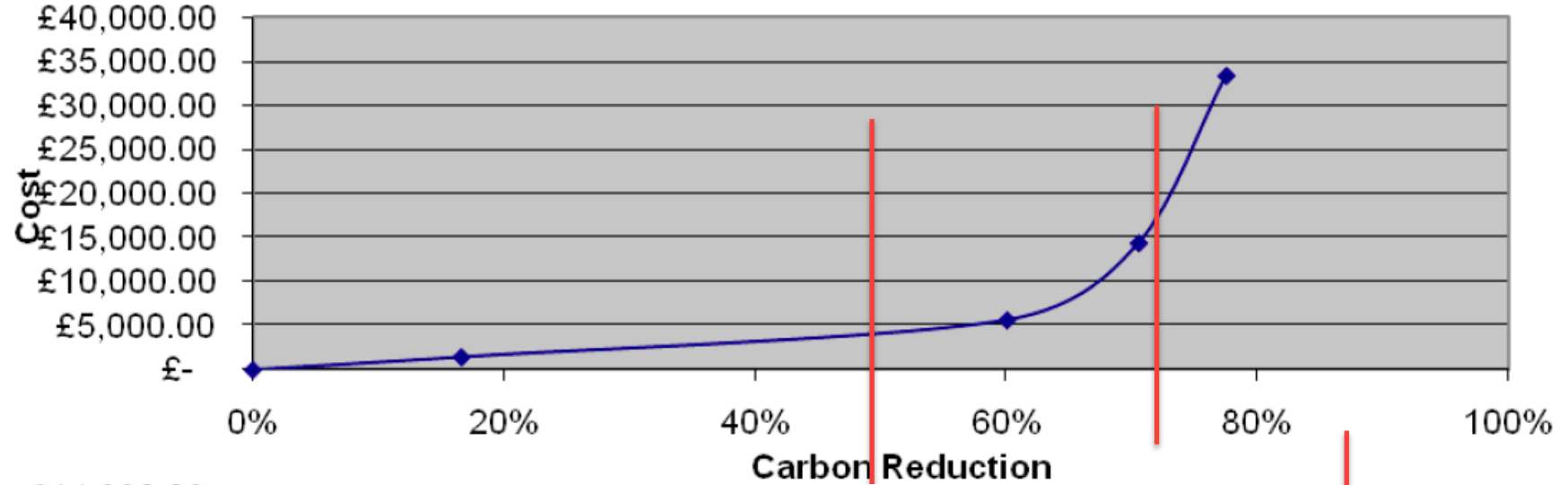
Not responding : Hungary Portugal Romania

Average costs for mid/deep emissions reduction

Source	Typology	Low cost	Med cost	High cost	LZC cost	£Total	%CO2 reduction
Housing Forum	HR Flat	150	2500	7500	2000	12150	84
HF	Terrace	1350	3000	10450	19000	33800	81
HF	LR Flat	800	3000	7500	2000	13300	94
HF	Semi	1450	4200	8750	19000	33400	78
Existing Homes Alliance	Semi cavity wall					22300	68
EHA	Semi solid wall					29500	71
EHA	Semi off gas					27400	78
United House Construction	Precast semi					22000	70
DGHP (Hous Assoc)	Terrace					25000	80
Radian (Hous Assoc)	House					36000	85
MEAN						£25,485	79%

Tipping Point: semi-detached & mid-floor flat

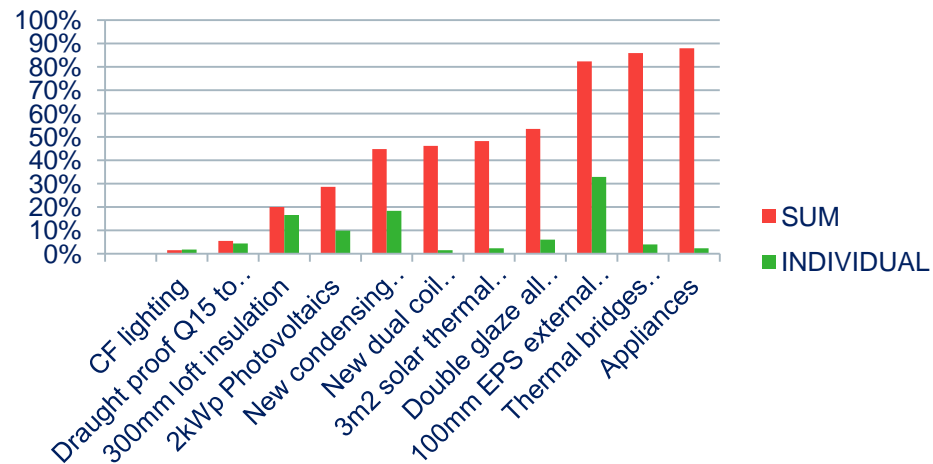
source: The Housing Forum, <http://housingforum.org.uk/sites/default/files/sustainable-refurbishment-010409.pdf>



FOR THE SAME COST: ONE HOUSE AT 70-80% OR THREE HOUSES AT 50% PLUS "ENABLING WORKS"

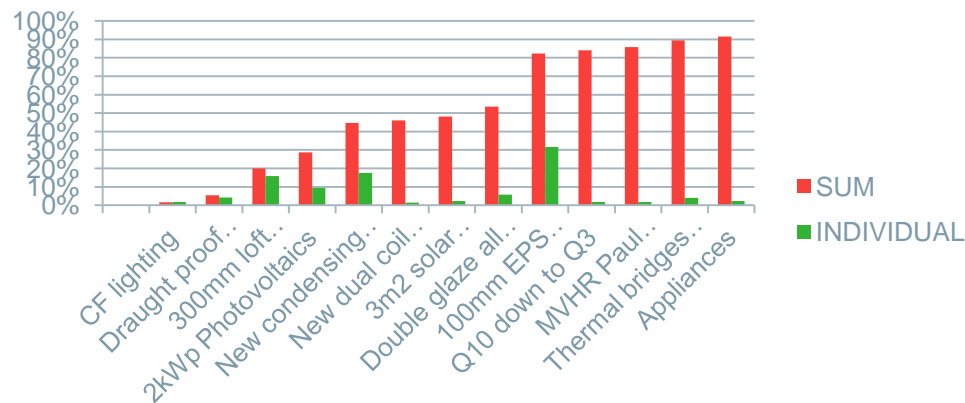
10 days in house	CO2 (kg/yr)			
HIGH DISRUPTION	REDUCTION	SAVED	CuSum	Individual
Original Solid Wall Detached	9717	0	0%	0%
CF lighting	9564	153	2%	2%
Draught proof Q15 to Q10	9190	374	5%	4%
300mm loft insulation	7778	1412	20%	17%
2kWp Photovoltaics	6934	844	29%	10%
New condensing boiler & controls	5371	1563	45%	18%
New dual coil cylinder & insulated primaries	5240	131	46%	2%
3m2 solar thermal with PV pump	5039	201	48%	2%
Double glaze all windows u=2.0	4525	514	53%	6%
100mm EPS external wall insulation (EWI)	1718	2807	82%	33%
Thermal bridges $\gamma=0.04$	1373	345	86%	4%
Appliances	1173	200	88%	2%
		8544		100%
Disruption to heating and hot water				
Internal disruption from window replacement				
External facades require preparation				
EWI: re-routing of services & RWPs, SVP & drains?				
EWI: Roof soffits may need extending?				
OPTION FOR Q5 + fans or Q3 + MVHR				

D) DSWHD



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Double glaze all windows u=1.4	4525	514	53%	6%
100mm EPS external wall insulation (EWI)	1718	2807	82%	32%
Q10 down to Q3	1554	164	84%	2%
MVHR Paul Thermos	1388	166	86%	2%
Thermal bridges $\gamma=0.04$	1030	358	89%	4%
Appliances	830	200	91%	2%
		8887		100%
AIR TIGHTNESS CHAMPION				
MVHR designer				
MVHR installer and commissioner				

D2) DSWHD



Intervention	Comments	Level of Disruption
Low energy lighting	CFL becoming more common. GLS lamps to be phased out in UK by 2011	Low
Appliances	Need credible advice	Low
Hot water tank insulation	Uncontrolled heat loss to the house leading to summer overheating.	Low
Loft insulation	Many RSLs have already installed LI. Potentially disruptive where loft used as storage space. Reticence to allow access	Low
Cavity wall insulation	Many RSLs have already installed CWI. QA issues where thermal imaging shows poor application or entirely missing	Low
Draught proofing	Reduced ventilation can lead to condensation problems especially where envelope u values are low and insulation is internal. Sash windows in particular require skilled labour	Low to Medium
Photovoltaics	Scaffolding, roof work, external and internal electrical wiring. High cost currently offset by Feed in Tariff.	Low
New boiler	Loss of heating & hot water, disruption to electrics, builder's work	Medium
Solar thermal	Generally requires dual coil hot water cylinder, and interventions in internal central heating system plus external roof work with scaffolding	Medium
Insulated primaries	Potentially difficult to insulate in cylinder cupboards, behind boilers and where pipes go through walls	Medium
Heating controls	User interface leads to difficulty in programming heating and hot water. Default to manual over-ride	Medium
Reduced upstairs temperature	Assumes all house heating at a common temperature. Living room and bedroom temperatures for low income families indicate 19.1 and 17.1°C respectively Dependent on TRV installation in all rooms and on occupant behaviour	Medium
New windows & Doors	Wide experience of window replacement market. Potential challenges where new windows interface with deep insulation and effective air tightness sealing.	Medium
Internal wall insulation	"Dry lining" requires furniture removal and loss of space during retrofit. Loss of space as insulation effectiveness increases and extensive making good to doors, skirtings, electrical outlets, etc. High cost for single room. New methods proposed for laser measuring and off-site prefabrication to lower disruption. Potential for interstitial condensation	Very High
Ground floor insulation	Requires removal of existing floor or the use of expensive "super insulation" products such as vacuum sealed insulation with extensive making good to doors, skirtings, electrical outlets, etc.	Very High
MVHR	Very low air permeability from draught proofing requires whole house mechanical ventilation. MVHR is the most energy efficient but requires whole house ductwork installation and is thus high cost. Skills shortage in design, installation and commissioning and maintenance.	Very High
Community Biomass systems	Scope ranges from district heating to communal block heating. "Replacing a community gas boiler may not require tenant removal but replacing a block of flats on electrical storage heaters may result in significant disruption"	None to High

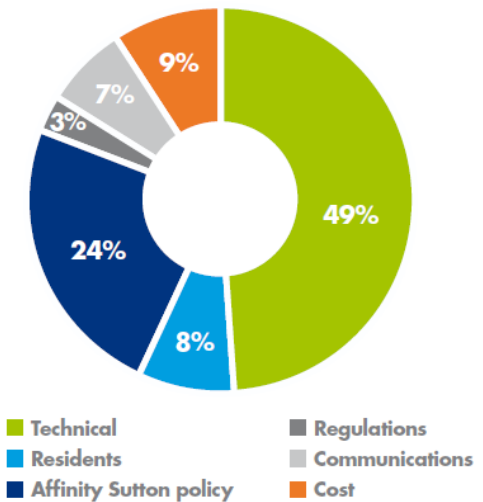
Subjective Skills Analysis

	Low	Medium	High	Skills	Comment
CFL				DIY	
Appliances	*			DIY	White goods energy advisors
Draught exclusion Q15 to Q10		*		Joiner/specialist contractor	Specialist contractors identified in interviews
Cavity wall insulation		*		Specialist contractor, Builder	Cavity wall Insulation contractor
Extract fans			*	Electrician Builder	
Loft insulation	*			Insulation contractor (Australian experience)	May be DIY, otherwise builder or specialist contractor
Photovoltaics			*	Electrician, Roofer	Specialist contractor under Microgeneration scheme
Boiler & controls			*	Plumber, Electrician, Builder	Future maintenance works
Cylinder & controls			*	Plumber, Electrician	
Solar Thermal			*	Plumber, Electrician, Roofer, Builder	Specialist contractor under Microgeneration scheme
Openings (windows & doors)		*		Builder, Joiner, specialist contractor	Builder or window contractor
External Wall Insulation		*		Specialist contractor, Builder, Plumber, Electrician	Specialist EWI contractor, all trades attending.
Draught proof Q10 to Q5		*		All trades	Requires specialist tapes and mastics, knowledge & commitment from all trades. Supported with Tool Box talks
Air-tight construction Q5 to ≤Q3			*	All trades	Requires specialist tapes and mastics, knowledge & commitment from all trades. Supported with Tool Box talks and in-depth planning & supervision.
Mechanical Ventilation with Heat Recovery (MVHR)			*	Specialist contractor, builder, electrician	Specialist design, installation, commissioning and maintenance. Requires access to hidden ductwork and MVHR unit.
Internal Wall Insulation		*		Builder, Plasterer, Decorator	Builder or specialist contractor, all trades attending
Floor insulation		*		Builder	Builder, all trades attending
Making good		*		Builder, plaster, decorator	All building works require "making good" and redecorating

FutureFit: Affinity Sutton HA Sept 2011

Source: http://www.affinitysutton.com/PDF/6416_futurefit_report_web.pdf

Figure 2: Workforce issues log – breakdown by theme



- Difficulty in achieving significant savings where works have already been carried out (insulate roofs, cavity walls, double glazing).
- Invitation to take part in a free eco-project sent to more than 800 residents resulted in only a 5% response rate [760 non-responders].
- 23% withdrew their permission, either leading up to or during the works period. They stated that the works were “too inconvenient”, “too disruptive”.
- From survey to completion, the number of visits to site ranged from 6 to 20.

The queries log tracked 166 issues, nearly half of which were technical. This highlighted the knowledge gap in an industry that has focused solely on Decent Homes for the last decade.

The supply chain is very keen to take up this agenda but will need training, commitment and volume if it is to be able to meet the Green Deal challenge.

Summary of the proposed methodology:

- Consider lights and appliances
- Consider **occupant behaviour**
- **Assess** the emissions using SAP or EPBD equivalent (requires 'u' values, knowledge of heating design, etc)
- Carry out **appraisal** based on technical options & **disruption**
- Carry out **project management** appraisal – costs, **skilled labour** availability, furniture/carpets, redecorate, supply chain, etc.
- Decide the acceptable level of **disruption**
- Retrofit measures, leave **“snag-free”**
- Report on estimated final emissions savings – **MONITOR?**