



Description

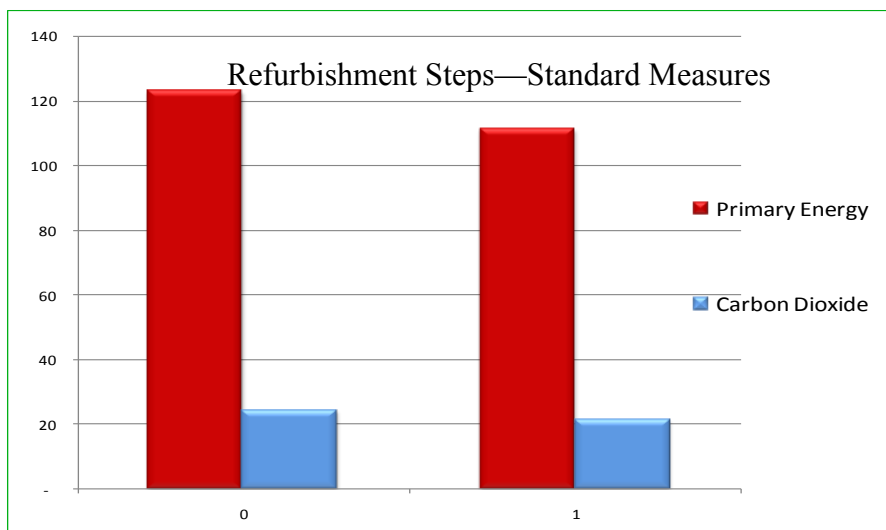
The walls of this timber frame house are well insulated with U values as low as 0.27 W/m²K and the floors are well insulated. Apart from adding additional roof insulation, the focus for retrofit would be on upgrading the space & water heating systems.

Building elements :		Insulation	U - value
Walls	Timber frame	100 mm	0.37
Roofs	Pitched, insulation between joists	200 mm	0.2
Floors	Solid concrete	40-80 mm	0.25
Windows	Double glazed, Low-E, wood/PVC frame, 16 mm gap	n.a.	2.0
Doors	Solid wooden	none	3.0

Heating systems characteristics:		Fuel	Efficiency
Primary	Central heating boiler, primary pipework insulated.	Mains gas	90%
Secondary	None.	n.a.	n.a.
Hot water	From primary heating system. Separated time controls.		
Cylinder	Factory insulated, 50 mm, cylinder thermostat		
Controls	Full zone control, boiler interlock		

Refurbishment steps — standard					Prim. energy kWh/m ² /y	Carbon Dioxide kgCO ₂ /m ² /y	Energy Rating	
0	Building fabric upgrade steps:				Expected U-values	123 (actual state)	24 (actual state)	B2
1	Roof insulation and standard package*	Add	100 mm of mineral wool over the existing insulation	0.13	111	21	B2	
Systems upgrade:								
2	Space and water heating system and controls	n.a.	Heating system meets all current requirements		n.a.	n.a.	n.a.	

*also includes draughtstripping (if not present), 80mm lagging jacket for DHW cylinder (if insulation is not present) and low energy bulbs.



Primary Energy: kWh/m²/y, Carbon Dioxide emissions: kg/m²/y


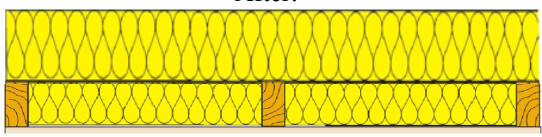
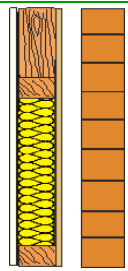
Estimated costs and payback time**

Measure	Estimated costs	Payback (y)
Step 1	€ 500	6.0
Total:	€ 500	6.0

Standard upgrade summary

Consumption of primary energy reduced by:	12 kWh/m²/y
Emission of carbon dioxide reduced by:	3 kgCO₂/m²/y

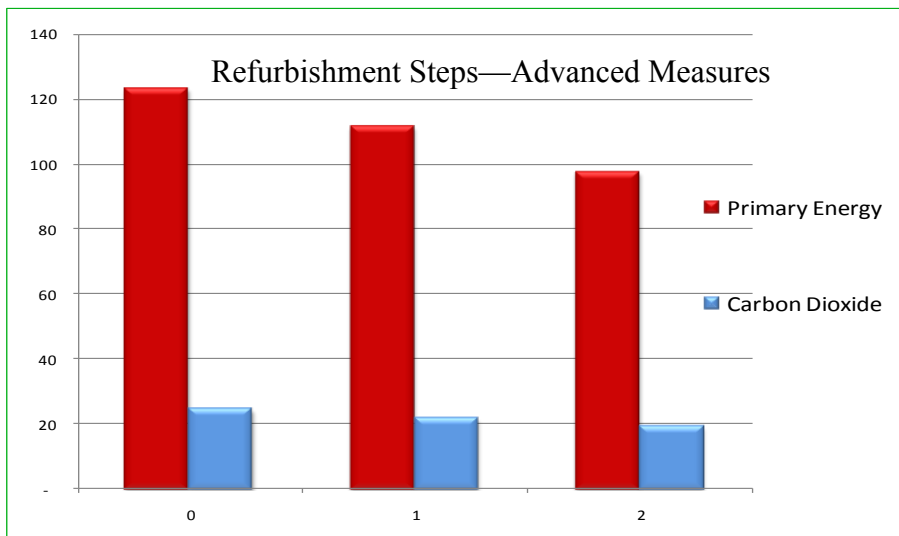
**Note: 1. Costs are indicative only, based on typical prices (2011). 2. Measures analysed are one of many options, especially for the renewable heating systems.

Typical roof upgrade (standard/advanced)	
200 mm of mineral wool between and above the ceiling joists	 <p>Before:</p>
Typical roof upgrade includes topping the attic insulation up to 300 mm. Conductivity = 0.04 W/mK	 <p>After:</p>
Typical wall construction	
Timber frame wall	
	Timber frame wall with the outer brickwork and ventilated drainage cavity. Insulation between the studs. U-value = 0.37 W/m ² K

Heating system upgrade		
Feature:	Standard	Advanced
Heat generator	n.a.	n.a.
Efficiency:	n.a.	n.a.
Fuel:	n.a.	n.a.
SH Controls type:	n.a.	n.a.
Hot water source (HW):	n.a.	Primary heating system and solar thermal panels providing 50% of HW demand
HW Cylinder:	n.a.	n.a.
HW Controls type:	n.a.	n.a.
Ventilation:	n.a.	n.a.

Refurbishment steps — advanced				Prim. energy kWh/m ² /y	Carbon Dioxide kgCO ₂ /m ² /y	Energy Rating	
0	Building fabric upgrade steps:			Expected U-values	123 (actual state)	24 (actual state)	B2
1	Roof insulation and standard package*	Add	100 mm of mineral wool over the existing insulation.	0.13	111	21	B2
Systems upgrade:							
2	Space and water heating system and controls	Replace/add	Solar thermal panels providing 50% of hot water demand		98	19	B1

* package also includes draughtstripping, 80mm lagging jacket for DHW cylinder (if not present) and low



Primary Energy: kWh/m²/y, Carbon Dioxide emissions: kg/m²/y

Estimated costs and payback time**

Measure	Estimated costs	Payback (y)
Step 1	€ 500	6.0
Step 2	€ 3000	47.4
Total:	€ 3500	23.8

Advanced upgrade summary

Consumption of primary energy reduced by:	25 kWh/m²/y
Emission of carbon dioxide reduced by:	5 kgCO₂/m²/y

**Note: 1. Costs are indicative only, based on typical prices (2011). 2. Measures analysed are one of many options, especially for the renewable heating systems.

Analysis conducted in association with IHER Energy Services, www.iher.ie