



Description: Very common house construction in most of rural Ireland during 1960s and 1970s. Typically has 100mm empty cavity in walls that can be pumped with insulation beads.

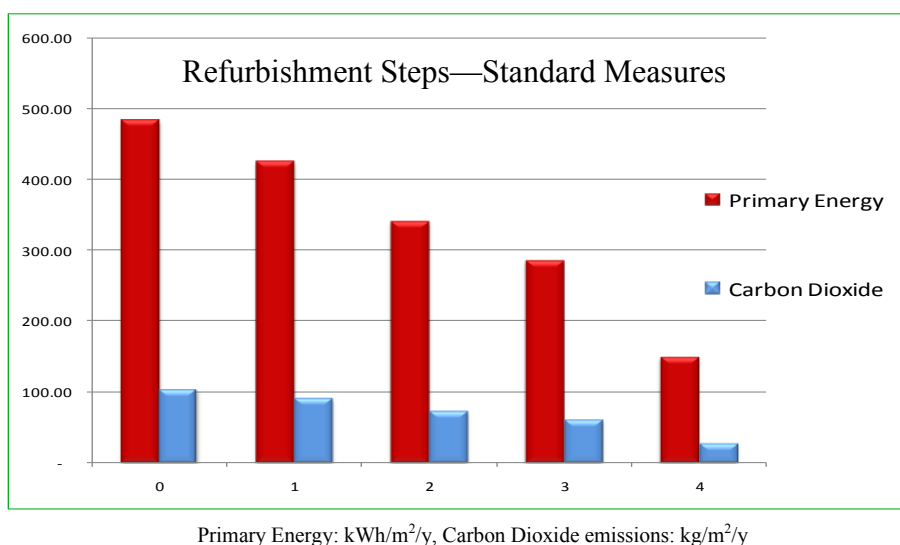
Building elements :		Insulation	U - value
Walls	Empty cavity walls	none	1.78
Roofs	Pitched, insulation between joists	50 mm	0.68
Floors	Suspended timber floor	none	0.65
Windows	Single glazed, metal frame	n.a.	5.7
Doors	Single glazed, metal frame	n.a.	5.7

Heating systems characteristics:		Fuel	Efficiency
Primary	Central heating boiler, pipework uninsulated	Mains gas	65%
Secondary	Open fire in grate	Solid, smoke-less	30%
Hot water	From primary heating system. Electric immersion used in summer		
Cylinder	No thermostat, insulated with 25mm lagging jacket		
Controls	Time clock only		

Refurbishment steps — standard

				Prim. energy kWh/m ² /y	Carbon Dioxide kgCO ₂ /m ² /y	Energy Rating	
0	Building fabric upgrade steps:			483 (actual state)	102 (actual state)	G	
1	Roof insulation and standard package*	Add	250 mm mineral wool between and over the ceiling joists	0.13	425	90	F
2	Wall insulation	Add	100mm cavity filled with beads.	0.32	340	72	E2
3	Windows and Doors	Replace	Double glazed, low-e windows, air filled, 16mm gap Insulated Doors	2.0	286	60	D2
Systems upgrade:							
4	Space and water heating system and controls	Replace	Condensing boiler 90% efficient, two separated heating zones with time and thermostatic control, independent water heating . Hot water cylinder insulated with 50 mm spray foam.	149	28	B3	

*also includes draughtstripping, 80mm lagging jacket for HW cylinder and low energy bulbs.



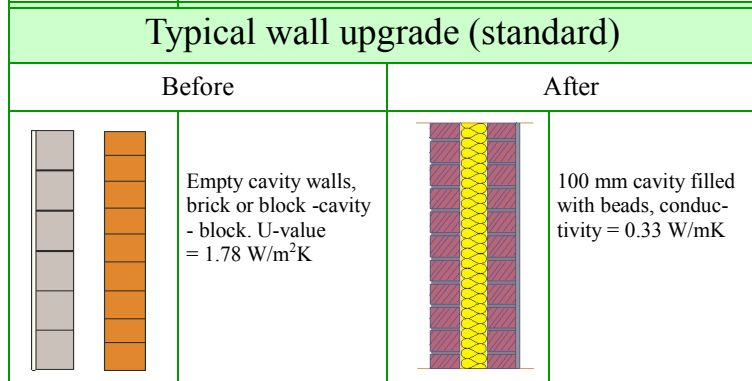
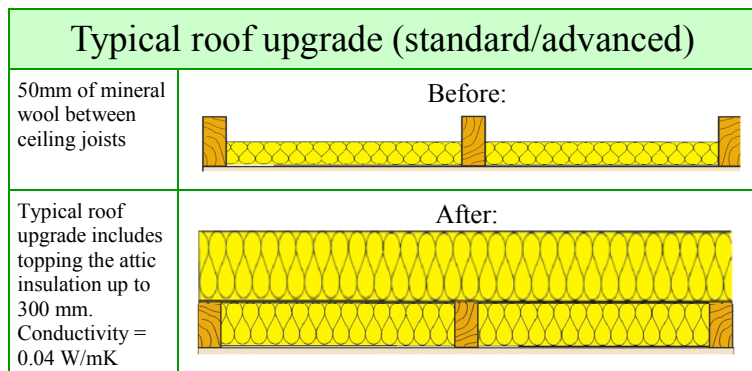
Estimated costs and payback time**

Measure	Estimated costs	Payback (y)
Step 1	€1,600	2.9
Step 2	€900	1.1
Step 3	€9,425	16.9
Step 4	€3,000	2.2
Total:	€14,925	4.5

Standard upgrade summary

Consumption of primary energy reduced by:	334 kWh/m²/y
Emission of carbon dioxide reduced by:	74 kg CO₂/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.



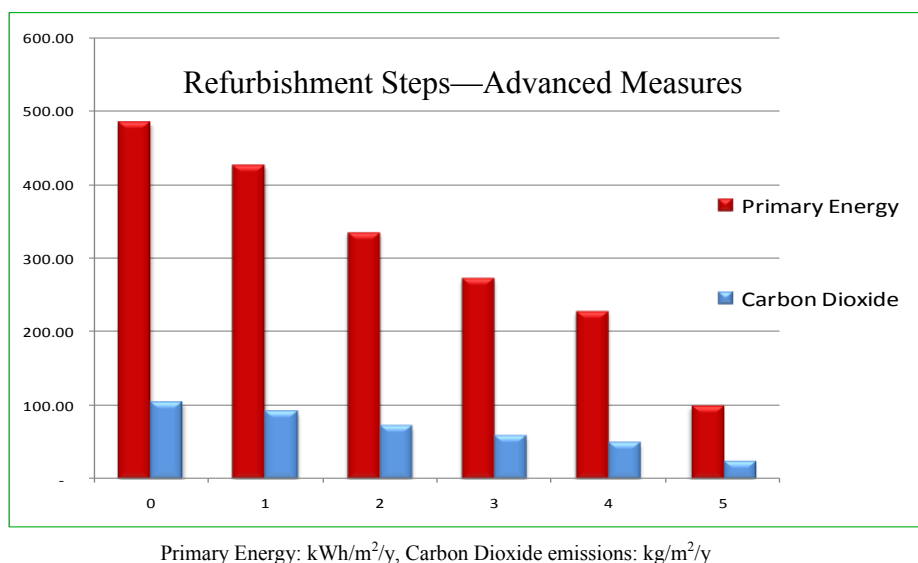
Heating system upgrade

Feature:	Standard	Advanced
Heat generator	Regular condensing boiler	Air source heat pump
Efficiency:	90%	380%
Fuel:	Mains gas	Electricity
SH Controls type:	Full zone control	Full zone control
Hot water source (HW):	Primary heating system	Primary heating system and solar thermal panels providing 50% of HW demand
HW Cylinder:	120 litre, factory insulated	200 litre combined cylinder, factory insulated
HW Controls type:	Time and thermostat	Time and thermostatic
Ventilation:	Natural	MVHR, 90% efficient

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	483 (actual state)	103 (actual state)	G
1	Roof insulation and standard package*	Add	250 mm mineral wool between and over the ceiling joists	0.13	425	90	F
2	Wall insulation	Add	Cavity walls filled with beads with combination of external wall insulation	0.21	334	70	E1
3	Windows and Doors	Replace	Triple glazed, low-e windows, argon filled	1.3	271	57	D2
4	Floors	Add	Insulation boards between the floor joists	0.25	226	47	D1
Systems upgrade:							
5	Space and water heating system and controls	Replace	Air source heat pump 380% efficient, two separated heating zones with time and thermostatic control, independent water heating, solar thermal panels providing 50% of hot water demand with combined HW cylinder. Mechanical ventilation with heat recovery (MVHR).		98	23	B1

* package also includes draughtstripping, 80mm lagging jacket for HW cylinder and low energy bulbs.



Estimated costs and payback time**

Measure	Estimated costs	Payback (y)
Step 1	€1,600	2.9
Step 2	€11,500	12.3
Step 3	€13,050	20.5
Step 4	€2,750	6.0
Step 5	€11,100	7.8
Total:	€40,000	10

Advanced upgrade summary

Consumption of primary energy reduced by:	385 kWh/m²/y
Emission of carbon dioxide reduced by:	79 kg CO₂/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.