



Description

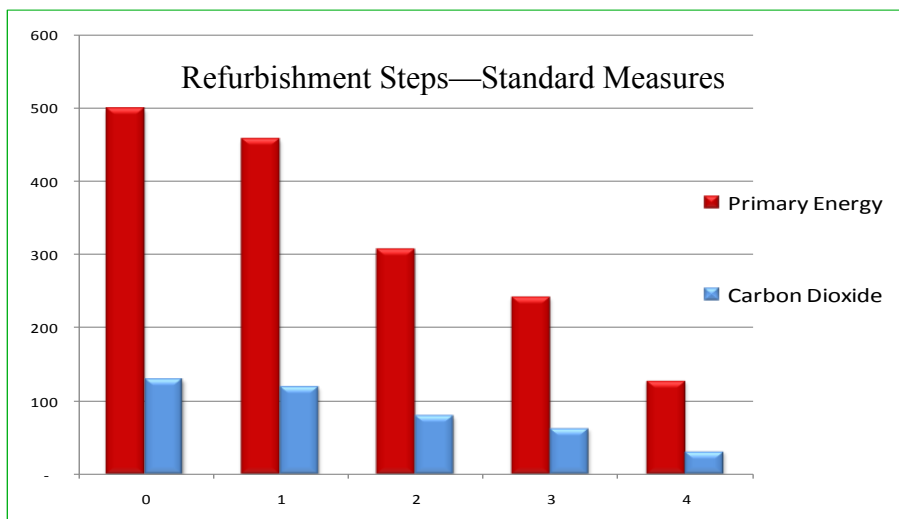
Semi-detached house with a brick-cavity-block front wall and hollow block walls to side & rear. All walls would be uninsulated. This construction was common from the 1950s up to the end of the 1970s in Dublin and along the East Coast but can be found in Cork too.

Building elements :		Insulation	U - value
Walls	Hollow block (gable and rear) Cavity wall (front)	none none	2.4 1.78
Roofs	Pitched, insulation between joists	50 mm	0.68
Floors	Solid	none	0.79
Windows	Single glazed, metal frame	n.a.	5.7
Doors	Single glazed, metal frame	none	5.7
Heating systems characteristics:		Fuel	Efficiency
Primary	Central heating boiler, pipework uninsulated	Heating oil	65%
Secondary	Open fire in grate	Smokeless	30%
Hot water	From primary heating system. Electric immersion used in Summer.		
Cylinder	Insulated with lagging jacket 25mm thick, no cylinder thermostat.		
Controls	Programmer only		

Refurbishment steps — standard

Refurbishment steps — standard				Prim. energy kWh/m ² /y	Carbon Dioxide kgCO ₂ /m ² /y	Energy Rating	
0	Building fabric upgrade steps:			499 (actual state)	129 (actual state)	G	
1	Roof insulation and standard package*	Add	250 mm of mineral wool between and over the ceiling joists	0.13	458	119	G
2	Wall insulation	Add	Gable and rear— internal drylining, 82.5 mm urethane/phenolic boards Front - cavity fill, 60mm	0.27 0.48	308	79	E1
3	Windows and Doors	Replace	Double glazed, low-e windows, air filled, 16mm gap Insulated doors.	2.0	242	62	D1
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.	128	31	B3	

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



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

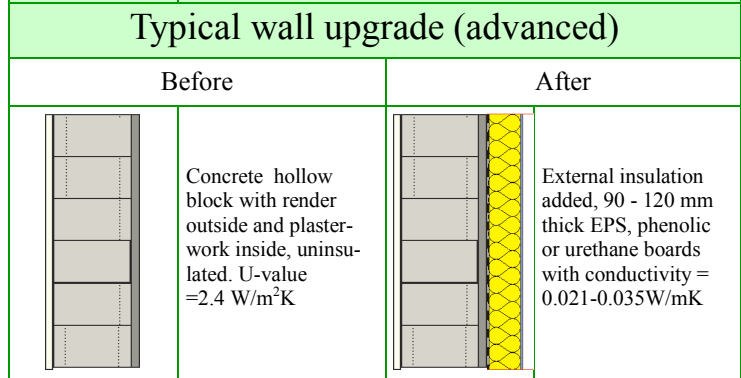
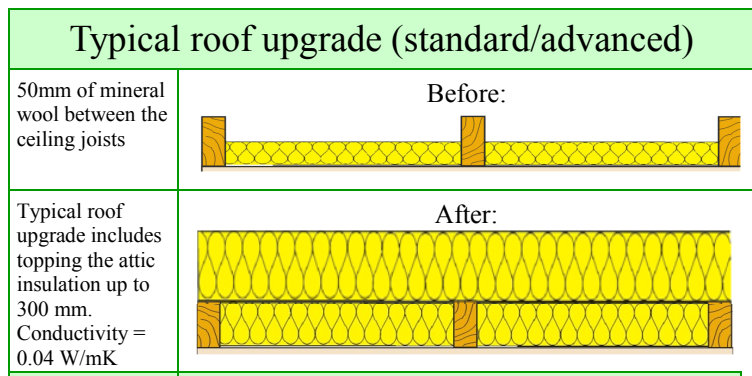
Estimated costs and payback time**

Measure	Estimated costs	Payback (y)
Step 1	€ 1,280	3.3
Step 2	€ 7,400	4.7
Step 3	€ 9,430	13.8
Step 4	€ 3,500	3.1
Total:	€ 21,610	5.7

Standard upgrade summary

Consumption of primary energy reduced by:	371 kWh/m²/y
Emission of carbon dioxide reduced by:	98 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.



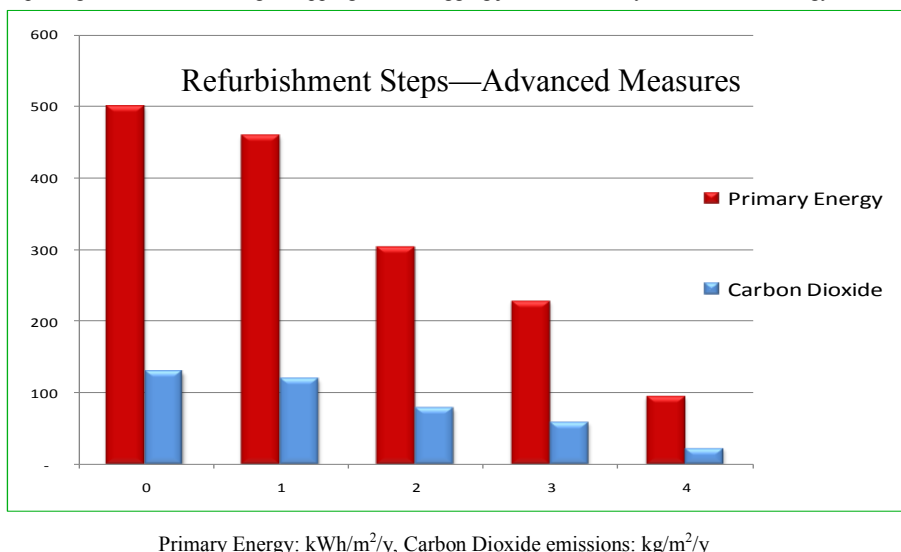
Heating system upgrade

Feature:	Standard	Advanced
Heat generator	Regular condensing boiler	Air source heat pump
Efficiency:	90%	380%
Fuel:	Heating oil	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	499 (actual state)	129 (actual state)	G		
1	Roof insulation and standard package*	Add	250 mm of mineral wool between and over the ceiling joists	0.13	458	119	G
2	Wall insulation	Add	Gable and rear— external insulation, 90-150 mm Front - cavity fill, 60mm	0.21 0.48	303	78	E1
3	Windows and Doors	Add	Insulated PVC/wooden doors Triple glazed, argon filled, low-e windows	2.0 1.3	228	58	D1
Systems upgrade:							
4	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).	94	22	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	€ 1,280	3.3
Step 2	€ 12,800	6.4
Step 3	€ 13,050	30.6
Step 4	€ 13,100	8.7
Total:	€ 40,230	9.3

Advanced upgrade summary

Consumption of primary energy reduced by:	405 kWh/m²/y
Emission of carbon dioxide reduced by:	107 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.