

4. End of terrace, solid brick walls, pre-1978



Description

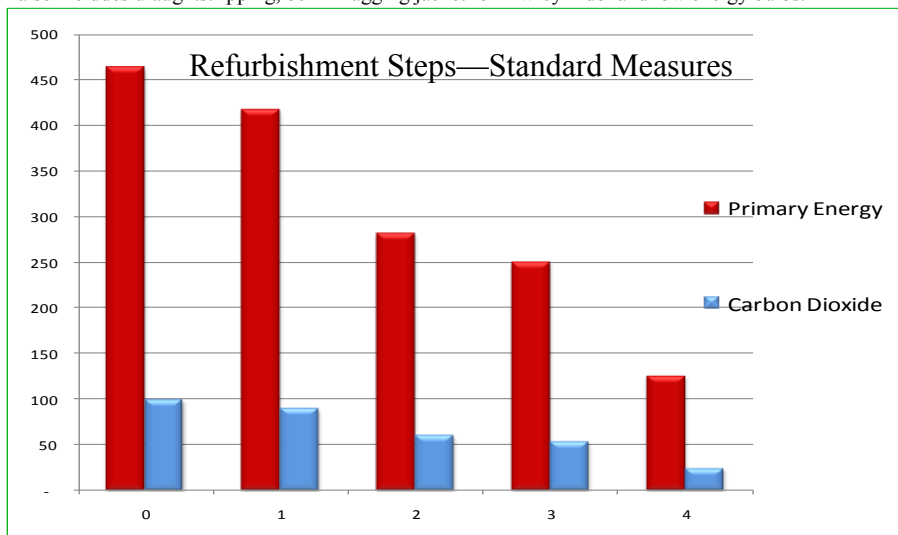
Solid brick fronted house with solid block walls to side and rear. Very common in older parts of Dublin, Limerick, Cork, etc. Built in the early 1900s and up to the 1940s. Suspended timber floors fitted in most of the property.

Building elements :		Insulation	U - value
Walls	Solid brick, 225 mm, partially semi-exposed	none none	2.1 1.38
Roofs	Pitched, insulation between joists	50 mm none	0.68
Floors	Suspended timber floor Solid floor	none none	0.69 0.79
Windows	Single glazed, wooden frame Single glazed, metal frame	n.a. n.a.	4.8 5.7
Doors	Solid wooden Wooden, half glazed	None none	3 3.9
Heating systems characteristics:		Fuel	Efficiency
Primary	Central heating boiler, pipework uninsulated	Mains gas	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, 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:			Expected U-values	464 (actual state)	99 (actual state)	G
1	Roof insulation and standard package*	Add	250 mm of mineral wool between and over the ceiling joists	0.13	418	89	F
2	Wall insulation	Add	82.5 mm of internal wall insulation+ vapour control layer.	0.27	282	60	D2
3	Windows and Doors	Replace	Double glazed, low-e windows, air filled, 16mm gap PVC/Timber frame doors.	2.0	250	53	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.		125	24	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


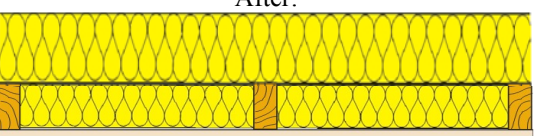
Estimated costs and payback time**

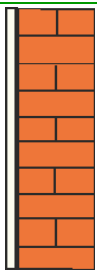
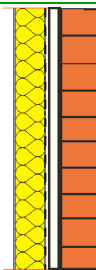
Measure	Estimated costs	Payback (y)
Step 1	€ 1,330	3.9
Step 2	€ 10,560	12.3
Step 3	€ 6,230	31.1
Step 4	€ 3,000	3.5
Total:	€ 21,120	9.3

Standard upgrade summary

Consumption of primary energy reduced by:	339 kWh/m²/y
Emission of carbon dioxide reduced by:	75 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.

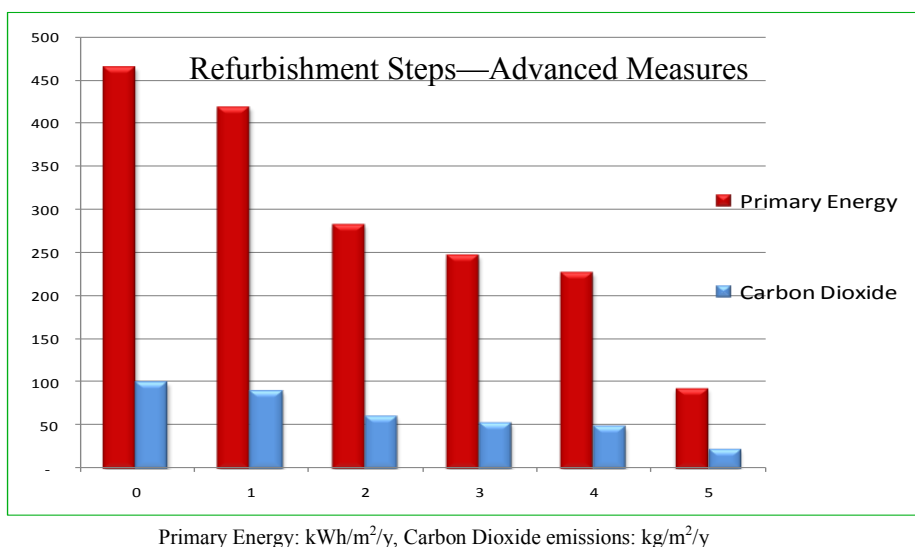
Typical roof upgrade (standard/advanced)	
50mm of mineral wool between the ceiling joists	 <p>Before:</p>
Typical roof upgrade includes topping the attic insulation up to 300 mm. Conductivity = 0.04 W/mK	 <p>After:</p>

Typical wall upgrade (standard/advanced)	
Before	After
 <p>Solid brick wall 225 mm, uninsulated, U-value = 2.1 W/m²K</p>	 <p>Internal insulation added, urethane or phenolic boards, conductivity = 0.021 - 0.025 W/mK</p>

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, 88-90% 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	464 (actual state)	99 (actual state)	G
1	Roof insulation and standard package*	Add	250 mm of mineral wool between and over the ceiling joist	0.13	418	89	F	
2	Wall insulation	Add	82.5 mm of internal wall insulation+ vapour control layer.	0.27	282	60	D2	
3	Windows and Doors	Add	Insulated PVC/wooden doors, Triple glazed, argon filled, low-e windows	2.0 1.3	246	52	D1	
4	Suspended floor	Replace	Insulate the suspended wooden floor with 70-100mm phenolic/urethane boards	0.25	226	48	C3	
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).		93	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	€ 1,330	3.9
Step 2	€ 10,560	12.3
Step 3	€ 8,350	36.9
Step 4	€ 2,130	18.4
Step 5	€ 13,100	18.8
Total:	€ 35,470	15.8

Advanced upgrade summary	
Consumption of primary energy reduced by:	371 kWh/m²/y
Emission of carbon dioxide reduced by:	77 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.