

22. Terraced house, hollow block walls, 1983-1993



Building elements :		Insulation	U - value
Walls	Concrete hollow block with internal dry-lining	25-50 mm	0.6
Roofs	Pitched, insulation between joists	100 mm	0.4
Floors	Solid	10-15 mm	0.48
Windows	Double glazed, metal frame, 12 mm gap	n.a	3.4
Doors	Solid wooden	none	3.0
Heating systems characteristics:		Fuel	Efficiency
Primary	Central heating boiler, pipework uninsulated.	Mains gas	75%
Secondary	Open fire in grate	Smokeless	30%
Hot water	From primary heating system. Electric immersion heater is used in summer.		
Cylinder	Insulated, loose jacket 35mm thick, no cylinder thermostat.		
Controls	Programmer		

Description

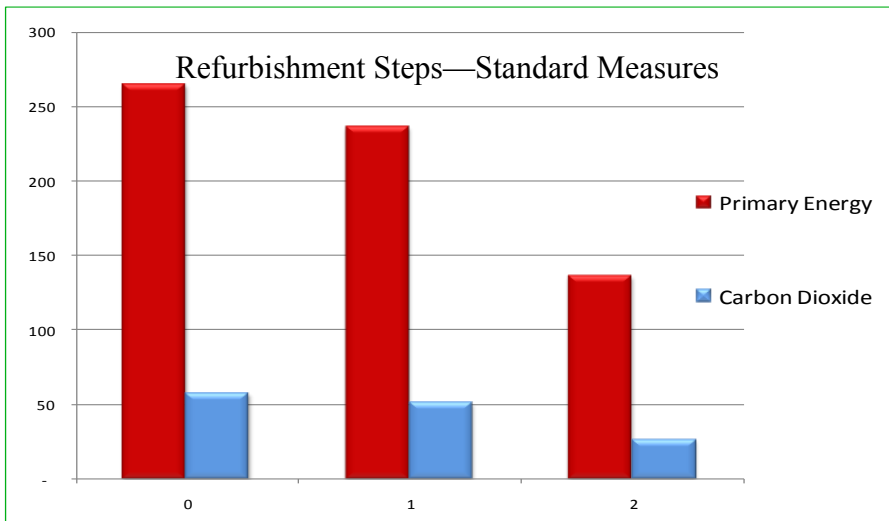
Very typical house built in Dublin and east coast area during the 1980s with hollow block walls that were dry-lined internally with 50mm of fibre insulation between wooden battens fixed to the walls. See notes on wall insulation options below. Solid floors are common with this house type.

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	265 (actual state)	57 (actual state)	D2
1	Roof insulation and standard package*	Add	200 mm mineral wool over the existing insulation.	0.13	237	51	D1

Walls are insulated, but the thickness of the insulation is below the current standards. One of the possible measures is re-dry-lining or installing external wall insulation to achieve a U-value of 0.27 W/m²/K. Usually, when the walls are uninsulated, the payback time for installing external wall insulation is around 10-15 years. But in this case, where the walls are partially insulated, the payback time would be around 80 years. Therefore it is not recommended on economic grounds. Replacement of double glazed windows to achieve current standards is also possible, but due to long payback times, it is not recommended either.

Systems upgrade:							
2	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.		136	26	B3

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



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


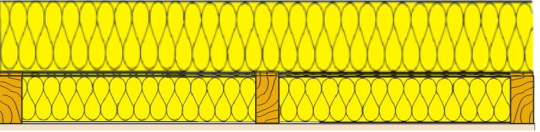
Estimated costs and payback time**

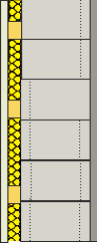
Measure	Estimated costs	Payback (y)
Step 1	€ 570	4.7
Step 2	€ 3,000	7.6
Total:	€ 3,570	6.9

Standard upgrade summary

Consumption of primary energy reduced by:	129 kWh/m²/y
Emission of carbon dioxide reduced by:	31 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.

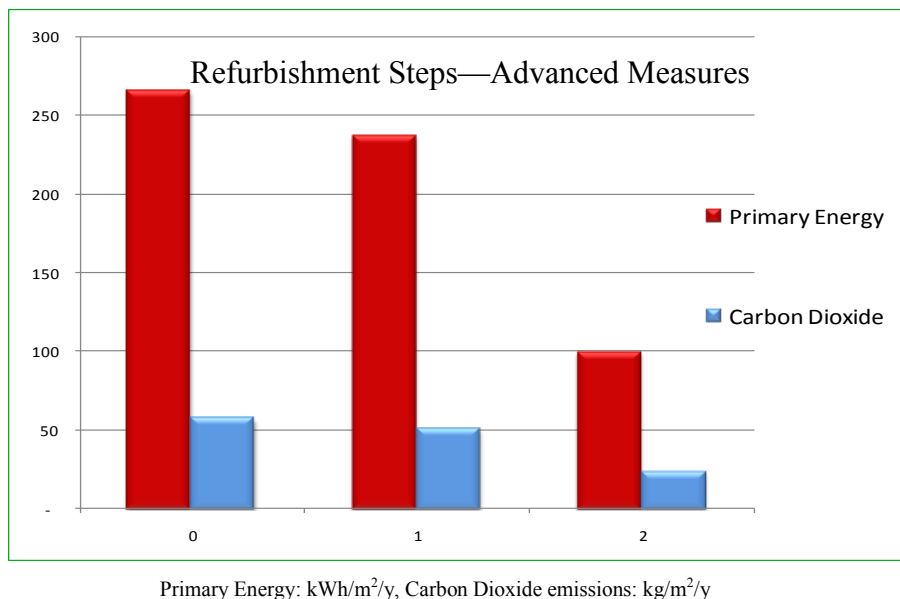
Typical roof upgrade (standard/advanced)	
100 mm of mineral wool between ceiling joists	 <p>Before:</p>
Typical roof upgrade includes topping the attic insulation up to 300 mm. Conductivity = 0.04 W/mK	 <p>After:</p>

Typical wall construction	
Concrete hollow block, insulated	
	Concrete hollow block, internally drylined. 25-50mm thick insulation between the wooden battens, 12.5 mm thick plasterboards. U value = 0.6 W/m ² K

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	265 (actual state)	57 (actual state)	D2
1	Roof insulation and standard package*	Add	200 mm mineral wool over the existing insulation.	0.13	237	51	D2
Systems upgrade:							
2	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).		100	24	B1

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



Estimated costs and payback time**		
Measure	Estimated costs	Payback (y)
Step 1	€ 570	4.7
Step 2	€ 11,100	28.2
Total:	€ 11,670	22.6

Advanced upgrade summary	
Consumption of primary energy reduced by:	165 kWh/m²/y
Emission of carbon dioxide reduced by:	33 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