

21. Detached bungalow, hollow block walls, 1983-1993



| Building elements : | | Insulation | U - value |
|---------------------|--|------------------|------------|
| Walls | Concrete hollow block | 25-50 mm | 0.6 |
| Roofs | Pitched, insulation between joists Insulation between rafters | 100 mm 100 mm | 0.4 0.4 |
| Floors | Solid | 10-15 mm | 0.64 |
| Windows | Double glazed, PVC frame, 6 mm gap | n.a | 3.1 |
| Doors | Solid wooden | none | 3.0 |

Description
 This house was found in Dublin and had hollow block walls with internal dry-lining. If it was located outside Dublin, cavity wall construction would be more likely. The room in the roof at first floor level would have had modest fibre insulation at the time of construction and could be much improved.

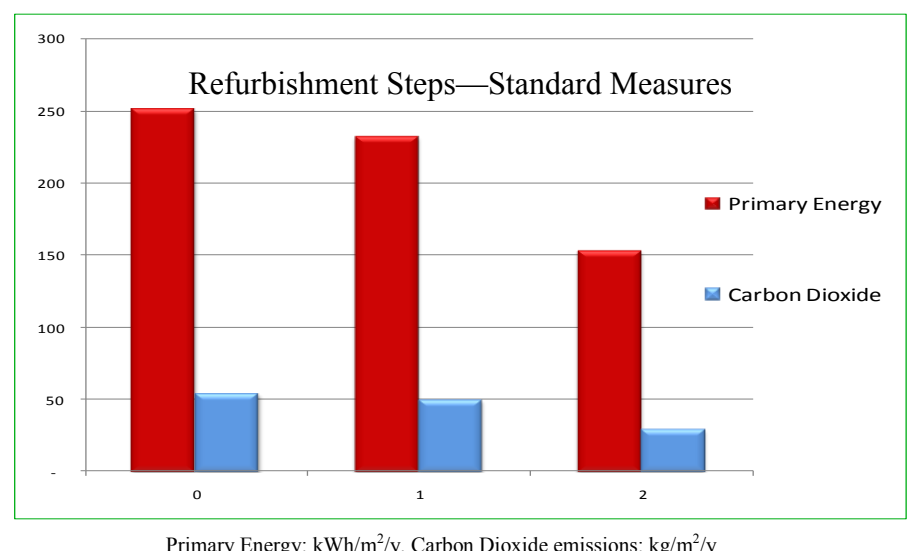
| Heating systems characteristics: | | Fuel | Efficiency |
|----------------------------------|---|-----------|------------|
| Primary | Central heating boiler, pipework uninsulated. | Mains gas | 75% |
| Secondary | Open fire in grate | Smokeless | 30% |
| Hot water | From primary heating system. Electric immersion heater is used in summer. | | |
| Cylinder | Insulated with loose jacket 35mm, cylinder thermostat present. | | |
| Controls | Programmer and room thermostat | | |

| Refurbishment steps — standard | | | | Prim. energy kWh/m ² /y | Carbon Dioxide kgCO ₂ /m ² /y | Energy Rating | |
|--------------------------------|--|-----|---|------------------------------------|---|---------------|----|
| 0 | Building fabric upgrade steps: | | | 251 (actual state) | 54 (actual state) | D1 | |
| 1 | Roof insulation and standard package* | Add | 200 mm mineral wool over the existing insulation. | 0.13 | 232 | 49 | D1 |

Walls are insulated, but the thickness of the insulation is below the current standards. One of the possible measures is re-drylining 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, this step is not generally 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. | | 153 | 29 | C1 |


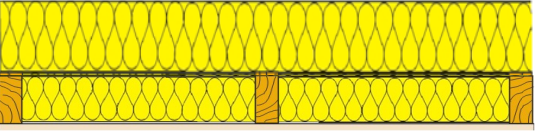
*also includes draughtstripping, 80mm lagging jacket for DHW cylinder and low energy bulbs.

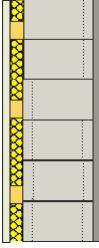


| Estimated costs and payback time** | | |
|------------------------------------|-----------------|-------------|
| Measure | Estimated costs | Payback (y) |
| Step 1 | € 1,020 | 5.8 |
| Step 2 | € 3,000 | 5.6 |
| Total: | € 4,020 | 5.6 |

| Standard upgrade summary | |
|---|--|
| Consumption of primary energy reduced by: | 98 kWh/m²/y |
| Emission of carbon dioxide reduced by: | 25 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.

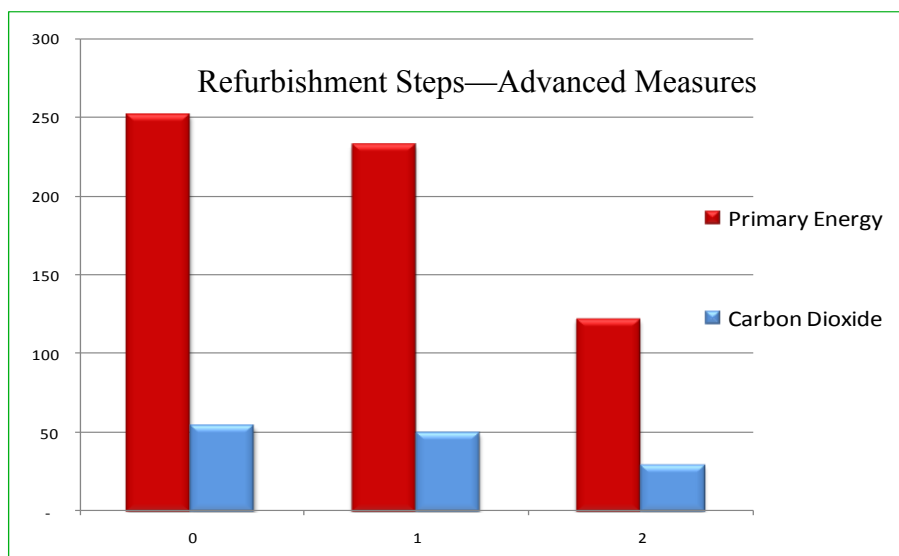
| Typical roof upgrade (standard/advanced) | |
|---|--|
| 100 mm of mineral wool between ceiling joists |  <p>Before:</p> |
| Typical roof upgrade includes topping the attic insulation up to 300 mm. Conductivity = 0.04 W/mK |  <p>After:</p> |

| 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 | 251 (actual state) | 54 (actual state) | D1 |
| 1 | Roof insulation and standard package* | Add | 200 mm mineral wool over the existing insulation. | 0.13 | 232 | 49 | D1 |
| 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). | | 122 | 29 | B2 |

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



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

| Estimated costs and payback time** | | |
|---|-----------------|--|
| Measure | Estimated costs | Payback (y) |
| Step 1 | € 1,020 | 5.8 |
| Step 2 | € 13,100 | 31.0 |
| Total: | € 14,120 | 23.6 |
| Advanced upgrade summary | | |
| Consumption of primary energy reduced by: | | 129 kWh/m²/y |
| Emission of carbon dioxide reduced by: | | 25 kgCO₂/m²/y |

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