

NZ vs Ireland building regs

The third in this series looking at how current New Zealand building regulations for energy efficiency compare to those elsewhere measures us against Ireland.

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WHAT COUNTRY HAS A POPULATION of around 5 million, a mild climate, multi-billion-dollar dairy and meat industries and people mad keen on sports? Yes, it's the Republic of Ireland.

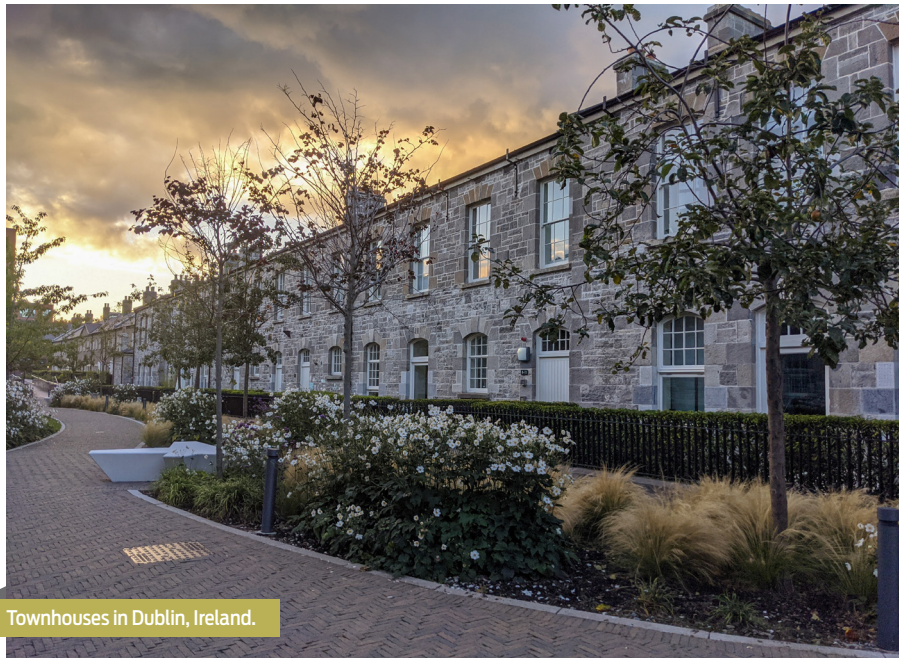
Ireland part of EU

The similarities with New Zealand only go so far. The Irish economy is approaching twice the size of ours. Ireland joined the European Economic Community (now the European Union (EU)) in 1973. This partly explains its growth - and its high standards in energy efficiency.

A 2019 update to Ireland's building regulations implemented requirements from an EU Energy Performance of Buildings Directive. Ireland, as part of the EU, requires its new-build houses to be considerably better insulated than we require ours to be.

Comparing UK, Australia and now Dublin

The first article in this series (see *Build* 179,



Townhouses in Dublin, Ireland.

Rating our building regs - part 1) compared New Zealand and UK locations with similar average temperatures. New Zealand allows more than twice as much heat loss through

the walls and over two and a half times more heat loss through windows than is allowed in the UK.

The second article (see *Build* 180, *NZ vs*

Australia building regs) compared Auckland and Whangārei with Melbourne and Sydney. The minimum roof and wall R-values in Australia are 40-75% higher than those in New Zealand.

In this *Build*, we compare the requirements for Dunedin and Dublin. There are some extraordinary similarities in their climates, especially average temperatures for the hottest and coolest months and average annual rainfall (Table 1). A measure of climates, the Köppen-Geiger system, puts both cities in the same category - Cfb.

New Zealand minimum insulation requirements

The main requirements covering indoor temperature in the New Zealand Building Code are in clause H1 *Energy efficiency*. Compliance can be demonstrated in various ways, including using the schedule, modelling or calculation methods in NZS 4218:2009 *Thermal insulation - Housing and small buildings*.

The schedule method specifies minimum R-values for building envelope components depending on construction type and location. The construction R-value figures are not the R-value of the insulation in a building element but of the element itself.

In other words, the construction R-value includes the insulation plus consideration of thermal bridges, air gaps, cladding material and so on. The minimum R-values for timber-framed houses in Table 2 are for climate zone 3 - which covers the South Island and the North Island Volcanic Plateau.

Irish minimum insulation requirements

The minimum insulation requirements in Ireland are found in the Building Regulations 2019 Part L *Conservation of fuel* ➤

Table 1

Comparison of Dunedin and Dublin climates

CITY	DUNEDIN	DUBLIN
Average annual temperature	10.8°C	9.7°C
Average temperature – coolest month	5.7°C	5.1°C
Average temperature – warmest month	15.2°C	15.3°C
Average annual rainfall	775 mm	767 mm
Köppen-Geiger climate classification	Cfb	Cfb

Table 2

Comparison of minimum construction R-values for Dunedin and Dublin

BUILDING ELEMENT	DUNEDIN New Zealand minimum construction R-values (m ² .°C/W) for non-solid house construction in Zone 3 ¹	DUBLIN Minimum requirements in Ireland ² – construction R-values (m ² .°C/W) with equivalent U-value (W/m ² K)
Roofs	R3.3	Flat roof – R5 (U0.20) Pitched roof – R6.25 (U0.16)
External walls	R2.0	R5.6 (U0.18)
Ground floor	No underfloor heating – R1.3 Underfloor heating – R1.9	No underfloor heating – R5.6 (U0.18) Underfloor heating – R6.7 (U0.15)
Windows and glazing	R0.26	R0.71 (U1.4)
Skylights	R0.31	R0.71 (U1.4)

1. From NZS 4218:2009 *Thermal insulation – Housing and small buildings*.
2. The Irish figures are taken from Table 1 of Building Regulations 2019 Technical Guidance Document L *Conservation of fuel and energy – Dwellings*.

and energy - Dwellings. The current version became compulsory from 1 November 2019.

While we quote requirements in R-values - a measure of the resistance to heat flow - Irish requirements are actually given in U-values, which measure the rate of heat transfer.

U-values are the reciprocal of R-values. The lower the U-value/the higher the R-value, the more effective the insulation is.

Table 2 gives the U-values quoted in Ireland and our conversion to R-values to allow comparison. In both countries, limited trade-offs are possible. One area may have a slightly reduced thermal performance if this is compensated for elsewhere.

New Zealand well behind Ireland

The minimum requirements for thermal performance in Ireland are significantly higher than ours:

- For floors - more than three times higher than New Zealand.
- For windows - almost three times higher than New Zealand.
- For external walls - almost three times higher.
- For pitched roofs - almost twice as high.

Even the minimum levels of thermal performance required in Ireland back in 2002 were significantly higher than the minimums required in New Zealand in 2020/21.

Stark contrast in rate of change

Building requirements for new houses in Ireland and the EU have been tightened many times and significantly. The 2019 change represents a 70% tightening from the 2005 requirements.

The pace and scale of improvements shows the starkest contrast between Ireland and New Zealand:

- The minimum R-value for walls in Ireland has gone from R1.8 in 1991 to R5.6 today - a 200% increase over 29 years.
- The minimum R-value for walls in New Zealand (climate zone 2) has gone from R1.5 in 1978 to R1.9 today - a 27% increase over 42 years.

Ireland also has extra requirements

Apart from higher levels of insulation, there are requirements in current Irish building regulations that have no equivalent in New Zealand:

- All new houses must be tested for airtightness by a certified tester.
- Very airtight homes (3 m³/hr/m² at 50 pascal or less) must have mechanical ventilation.
- 20% of the energy consumed in new dwellings must come from renewable resources generated on site or off site. Acceptable options include solar photovoltaic electricity, solar thermal water heating, wood pump stoves and boilers and heat pumps.

Ireland moving to near zero energy new buildings

Primary energy consumption and related CO₂ emissions must be assessed using the Dwelling Energy Assessment Procedure, a tool provided by the Sustainable Energy Authority of Ireland.

The 2019 update of the building regulations was one part of the implementation of the Nearly Zero Energy Building (nZEB) standard that will apply to all new buildings occupied after 31 December 2020.

The definition of nZEB is, 'A very high energy performance... The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on site or nearby.'

Both have poor-performing older stock

While Ireland sets high requirements for new construction, it has a similar problem to New Zealand with poor-performing older stock.

Just over half of Irish houses have had Building Energy Ratings carried out. These are a standardised measure of energy performance, taking account of features such as insulation and glazing. Houses are rated from A (the best) to G (the poorest performing, with little or no insulation and single-glazed or poor double-glazed windows).

While 97% of homes built since 2015 are A-rated, overall, just one house in 20 gets a top rating. Irish houses built before 1990 typically rate from D to G. ◀