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Energising **Efficiency**

In the latest piece in his series on the development of low energy building, **Dr Marc Ó Riain** describes the evolution and Impact of EPCs in Ireland and the UK.

The introduction of energy performance certificates (EPCs) in 2007 represented a pivotal moment in enhancing consumer awareness of home energy efficiency in both Ireland and the UK. The concept of energy performance ratings dates back to Energy World's initiatives in Milton Keynes in 1985 and the UK's National Energy Rating Scheme developed by the Building Research Establishment (BRE) in 1990. However, it was the global Kyoto Protocol of 1998 that spurred the EU to introduce its first Energy Performance of Buildings Directive (EPBD) in 2002. This directive laid the groundwork for integrating energy conservation targets into national regulations, prompting Ireland and the UK to revise their respective requirements for energy performance under building regulations, called Part L in both Ireland, and England and Wales.

In 2007, Ireland and the UK launched EPCs for residential buildings, extending to public buildings in 2008 with the introduction of Display Energy Certificates (DECs). Both rating systems evaluate and rate a building's energy efficiency on a scale from A to G.

Although methodologies for calculating energy performance differ between the two countries, they both comply with the EU's Energy Performance of Buildings Directive. In the UK, the Standard Assessment Procedure (SAP) is used to generate EPCs, while Ireland uses the Domestic Energy Assessment Procedure (DEAP) to produce Building Energy Ratings (BERs). Both procedures focus on fixed energy loads such as heating, cooling, hot water, and lighting. However, they exclude the impact of household appliances, such as refrigerators and washing machines, which are classified as "loose" or "plug" loads.

Unlike the DECs for public buildings, which are based on actual energy consumption, residential EPCs and BERs are based on theoretical models and fixed assumptions. This theoretical approach has led to a discrepancy between calculated and actual energy consumption. Studies, such as those conducted by O'Driscoll (2014), have highlighted the growing importance of plug loads in energy consumption, particularly in net zero-energy buildings.

Prior to 2005, compliance with Part L was relatively straightforward, based on standard U-values for building components. However, the introduction of BERs/EPCs necessitated significant revisions to Part L in the UK in 2006 and in Ireland in 2007. These updates incorporated new factors, including thermal bridging, airtightness, and – in the case of Ireland – contributions from renewable energy sources. While these changes aimed to improve energy efficiency and sustainability, they also added complexity to the design and compliance processes. As a result, energy consultants became crucial, using simulation tools to help architects achieve compliance through design modifications and the integration of renewable technologies such as solar panels, heat pumps, and wood-burning stoves.

The introduction of BERs, EPCs and DECs increased public awareness and influenced both individual behaviour and market dynamics. Reports from 2013 onwards revealed that properties with higher energy performance ratings commanded higher purchase prices, reflecting an energy efficiency premium. For example, the study by Duarte & Chen (2022) found that A-rated homes in Ireland saw a 9.5 per cent increase in value compared to D-rated homes, whereas F/G-rated properties experienced a 10.6 per cent decrease. In England, A-rated homes saw a 5 per cent premium, while F/G-rated homes saw similar levels of price reductions. Other countries, such as Norway and Denmark, reported even more pronounced premiums and reductions, highlighting the growing importance of energy efficiency in property valuation.

A 2010 recast to the EU Directive on the Energy Performance of Buildings introduced a new target for new buildings, the Nearly Zero Energy Building (NZEB), which member states had to define and implement by 2019. The directive also required member states to set minimum energy performance targets for major renovations of existing buildings. In Ireland, a new coalition government in 2020 introduced a commitment to upgrade 500,000 homes to a B2 rating by 2030, with grants of up to 50 per cent available to improve eligible homes. The DEAP software was also updated and converted into a web tool, with periodic updates to primary energy factors for the electricity grid meaning that electrically heated homes achieved BER improvements even without fabric improvements – a shift which helped turbocharge the rise of the heat pump.

> The surge in energy prices underscores the growing significance and awareness of energy performance certificates as a vital tool for assessing building energy efficiency, benefiting homeowners and investors alike.

The global energy crisis triggered by the war in Ukraine in February 2022 led to a dramatic rise in energy prices, with heating and electricity costs increasing by 70-80 per cent. This surge has driven a significant rise in building retrofits and solar panel installations. In Ireland, building retrofits increased by 53 per cent since the first quarter of 2023, and domestic rooftop solar production rose by 42.6 per cent over the same period. This surge underscores the growing significance and awareness of energy performance certificates as a vital tool for assessing building energy efficiency, benefiting homeowners and investors alike.

In the next article I will tackle the definition of Nearly Zero Energy Buildings a decade ago and whether these standards are still fit for purpose. ■

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