Engineers Ireland

Submission on 'Review of Part L & F of the Building Regulations'

For the attention of the Housing Advisors / Building Standards Section, Department of Housing, Planning and Local Government

8th June 2018

Overview

Engineers Ireland welcomes the opportunity to comment on the review of Part L (Conservation of Fuel and Energy) and Part F (Ventilation) of the Building Regulations and the accompanying Technical Guidance Documents. We support the Department of Housing, Planning and Local Government's proposed amendments to the Regulations as important steps in improving the energy performance of buildings and contributing to the reduction of greenhouse gas emissions – and implementing the Energy Performance Building Directive.

Engineers Ireland was delighted to collaborate on this with nZEB-RETROFIT (Achieving nearly zero-energy buildings – a lifecycle assessment approach to retrofitting existing buildings), a SFI-funded research project based at NUI Galway. Based on extensive empirical research and modelling (including DEAP), the nZEB-RETROFIT team has proposed a set of changes to TGD-L and the DEAP methodology – these are outlined in the enclosed Excel templates. Engineers Ireland also engaged with members of our Energy & Environment Division, Mechanical & Manufacturing Division and Structures & Construction Division.

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Background to Engineers Ireland

With over 25,000 members from every discipline of engineering, Engineers Ireland is the voice of the engineering profession in Ireland. Engineers Ireland was established in 1835 making us one of the oldest and largest professional bodies in the country. Members come from every discipline of engineering, and range from engineering students to fellows of the profession.

Our responsibility is to

- Promote knowledge of engineering
- Establish and maintain standards of professional engineering and engineering education
- Provide opportunities for Continuing Professional Development (CPD)
- Maintain standards of professional ethics and conduct
- Ensure that professional titles are granted to qualified candidates
- Act as the authoritative voice of the engineering profession in Ireland

Our Vision Statement

Engineers Ireland: a community of creative professionals delivering solutions for society.

Our Mission Statement

Engineers Ireland is an organisation that enables the engineering community to progress their professional development, make an impact on society and encourage and educate the future generations of engineers.

Template for comments / observations returned during the consultation		Date:	Document: Review of Technical Guidance Document L- Conservation of Fuel and Energy for Dwellings (2018)	
Name of Organisation / Respondent	**Heading / Section No. / Appendix No. / Table No. or Diagram No. (e.g. Interpretation / Section 2.1.2.6 / Appendix B.5.1.1)**	**Type of comment G = General E = Editorial T = Technical**	**Comment / Observation**	**Proposed change (if any)**
NZEB RETROFIT, NUI(	Section 1.5.4	G	Dwellings undergoing renovation works should be required to undergo an air permeability test both before and after the works. This will aid the retrofit designer to develop a more cost optimal solution, assess the quality of works by the building contractor and the collection of air permeability data before and after renovation works will allow for creating more accurate policy measures with regards to retrofitting the Irish building stock.	Dwellings undergoing renovation works should be required to undergo an air permeability test both before and after the works.
NZEB RETROFIT, NUI(	Section 2.3.3	T	Section 2.3.3 states "as an alternative to paragraph 2.3.2 Table 6 sets out the improvements normally considered to be cost optimal and will typically be economically feasible when more than 25% of the surface area of a building is being upgraded". Does this mean that the renovation works of Table 6 do not have to lower the dwelling energy performance level to at least 125 kWh/m2/yr. as the text suggests?	Revise text of section 2.3.3 if renovation works of Table 6 are required to achieve a building energy performance level of at least 125 kWh/m2/yr. when calculated in DEAP.
NZEB RETROFIT, NUI(	Section 2.3.6	E	Section heading 2.3.6 repeated twice on page 39	Revise Section headings on page 39
NZEB RETROFIT, NUI(	Table 6	T	Works of a single project may need to be more clearly defined. For example, what if someone drylines the internal surface of one wall in a house and repeats the works again in two months' time on another internal wall surface. Is this considered a single project or two projects? Someone could split works into multiple projects to avoid exceeding work on 25% of the building envelope surface during a single project. This would allow easy avoidance of mandatory major renovation works.	Clearer definition of a single project. Possibly specify a time period over which if works on a building envelope exceed 25% of the building envelope surface area, major renovation works are required.
NZEB RETROFIT, NUI(	Table 6	T	Table 6 states cost optimal works involve external wall insulation, attic insulation and heating system upgrades. There is no reference to best practices when retrofitting dwellings in Table 6. For example, Section 7.3.2.3.7 of the NSAI Code of Practice for the energy efficient retrofit of dwellings (S.R. 54:2014) does not recommend using external wall insulation on an empty cavity wall due to thermal bypass. The way Table 6 is currently phrased may result in dwellings where cavity walls are left empty.	Include a clause for Table 6 where all cost optimal level works must be carried out in accordance with best retrofit practices of S.R. 54:2014
NZEB RETROFIT, NUI(	Table 6	G	Section 2.3.5 states drylining the internal surface of a wall to be works to the surface area for which it is technically, functionally and economically feasible to improve the energy performance of the whole building to cost optimal level. Why is it not included in Table 6?	

Template for comments / observations		Date:	Document: DEAP Methodology for Part L 2018 Public Consultation	
Name of Organisation / Respondent	**Heading / Section No. / Appendix No. / Table No. or Diagram No. (e.g. Interpretation / Section 2.1.2.6 / Appendix B.5.1.1)**	**Type of comment G = General E = Editorial T = Technical**	**Comment / Observation**	**Proposed change (if any)**
NZEB-RETROFIT, NUIG		G	The energy demand of plug loads/appliances should be considered in the DEAP methodology given that space and water heating requirements of residential buildings are being diminished from the focus of limiting heat loss, maximising heat gain through the fabric of the building where appropriate and installing a highly efficient space and water heating system. 7 other EU countries account for energy demand of plug loads/appliances in their NZEB definitions *(D. D'Agostino, P. Zangheri, B. Cuniberti, D. Paci, P. Bertoldi, Synthesis Report on the National Plans for NZEBs, European Commission, 2016. doi:10.2790/659611)*	The energy demand of plug loads/appliances should be considered in the DEAP methodology given that space and water heating requirements of residential buildings are being diminished from the focus of limiting heat loss, maximising heat gain through the fabric of the building where appropriate and installing a highly efficient space and water heating system.
NZEB-RETROFIT, NUIG	Section 3	T	Section 3 states that the primary energy factor is based on the projected average primary energy for the next 5 years (2018 to 2022). However, the primary energy and CO_2 emissions factor for the electricity grid should to be for a larger timespan as the electricity grid is to be decarbonised in the future. In the DEAP Consultations Examples attached for Public Consultation, the primary energy factor for electricity is assumed to be 1.94. As the electricity grid becomes decarbonised and more efficient, the primary energy factor will reduce. This will significantly impact the DEAP results and BER Ratings achieved by domestic buildings. For example, in the DEAP Public Consultation Examples A E1.1 and B E1.2 attached for public consultation, both examples rely on gas for their main space and water heating requirements and use PV/wind to minimise energy demand and achieve renewable energy targets. Both examples produce more electricity than the house consumes. Assuming an electricity primary energy factor of 1.5 (and the same energy demand reference value of 18359 kWh/y), both examples would fail to achieve compliance with EPC and RER targets. This is due to the diminished energy savings of the PV system. The impact of a decarbonised grid on BER Ratings has been highlighted in research carried out by the NZEB RETROFIT project *(Moran, P., Goggins, J. and Hajdukiewicz, M. (2017) 'Super-insulate or use renewable technology? Life cycle cost, energy and global warming potential analysis of nearly zero energy buildings (NZEB) in a temperate oceanic climate', Energy and Buildings. Elsevier B.V., 139(2017), pp. 590–607. doi: 10.1016/j.enbuild.2017.01.029)* .	If using a smaller primary electricity factor for electricity based on a decarbonised grid is not feasible for providing a final result from DEAP, a section of the excel file should highlight these potential issues to design engineers when assessing the sustainability of their building designs. Limiting the impact of the scenario where a building is producing more electricity than consuming could be achieved by accounting for the energy demand of plug loads/appliances similar to other EU countries in their NZEB definitions (*D. D'Agostino, P. Zangheri, B. Cuniberti, D. Paci, P. Bertoldi, Synthesis Report on the National Plans for NZEBs, European Commission, 2016. doi:10.2790/659611*).
NZEB-RETROFIT, NUIG		T	European standard assessment procedures have been shown to be inaccurate when comparing their estimated energy demand to actual energy demand. "In the case of a calculated rating with a full range of input data to establish by measurement/assessment (surface areas, U-values, system characteristics, etc.) the derived data can differ by ± 30% from the actual building, due to the errors introduced by the expert. This is the main source of inaccuracies, leading to a total of ± 45% deviation in the calculated outcome of the energy performance of a building compared to the actual building" (*Building Performance Institute Europe, Energy Performance Certificates across Europe: From design to implementation, BPIE, 2010.*)	A more robust protocol procedure needs to be established for justifying input variables by DEAP assessors to minimise energy performance gaps. This should include uploading of documentation to support input values for variables in DEAP procedure. For example in the case of older buildings where original drawings may not be available, what procedures should be complete by the DEAP assessor to determine the building heat loss coefficient apart from using default building element u-values, thermal bridging factor and window characteristics? Is this example, an air-tightness test should be mandatory. U-values of building elements could be measured using market available technology (e.g. https://www.greenteg.com/gO%20Measurement%20System/) and compared with default values.