Submission to the Public Consultation on the Review of Part L
(Conservation of Fuel and Energy for Buildings other than Dwellings) 2017

UCD School of Architecture, Planning and Environmental Policy

Written Submission to the Department of Housing, Planning, Community & Local Government

This submission is a contribution to the Review of Part L (Conservation of Fuel and Energy for Buildings other than Dwellings) 2017, which have "*the overall objective of improving the energy and carbon performance of new buildings other than dwellings and to transpose the EU requirement for nearly zero energy buildings and major renovations, without imposing a disproportionate burden on industry in terms of bureaucracy or costs*"

Contributors:

Part A: Policy Context, Risks to Delivery and Regulatory Impact

Orla Hegarty, Architect, Assistant Professor B.Arch MRIAI RIBA
http://www.ucd.ie/research/people/architectureplanningenvironmentalpolicy/msorlahegarty/

Part B: Technical Standards

Dr. Oliver Kinnane, Lecturer (Sustainable Design Technologies), PhD, M.Arch., B.E.
https://www.researchgate.net/profile/Oliver_Kinnane

Dr. Aidan Reilly, Research Fellow.

Part A- Policy Context, Risks to Delivery and Regulatory Impact

POLICY CONTEXT

"*The 2016 Programme for a Partnership Government specifically commits to Ireland's transition to a low carbon society by 2050 and energy and CO2 emissions savings likely to accrue as a consequence of the proposals have already been factored into the third National Energy Efficiency Action Plan 2014*[1] *and will be factored into plans being prepared as part of the built environment carbon sectoral plan which will feed into the National Mitigation Plan which will be published by the Minister for Communications, Climate Action and Environment, in accordance with the Climate Action and Low Carbon Development Act 2015, in the coming months*" (Regulatory Impact Analysis, 2017)[2]

The Building Regulations for Conservation of Fuel and Energy are a key part of *" Ireland's transition to a low carbon society by 2050".* Energy savings from buildings are anticipated to make up more that 38% of the national final energy savings by 2020under the National Energy Efficiency Action Plan[3]. This is planned to be achieved from new buildings (under Department of Housing) and retro-fit improvements in old buildings (under Department of Communications, Climate Action and Environment).

Sustainable Energy Authority of Ireland (SEAI) report that "*Buildings accounted for 35% of total final energy consumption and 59% of electricity consumption in Ireland in 2014, making it the second largest energy end-use behind transport*"[4] so the State reliance on the building sector is very significant, and this in turn must be based on robust and reliable systems and monitoring.

The European Commission (EC) notes that "*it remains challenging to acquire reliable data on building characteristics, energy use, and financial implications of renovation in terms of cost savings or asset values. This generalised lack of data has negative consequences on the market perception of the cost-effective energy saving potential of the EU building stock, and on the enforcement, monitoring and evaluation of the Directive"*[5] . It is critically imporatant, therefore, that this Part L Review be re-cast in a wider policy context and not the current narrow focus of limited compliance "*without imposing a disproportionate burden on [*the construction*] industry in terms of bureaucracy or costs*", as set out in this Public Consultation.

A review of appropriate technical guidance, procedures for consistent delivery (at design and construction) and effective monitoring and enforcement are integral to a review of the technical standards . This is because publication of technical standards must be viewed in the context of policy objectives; climate change targets target will not be reached unless the systems are in place to ensure consistent and compliance delivery on at design stage and on building sites.

New buildings are designed by construction professionals (architects, engineers and specialists) and delivered by builders, subcontractors and specialists in the construction industry. This is a complex process with large teams, complex contractual arrangements, multiple materials and technical requirements. In order to achieve of energy-efficiency standards, there must be appropriate knowledge, skill, monitoring and enforcement at appropriate stages, both design and construction. This should be the context of a rigorous regulatory impact analysis and 'risk assessment' of the new standards.

---

[1] NEEAP #3 (2014), now NEEAP #4 (2017-20) http://www.dccae.gov.ie/en-ie/energy/topics/Energy-

[2] DHPCLG, 2017 http://www.housing.gov.ie/sites/default/files/public-consultation/files/regulatory_impact_analysis_for_draft_part_l_for_public_consultation.pdf

[3] 7,189 of 18,595 GWh, Table: 1, NEEAP#4 http://dccae.gov.ie/documents/NEEAP%204.pdf

[4] SEAI, 2016 Energy Efficiency in Ireland Report https://www.seai.ie/Publications/Statistics_Publications/Energy_Efficiency_in_Ireland/Energy-Efficiency-in-Ireland-2016-Report.pdf

[5] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2010/31/EU on the energy performance of buildings, 2016 https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v10.pdf

The construction industry is recovering from almost 10 years of recession and a critical loss of staff and skills. Higher energy standards have been introduced during this period of very low levels of building activity, meaning that there have been limited opportunities for education and up-skilling. In addition, training and apprenticeship programmes have been reduced[6], education of professionals is lengthy and very limited guidance and technical information is available in the industry to practitioners.

The Irish construction industry is very fractured; in 2010, 95% of companies working in the sector were classified as micro-enterprises, employing fewer than 10 people[7]. In 2015, (at a time of very low activity) there were 74,795 active principals and sub-contractors in the construction industry and 128,127 PAYE employees[8]. Individual projects are organised 'ad hoc' with multiple designers, contractors and suppliers

Furthermore, as stated by the Construction Industry Council in 2012:[9] "*there is no overall vision for what a healthy, dynamic construction industry should look like; responsibilities and accountabilities are separated from each other within Government departments, agencies, and regulators, with little coherence or connectivity across the network of networks; and, no one has responsibility or accountability for looking across the construction industry as a whole, i.e., across the network of networks"*

The recent change in technical standards, the loss of skill and this lack of clarity of governance mean that there are significant structural weaknesses in the delivery of compliant standards. Added to this, the construction industry is largely self-regulated with no requirement for independent certification of design or construction, although there is some monitoring of energy compliance through the Building Energy Ratings (BER) system. It is critical, therefore, that this review of the regulations include provisions for monitoring, control, enforcement and sanctions. The Commission recommends that: *"Member States define the mechanism that will be used to monitor the fulfilment of the NZEB targets and to consider the possibility to set up differentiated sanctions for new buildings after the NZEB deadlines have passed"*[10]

RISKS TO DELIVERY OF PART L (CONSERVATION OF FUEL AND ENERGY) STANDARDS[11]

In broad outline the risks to the delivery of energy efficient standards for new buildings[12] are in the following areas:

BEST PRACTICE STANDARDS Building Regulation Standards must accord with best international practice; this will ensure that as the EU NZEB (Near Zero Energy Building) standards develop and are aligned across the EU that Ireland will not be playing 'catch up'. It also means efficiency savings in imported materials, components and equipment and greater opportunities for Irish companies to supply to international markets.

INTEGRATION Standards must be technically rigorous, integrated and aligned with other relevant standards (including Part F- Ventilation, Part J- Heat Producing Appliances, etc). Buildings are shelter for people and 'air-tight' buildings must be ventilated to ensure indoor air quality and occupant health. Part F- Ventilation regulations must therefore be aligned with the Part L – Energy regulations and included in this Review.

---

[6] "*There were some 4,400 apprentices across all trades in construction in 2015 compared with 23,700 apprentices in Q4 2007*" DKM/ Solas Demand for Skills in Construction to 2020 http://cif.ie/images/Publications/Skillsreportfor2020.pdf

[7] Construction Industry Council, 2012 http://constructionindustry.ie/CIC_Report(June2012)_web.pdf

[8] Minister for Finance Michael Noonan, in reply to Dail Question, 19 July 2016.

[9] Construction Industry Council, 2012 http://constructionindustry.ie/CIC_Report(June2012)_web.pdf

[10] Commission Recommendation (EU) 2016/1318 of 29 July 2016 on guidelines for the promotion of nearly zero-energy buildings and best practices to ensure that, by 2020, all new buildings are nearly zero-energy buildings http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016H1318

[11] Note: This Public Consultation is a review of Part L, 2017 for buildings other than dwellings. However, most of the commentary in this submission equally applies to the Part L standard for dwellings.

[12] Note: This Public Consultation is a review of Part L, 2017 for buildings other than dwellings. However, most of the commentary in this submission equally applies to the Part L standard for dwellings.

MISSED OPPORTUNITIES The proposed Part L standards pre-suppose that a building is 'designed' and fixed to Planning Permission requirements before energy efficiency is considered. This is a missed opportunity for easy wins in energy savings at no additional cost (e.g. building shape, orientation, siting, fenestration, materials, energy systems, etc.). The Review should be expanded to consider the opportunities for promoting passive design principles and for requiring energy compliance to be assessed prior to making a Planning Application.

'PERFORMANCE GAP' theoretical Part L standards must be monitored through post-occupancy evaluation. According to studies, '*Buildings typically consume 2 to 5 times more energy than predicted at design stage*'[13]; this is referred to as the 'performance gap'. Monitoring of the actual energy consumption in occupied buildings is necessary to develop and improve technical standards. It is also critical to accurate monitoring of whether theoretical standards deliver the anticipated results.

MAJOR RENOVATIONS There are shortcomings in the proposed regulations for 'Major Renovations' (defined as *where "more than 25% of the surface area of the building envelope undergoes renovation[14]).* Firstly, this definition means that most major renovations will be exempt from Building Control and outside any system of oversight or monitoring by the local authorities. This is a significant omission. Secondly, the proposal states that where *"major renovations are being carried out to a building…. the building should achieve a cost optimal energy performance at building level in so far as this is technically, functionally and economically feasible"* The interpretation of 'economically feasible' is unclear and there is a risk of widespread avoidance as a default response.

SKILLS DEFICIT Education and training are required for both design professionals and builders. It is estimated that an additional 112,000 skilled workers will be required in the construction industry by 2020[15]. It is likely that all of these workers, in addition to the majority of the existing workforce need to be upskilled. Build Up Skills Ireland (BUSI) reported that: "*the pace of change in building construction and renovation standard has not been matched by availability of compatible training provision for the construction workforce*"[16]. The National Roadmap for Energy Training in Construction[17] recognises that "*the gap that exists is one of knowledge rather than skills*' and it was estimated in 2012 that 60,000 existing workers needed to be trained to at least foundation level. The Regulatory Impact Analysis (RIA)[18] states that *"there maybe some intangible additional costs associated with upskilling the construction sector in the design and construction of low energy buildings".* These costs and the challenges for the sector have been established through earlier studies and should be included in the Review.

Micro-enterprises and SMEs make up almost all of the construction industry; these organisations have limited capacity to train staff without supports; there are also challenges in ensuring access to appropriate general and technical information. This should be addressed in the Review.

TRANSITION PERIOD The period for education, training and up-skilling in order to achieve NZEB by 2020 is critically short. During the period 2017-2019 the buildings that will be built in 2020 will be designed, receive statutory approvals and, importantly, will have development finances arranged.

---

[13] 'Performance Gap', CIBSE (2012) http://www.cibse.org/getmedia/55cf31bd-d9eb-4ffa-b2e2-e567327ee45f/cb11.pdf.aspx

[14] Part L (buildings other than dwellings), 2017 http://www.housing.gov.ie/sites/default/files/public-consultation/files/tgd_l_-_conservation_of_fuel_and_energy_for_buildings_other_than_dwellings_0.pdf

[15] DKM/ Solas Demand for Skills in Construction to 2020 http://cif.ie/images/Publications/Skillsreportfor2020.pdf

[16] Build up Skills Ireland, 2012 http://ireland.buildupskills.eu/

[17] National Roadmap for Energy Training in Construction, http://ireland.buildupskills.eu/sites/default/files/BuildUpSkillsRoadmap%28lowresUpdate%29.pdf

[18] Regulatory Impact Analysis, 2017 http://www.housing.gov.ie/sites/default/files/public-consultation/files/regulatory_impact_analysis_for_draft_part_l_for_public_consultation.pdf

The EU Commission warns that States must allow for: "*the period of validity of building permits, the length of construction and completion of building works" to avoid falling short of the NZEB target dates in the EPBD*[19]. Therefore early and focused action is needed to avoid delay, increased costs and compliance failures. There is currently a lack of awareness in both design professionals and builders about these changes to Part L; therefore, technical information, supports and guidance are needed and the Review should include an assessment of the resources to be provided.

BUILDING CONTROL AND COMPLIANCE CERTIFICATION Under the Building Control (Amendment) Regulations[20], Part L is 'self certified' by the architect, engineer or building surveyor. There is no requirement for local authority or independent verification that the building design is compliant with Part L regulations. This is a critical weakness in the delivery of compliant buildings, particularly in view of the skills deficit in the sector. As an element of Part L design certification FRsi[21] calculations are required for certain building junctions and there are currently only eleven NSAI approved thermal modellers in Ireland[22]. This skills shortage and mitigation through technical guidance should be addressed in the Review.

At construction stage, building work is inspected by an Assigned Certifier (appointed by the building owner or developer). Other consultants, sub-contractors and builders provide Ancillary Certificates to 'self-certify' their own work as compliant. These certificates are often required as a condition of payment under standard contractual arrangements. There are inherent conflicts of interest here that are a risk to achieving compliance, to public trust in the system, and to the reliability of the compliance documents (Certificates of Compliance, Ancillary Certificates and Building Energy Ratings).

MONITORING AND ENFORCEMENT Responsibility for compliance is the responsibility of the building owner, who appoints Certifiers and Builders. Importantly, their duties are to the building owner and not to the State. This should be addressed in the Review, as the most significant risk of non-compliance is to the State and not to the building owner. The Commission states that "*Member States [*should*] consider to set up differentiated sanctions for new buildings after the NZEB deadlines have passed"* as a means of penalty for non-compliance.

COMMENTARY ON THE REGULATORY IMPACT ASSESSMENT

"The purpose of this RIA is to consider in detail the impacts, costs and benefits of the proposed changes to Part L (Conservation of Fuel and Energy) for buildings other than dwellings"[23].

IMPACT ON STATE COMMITTMENTS Ireland's National Energy Efficiency Action Plan (NEEAP) is a mattter of national and international importance and climate change is a key policy issue for governmant. However the State is not listed as a 'stakeholder' and the RIA for Part L states that: - *"Responsibility for compliance ….. is primarily a matter for the owners, designers and builders of buildings*". There are significant risks to the State of failure to comply with the EPBD and these risks of and non-compliance have not been addressed in the Regulatory Impact Assessment.

[19] Commission Recommendation (EU) 2016/1318 of 29 July 2016 on guidelines for the promotion of nearly zero-energy buildings and best practices to ensure that, by 2020, all new buildings are nearly zero-energy buildings **(**EU Commission, July 2016) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016H1318

[20] BC(A)R, 2014 http://www.irishstatutebook.ie/eli/2014/si/9/made/en/pdf

21 fRsi temperature factor, calculated to prevent thermal bridging and condensation.

[22] NSAI, Thermal Modellers https://www.nsai.ie/our-services/certification/agrement-certification/thermal-modellers-scheme.aspx

[23] Regulatory Impact Assessment, 2017 http://www.housing.gov.ie/sites/default/files/public-consultation/files/regulatory_impact_analysis_for_draft_part_l_for_public_consultation.pdf

These include failure to meet NEEAP targets; failure to comply with EPBD, including financial penalties (EU); risks of environmental damage; fuel poverty; and critically risks to occupant comfort and health.

The Consultation states that "*the overall objective of improving the energy and carbon performance of new buildings other than dwellings and to transpose the EU requirement for nearly zero energy buildings and major renovations, without imposing a disproportionate burden on industry in terms of bureaucracy or costs*" There Regulatory Impact Assessment does not assess the wider economic cost to the State of non-compliance or partial implementation of the Directive. (These include areas of risk of remediation of defective buildings, excessive energy usage, impact on occupant health etc.).

IMPACT ON BUILDING OCCUPANTS The RIA does not include "building occupants" as stakeholders in this process. This is a significant omission as the risks of non-compliance significantly impact on the people who will occupy a building over its lifespan of 50+ years. These includes thermal comfort, indoor air quality etc.)

The Directive[24] states that: "*Better performing buildings provide higher comfort levels and wellbeing for their occupants and improve health by reducing mortality and morbidity from a poor indoor climate. Adequately heated and ventilated dwellings alleviate negative health impacts caused by dampness, particularly amongst vulnerable groups such as children and the elderly and those with pre-existing illnesses."*

IMPACT ON COMPETITIVENESS The Regulatory Impact Assessment (RIA)[25] does not include an assessment of the additional cost to industry of implementation of the regulations, whilst acknowledging that additional design, training and conformity-checking is required. The Review states that: *"It is not anticipated that there will be any significant impact on design and supervision fees or compliance burden associated with the additional conformity-checking the amended Building Regulations will impose on Building Control Authorities and Assigned Certifiers"* It is critical that the RIA include an accurate assessment of the additional resources required in up-skilling designers, builders, suppliers and inspectors. Some of this cost to industry may be mitigated by appropriate supports, training and information.

IMPACT ON CONSTRUCTION COSTS The RIA states that "*The uplift in costs for an office block is provided below. This shows an increase in capital to achieve NZEB performance in the order of 2% to 5%"* and also that "*The report identified a gap of more than 15% between the current 2008 requirements of Part L in respect of Buildings Other than Dwellings and a cost optimal energy performance*" This research is limited to two case studies of notional projects[26] and is inadequate to assess the scale of the impact across all building types, conditions, methods of construction and conditions. More rigorous ongoing research is required to assess the impact of NZEB across the industry.

IMPACT ON LOCAL AUTHORITIES The RIA does not refer to the impact on Local Authorities, including up-skilling of staff who may undertake some 'spot check' inspections of Building Regulation compliance. Staff have not been trained for Part L , at design stage, at construction stage or to assess performance at completion stage (none of which is obligatory under the Building Control Regulations).

---

[24] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2010/31/EU on the energy performance of buildings, 2016 https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v10.pdf

[25] Regulatory Impact Assessment, 2017 http://www.housing.gov.ie/sites/default/files/public-consultation/files/regulatory_impact_analysis_for_draft_part_l_for_public_consultation.pdf

[26] *"The energy and carbon dioxide emissions performance for 2 storey and 4 storey office blocks both naturally ventilated (NV) and air conditioned (AC) were calculated" http://www.housing.gov.ie/sites/default/files/public-consultation/files/regulatory_impact_analysis_for_draft_part_l_for_public_consultation.pdf*

The RIA does not adequately address the impact on enforcement authorities and the potential cost to Local Authorities of increased enforcement activity: It states that "*Responsibility for compliance with the requirements of the Building Regulations 1997 to 2017 is primarily a matter for the owners, designers and builders of buildings*".

There are no records of any enforcement proceedings to date by Local Authorities for non-compliance with current Part L regulations (since 1991). As a result the threat of enforcement for non-compliance is not seen as a risk by designers and builders. This issue should be addressed in the Review.

Note: As an interim measure the Part L standard for Public Buildings (required by 2018 under the EPBD) is currently being implemented through contractual arrangements and not through regulation. This means that it is not possible to take enforcement proceedings under Building Control legislation for non-compliance in these buildings.

Part B: Technical Standards

Outlined in this section is a general overview of some technical aspects of the new draft version of Part L Technical Guidance Document for buildings other than dwellings. In the opinion of these authors the new draft version is a considerable improvement on the 2008 document, with greatly improved guidance in a wide range of areas for which minimal guidance was previously provided. However, there remains scope for improvement and greater guidance in a number of key technical areas. These are presented below.

U-VALUES The strategy for conservation of energy in the building, presented in the RIA document, and similar to the previous Part L, is again primarily focused on lowering the U-value of the envelope. The U-value is reduced to 0.21 W/m2K. This singular focus is questionable when other aspects such as airtightness standards and air change rates in the buildings are dealt with more vaguely, although their relative impact on energy conservation is shown in contemporary research to be of similar, and in many cases of greater, impact. Also the specification of defined U-values presents guidance for building wall thermal resistance in the steady state only. Building other than dwelling will operate in the dynamic range daily and some guidance on the thermal performance of the building envelope outside of steady state operation is recommended.

THERMAL MASS Following from the point above, there is almost no discussion of thermal mass, which can have a large impact on energy performance. Recent studies have shown thermal mass to have a considerable influence on energy consumption in buildings in the Irish climate [27]. Surfaces of high capacitance *i.e.* of high thermal mass materials will absorb heat to reach room temperature. This will add to the energy related to space heating. Inclusion of thermal mass may be appropriate in buildings of high internal gain, occupancy and in the vicinity of considerable glazing, but in other buildings thermal mass can add significantly to the building energy consumption and thereby act counter to the objectives of the Conservation of Fuel and Energy.

Thermal mass can help in the prevention of overheating in buildings however the inclusion of thermal mass only in the section on overheating reinforces the incorrect perception that the only role of thermal mass is to reduce overheating. Guidance on the inclusion of thermal mass: how best to provide for it, in what building type and its positive and negative impacts on building energy consumption would enhance this guidance document.

---

[27] *Reilly, A. and Kinnane, O. 2017. The Impact of thermal Mass on Building Energy Consumption, Applied Energy, 198, 108-121*.

AIR TIGHTNESS The discussion of air-tightness is vague and would benefit from definite minimum requirements. It should also be discussed with reference to provision of adequate sources and/or controlled ventilation rates. Recent research has shown air-tightness, particularly when considered with passive ventilation (via through wall vents as is most commonly used to meet Part F requirements) is the primary nemesis of energy conservation in buildings[28]. Additional guidance of detailing around window and door junctions, for a wide range of construction types, would be beneficial guidance. Additional guidance on the usage of air tightness membranes in different envelope build ups would also be a worthwhile addition.

VENTILATION Solutions to achieve compliance with Part L while at the same time achieving compliance with Part F are not presented and the challenges of doing so are underexplored. It is proposed that guidance is therefore lacking on how to successfully meet the objectives of both. Without guidance, undermining of one or other is inevitable in practice. To enhance the document, it is proposed that the optimum balance between both requirements be clearly presented.

EMBODIED ENERGY There is no discussion of the embodied energy of buildings in the Technical Guidance Document, specifically the energy required to develop the products used to construct the building. As buildings become more efficient in use, the energy due to construction of the building has a greater proportion. It is proposed by some building researchers that over a 75-year lifetime of a highly efficient building, the energy used to construct the building may now be up to 50% of all the energy associated with that building. Some guidance on materials of low embodied energy is appropriate for a Part L document, and would be a worthwhile addition. It is proposed to include targets for maximum embodied energy and CO2 emissions for new build (and ideally retrofit also), with a defined calculation procedure.

/END

[28] Kinnane, O., Turner, W.J.N, Sinnott, D. 2016. Evaluation of passive ventilation provision in domestic housing retrofit. Building and Environment, 106 205-218.