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**Department of Environment, Heritage & Local Government,
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**Building Regulations 2007
DRAFT TECHNICAL GUIDANCE
DOCUMENT L
(NEW DWELLINGS)
21 September 2007 (Final Draft)**



The Limerick Clare Energy Agency (LCEA) welcomes the opportunity to comment on the Final Draft of the Technical Guidance Document (TGD) part L, of the Building Regulations, proposed for July 2008 and applicable to new dwellings. The LCEA comments are summarized below and developed in more detail later in the relevant sections (**LCEA comments in red**).

Section	Summary Comment
0: General Guidance	<p>LCEA welcomes the introduction of an ultimate goal for zero / low carbon buildings. A definition of the departments understanding of zero carbon would be beneficial at some stage, but it is recognized that this is being debated at present.</p> <p>0.1.5 LCEA suggests that a harmonization of building fabric standards for dwellings and non dwellings would overcome the interpretation of applicable standards to different sections in large buildings.</p>
1: Limitation of Primary Energy Use and CO₂ emissions	<p>LCEA suggest that modifying the reference building may be more instructional and transparent to developers / designers / builders, than the introduction of various coefficients for energy (EPC) or CO₂ (CPC).</p> <p>The issue of inspection / verification comes up in almost every conversation on building regulations. LCEA suggests that it would be helpful if some clarification of this issue was presented in the document.</p>
2: Use of Renewable Energy Technologies	<p>LCEA welcomes the introduction of renewable energy requirements, but seeks clarification on the energy sources applicable, and is very concerned about the standard of products, installation and training services being offered. There is an important role for TGD – L in this.</p>
3: Building Fabric	<p>The LCEA is very disappointed that the level of permitted (heat) energy leakage from buildings has not been reduced for over five years. More disappointing is the apparent allowance of more heat leakage from pitched roof (0.16 to 0.22 W / m² K). The rationale for this is never explained.</p>
4: Building Services	<p>LCEA welcomes the increase in the role and range of building services described by TGD – L. LCEA suggests that this section may need more detail and will need to expand further soon.</p>
5: Construction Quality and Commissioning of Services	<p>An excellent addition to the TGD – L. LCEA would have similar comment to make in this section on standards, training & inspection. LCEA suggests that cold water & electrical services should also be included.</p>
5: Construction Quality and Commissioning of Services	<p>Excellent and timely addition to TGD – L. LCEA would like to see the contents of such a report expanded to include drawings, and large equipment manuals. Harmonisation of advisory reports between TGD – L and BER would be advantageous.</p>

Thank you for this opportunity. The LCEA hopes that the comments enclosed can be of some service.



SUMMARY of TGD – L (2008) FINAL DRAFT

Introduction - Transitional Arrangements

In general, this document applies to works to *new dwellings*, where the *work commences* or takes place, as the case may be, *on or after 1 July 2008*.

Insofar as the guidance contained therein relates to new dwellings, Technical Guidance Document L - Conservation of Fuel and Energy (*2005 edition*) *ceases to have effect from 1 July 2008. However, the foregoing document may continue* to be used in the case of new dwellings:

- *where the work*, material alteration or the change of use *commences* or takes place, as the case may be, *on or before 30 June 2008*, or
- *where planning approval or permission has been applied for on or before 30 June 2008, and substantial work has been completed by 1 July 2009*.

“Substantial work has been completed” means that the structure of the external walls has been erected.

Conservation of Fuel and Energy Building Regulations - The Requirements

L1 A dwelling *shall be designed and constructed so as* to ensure that the energy performance of the building is such as to *limit the amount of energy required for the operation of the building and the amount of CO₂ emissions associated with this energy use* insofar as is reasonably practicable.

L2 *For new dwellings*, the requirement of L1 shall be met by:

- a. providing that the *energy performance* of the dwelling is such as to limit the calculated primary energy consumption and related CO₂ emissions insofar as is reasonably practicable, when *both energy consumption and CO₂ emissions are calculated using the Dwelling Energy Assessment Procedure (DEAP) published by Sustainable Energy Ireland*;
- b. providing that, for new dwellings, a reasonable *proportion of the energy consumption* to meet the energy performance of a dwelling *is provided by renewable energy* sources;
- c. *limiting heat loss* and, where appropriate, *availing of heat gain* through the fabric of the building;
- d. providing and commissioning energy *efficient space and water heating systems* with efficient heat sources and effective controls;
- e. providing *energy efficient artificial lighting* systems and adequate control of these systems;
- f. *providing to the building owner sufficient information about the building*, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.



Section 0: General Guidance

0.1 APPLICATION OF THE REGULATIONS

0.1.2 For new dwellings, the key issues to be addressed in order to ensure compliance are:

- a) **Primary Energy Consumption and related CO₂ emissions**:: providing that the calculated primary energy consumption associated with the operation of the dwelling and the related CO₂ emissions, *as described in Section 1*, do not exceed a target value specified in this document.
- b) **Use of Renewable Energy** Sources providing that the contribution of low or zero carbon energy sources to the calculated primary energy requirement meets the target for such contribution *set down in Section 2*.
- c) **Fabric insulation**: providing for fabric insulation, including the limitation of cold bridging, which satisfies the guidance in this regard *set out in Section 3* (Paragraphs 3.2 to 3.4)
- d) **Air Tightness**: limiting air infiltration as *set out in Section 3* in Paragraph 3.4
- e) **Boiler efficiency**: providing an efficient boiler or other heat source as *set out in Section 4* paragraph 4.2
- f) **Insulation of pipes**, ducts and vessels: limiting the heat loss from pipes, ducts and vessels used for the transport or storage of heated water or air, as *set out in Section 4* in Paragraph 4.4
- g) **Building Services Controls**: controlling, as appropriate the demand for and output of space heating and hot water services provided, as *set out in Section 4* in Paragraph 4.3
- h) **Mechanical Ventilation Systems**: providing that, where a mechanical ventilation system is installed, the system meets reasonable performance levels, as *set out in Section 4* in Paragraph 4.5.
- i) **Artificial Lighting**: providing that the installed lighting system meets reasonable performance levels as *set out in Section 4* in Paragraph 4.6.
- j) **Performance of Completed Dwelling**: Ensure design and construction process are such that completed building satisfies compliance targets and design intent. *Guidance is given in Section 5*.
- k) **User information**: Ensure that adequate operating and maintenance instructions are available to facilitate operation in an energy efficient manner. *Guidance is given in Section 6*.

The principal aims of Part L of the Building Regulations are to limit primary energy consumption and associated CO₂ emissions. The performance levels specified for items (b) to (i) above are in the nature of backstop minimum performance levels so as to ensure reasonable levels of performance for all factors affecting energy use, irrespective of the measures incorporated to achieve compliance with Regulation L2(a). Meeting the performance levels specified for items (b) to (i) will not necessarily mean that the level specified for primary energy consumption and related CO₂ emissions (item (a)) will be met. It is likely that one or more of the performance levels specified, for items (b) to (i), will need to be exceeded to achieve this.



0.1.3 This revision of Part L represents a significant step towards the optimization of the efficiency of energy use in new dwellings and the minimization of related CO₂ emissions. ***It is intended that the standards specified here will be tightened further in 2010. The aim is to achieve zero carbon emissions associated with the operation and use of buildings, at the earliest date practicable.***

0.1.3 LCEA comment; this is excellent. It is very important that the ultimate goal is identified in this way. There is some clarification necessary on the actual definition of zero carbon emissions in buildings. The LCEA believes that true zero carbon buildings may need to include a definition on “Passive Solar” housing and the export of energy (particularly electricity) from a building to a national distribution system, and also the use of market mechanisms such as carbon trading certificates.

0.1.4 Insofar as the current amendment does not achieve this target, ***the design and construction of dwellings*** complying with this amendment to Part L, ***should be carried out with due regard to the likely need to upgrade the building fabric and fixed services in the future*** so as to reduce further carbon emissions associated with the operation and use of these dwellings.

0.1.5 Where a dwelling has an attached room or space that is to be used for commercial purposes (e.g. workshop, surgery, consulting room or office), such room or space should be treated as part of the dwelling if the commercial part could revert to domestic use on a change of ownership, e.g. where there is direct access between the commercial space and the living accommodation, both are contained within the same thermal envelope and the living accommodation occupies a substantial proportion of the total area of the building.

Where a new dwelling forms part of a larger building, the guidance in this document applies to the individual dwelling, and the relevant guidance in Technical Guidance Document L, Conservation of Fuel and Energy (May 2006 Edition) applies to the non dwelling parts of the building such as common areas (including common areas of apartment blocks), and in the case of mixed-use developments, the commercial or retail space.

0.1.5 LCEA suggest that the application of different building regulations here should be based on the likelihood of the space being converted *and* the percentage of dwelling area to non-dwelling in the larger building. Also this difficulty could / should be overcome when the fabric and services standards for commercial buildings are at least equal to dwelling standard.

0.2 TECHNICAL RISKS AND PRECAUTIONS

General

0.2.1 The incorporation of additional thickness of thermal insulation and other energy conservation measures can result in changes in traditional construction practice. Some guidance on avoiding such increased risk is given in Appendix B of this document. General guidance on avoiding risks that may arise is also contained in the publication “*Thermal insulation: avoiding risks; Building Research Establishment (Ref BR 262)*”.

0.1.5 LCEA suggests this is particularly important in attic spaces where electricity cables may be covered by insulation and water pipes may not.



Fire Safety

0.2.2 Part B of the Second Schedule to the Building Regulations prescribes fire safety requirements....., it is important to ensure that *windows, which provide secondary means of escape in accordance with Section 1.5 of TGD B*, comply with the dimensional and other guidance for such windows set out in paragraph 1.5.6 of TGD B.

Ventilation

0.2.3 Part F of the Second Schedule to the Building Regulations prescribes ventilation requirements both to meet the needs of the occupants of the building and to prevent excessive condensation in roofs and roof spaces. *Technical Guidance Document F provides guidance in relation to ventilation of bathrooms, kitchens and utility rooms of dwellings and, in general, provides for mechanical extract ventilation or equivalent to these areas.....*

Part J of the Second Schedule to the Building Regulations prescribes *requirements in relation to the supply of air for combustion appliances*, including open-flued appliances which draw air from the room or space in which they are situated. Technical Guidance Document J provides guidance in this regard.

0.3 THERMAL CONDUCTIVITY AND THERMAL TRANSMITTANCE

0.3.5 Thermal transmittance values (U-values) relevant to this Part of the Regulations are those relating to elements exposed directly or indirectly to the outside air. This includes floors directly in contact with the ground, suspended ground floors incorporating ventilated or unventilated voids, and elements exposed indirectly via unheated spaces. The U-value takes account of the effect of the ground, voids and unheated spaces on the rate of heat loss, where appropriate. Heat loss through elements that separate dwellings or other premises that can reasonably be assumed to be heated, is considered to be negligible. Such elements do not need to meet any particular U-value nor should they be taken into account in calculation of CO₂ emissions or overall transmission heat loss.

0.4 DIMENSIONS

0.4.1 Except where otherwise indicated linear measurements for the calculation of wall, roof and floor areas and building volumes should be taken between the finished internal faces of the appropriate external building elements and, in the case of roofs, in the plane of the insulation. Linear measurements for the calculation of the areas of external door, window and rooflight openings should be taken between internal faces of appropriate cills, lintels and reveals.

0.4.2 "Volume" means the total volume enclosed by all enclosing elements and includes the volume of non-usable spaces such as ducts, stairwells and floor voids in intermediate floors.

Section 1: Limitation of Primary Energy Use and CO₂ emissions

1.1 This Section provides guidance on how to show compliance with the requirements in relation to primary energy consumption and CO₂ emissions specified in Regulations L2(a). The methodology for calculation to be used is specified in the Regulation as the DEAP methodology. This methodology is published by Sustainable Energy Ireland (SEI) and calculates the energy



consumption and CO₂ emissions associated with a standardised use of a dwelling. The energy consumption is expressed in terms of kilowatt Hours per square metre floor area per year (kWh/m²/yr) and the CO₂ emissions expressed in terms of kilograms of CO₂ per square metre floor area per year (kg CO₂/m²/yr). Full details of the methodology are available on the SEI website

1.2 The performance criteria are based on the relative values of the calculated primary energy consumption and CO₂ emissions of a dwelling being assessed, and similar calculated values for a Reference Dwelling. Details of the Reference Dwelling are given in Appendix C. The criteria are determined as follows:

- Primary energy consumption and CO₂ emissions for both the proposed dwelling and the reference dwelling are calculated using DEAP.
- The calculated *primary energy consumption of the proposed dwelling is divided by that of the reference dwelling, the result being the energy performance coefficient (EPC)* of the proposed dwelling. To demonstrate that an acceptable Primary Energy consumption rate has been achieved, the calculated EPC of the dwelling being assessed should be no greater than the Maximum Permitted Energy Performance Coefficient (MPEPC). The **MPEPC is 0.6.**

LCEA Comment: This is in effect saying that new dwellings must use 40% less Primary Energy than that of an identical reference dwelling using natural gas. The LCEA would suggest that it would be less cumbersome and more transparent to use a reference house that uses 40% less Primary Energy as the comparator. Revising the reference house also gives designers, developers etc. a reference dwelling to which they can directly refer.

- The *carbon dioxide emission rate of the proposed dwelling is divided by that of the reference dwelling, the result being the carbon performance coefficient (CPC)* of the proposed dwelling. To demonstrate that an acceptable Carbon Dioxide emission rate has been achieved, the calculated CPC of the dwelling being assessed should be no greater than the Maximum Permitted Carbon Performance Coefficient (MPCPC). The **MPCPC is 0.69.** The DEAP software will be amended to calculate the EPC and CPC of the dwelling being assessed and clearly indicate whether compliance with the requirements of Regulation L2 (a) has been achieved.

LCEA Comment: This is in effect saying that carbon dioxide emissions of a new dwelling must be 30% less than carbon dioxide emissions of an identical reference dwelling using natural gas. The LCEA would suggest that it would be less cumbersome and more transparent to use a reference house that produces 30% less CO₂ as the comparator. Revising the reference house also gives designers, developers etc. a reference dwelling to which they can directly refer.

LCEA is also concerned that the level of CO₂ emissions reduction sought is less than the level of Primary Energy reduction, particularly in light of documents stated aims to move toward zero carbon dwellings as soon as possible.

1.3 Where a building contains more than one dwelling (such as in a terrace of houses or a block of apartments), reasonable provision would be to show that:

- every individual dwelling has an EPC and CPC no greater than the MPEPC and MPCPC respectively, or
- the average EPC and CPC for all dwellings in the building is no greater than the MPEPC and MPCPC respectively.



Where the latter approach is used, The average EPC and CPC are calculated by multiplying the EPC and CPC for each individual dwelling by the floor area of that dwelling, adding together and dividing the results by the sum of the floor areas of all dwellings. Common areas in the building are not included in this calculation.

1.4 The requirements that *the calculated EPC and CPC do not exceed the calculated MPEPC and MPCPC respectively, applies to the constructed dwelling*..... the use of constructions and service systems which have been assessed at design stage, or other model designs, does not preclude the need to *verify compliance by calculating the EPC and CPC when all relevant details of the final construction are known*. ***Bold Italics by LCEA***

The LCEA would like to see some comment / direction on the manner in which this verification will be carried out. Building Control Units (BCU) do perform this function presently, however the BCU must inspect all aspects of compliance with the building regulations. In many public developments, verification is carried out on an ongoing basis by a clerk of works, and “signed off” by the project manager (architect or engineer). Private developments employ a similar method of “signing off” on compliance, which is overseen by the BCU in so far as their resources will permit. Self build construction is a largely unregulated (and growing) sector of the building economy.

Considering the progressing emphasis of TGD – L on building services and renewable energy technologies, which cannot be inspected until the dwelling is complete, it follows that inspection must take place at several stages of construction for any one dwelling:-

- Foundation & ground services
- Fabric construction (walls, roof, windows etc.)
- Building services installation (heating, hot water & renewables)
- Building commission (fabric, services, controls and consumer information etc.)

Each level of inspection is necessary for correct verification as the elements of the dwelling are built over or enclosed within the structure, in a manner that makes later inspection impossible.

The LCEA would welcome a section / sub section in TGD – L giving some comment / direction on:-

1. Definitive roles of various professionals (architects, engineers, surveyors, assessors), in the verification process for compliance with the building regulations.
2. The manner and level of inspection to be conducted by the Building Control Units, is it comprehensive inspection at several stages of a percentage of all dwellings, or some other requirement.
3. Clarity on the remedies for non-compliance. Some failures can be rectified retrospectively, others are impossible to correct by the nature of construction, without substantially altering or damaging the building. What are the consequences for the designer, developer, builder of dwellings that do not comply with the building regulations? What remedies do consumers have in these situations?



Section 2: Use of Renewable Energy Technologies

2.1 This section gives guidance on the *minimum level of renewable technologies to be provided to show compliance with Regulation L2* (b).

2.2 Each dwelling *should have a minimum of 10 kWhr/m²/annum supplied from renewable technologies..* Where a building or development contains more than one dwelling, reasonable provision would be to show that:

- every individual dwelling has a minimum of 10 kWhr/m²/annum supplied from renewable technologies, or
- the average contribution of renewable technologies to all dwellings in the building or development exceeds 10 kWhr/m²/annum Where the latter approach is used, common areas in the building are not included in this calculation.

2.3 The use of centralized renewable energy sources contributing to a heat distribution system serving all dwelling units in a development, apartment block, may prove to be more practicable than providing separate renewable energy for each dwelling individually.

2.4 In high density developments, e.g. apartment developments, where the provision of 10 kWhr/m²/annum from renewable sources to each dwelling is found not practicable, the provision of space and water heating utilizing a small scale combined heat and power (CHP) system would be acceptable as an alternative.

2.5 The design and installation of renewable energy systems to comply with this guidance should be carried out by a person qualified to carry out such work.

The LCEA comments are:-

The requirement for all dwellings to source some of their energy needs from renewable energy resources is a welcome development. The level of renewable energy required is low enough to be achievable in virtually every home. However the LCEA would like to see more detail on:-

- Does the 10 kWh/m²/anum target apply total dwelling energy; thermal & electric
- Is electricity generated and / or exported at the dwelling considered?
- Does the burning of timber in open fires qualify?
- Is there a minimum efficiency requirement for any renewable energy system?
- Is there a criterion for renewable energy fuels (i.e. are timber pellets from Latvia of equal value as wood chip from Kilrush, or peat briquettes from Longford)?
- What product standard(s) must the renewable technologies meet
- What installation standards must the renewable installations meet
- What certification scheme **presently exists** in Ireland for products
- What certification scheme **presently exists** in Ireland for installations / services

LCEA is fully in favor of introducing renewable energy technologies in all buildings. However if the consumer is required by regulation to install renewables, then the providers / installers of renewable energy technologies must be equally (or greater) regulated. The certification & regulation of the renewable energy market is not in place (Nov '07), and is not expected to be available nationwide for at least a year. Though many renewable technologies are available



nationwide, as are installers, there is no national certification scheme in place. The difficulty in this area is very well known, documented and has been highlighted by rouge suppliers and installers on the list of suppliers and installers, administered by Sustainable Energy Ireland, under the “Greener Homes Scheme”.

LCEA encourages the department to ensure the consumer is protected before placing them in this invidious position. If this means making the use of renewable energy technologies a request rather than a requirement in 2008, so be it. But it is much preferred that the department would use its influence with other departments to ensure national standards / certification for products & installation are in place in time for the introduction of the 2008 TGD – L. The standards and certification will of course have to include comprehensive training programmes similar those presently provided by Renewable Heat Energy Skillsnet in Meelick, County Clare. If the department is not confident of its ability to protect the consumer in this way, then the renewable energy requirement could / should be deferred to 2010 when the renewables energy market is sufficiently developed and regulated to protect the consumers of the technology.

It is also noted that despite the prescribed use of renewable technologies, the building market itself is already targeting the use of renewables as a means of complying with TGD – L, and also a desire for increase energy security.

Section 3: Building Fabric

3.1 GENERAL

3.1.1 This section gives guidance on acceptable levels of provision to ensure that heat loss through the fabric of a dwelling is limited insofar as reasonably practicable. Guidance is given on three main issues:

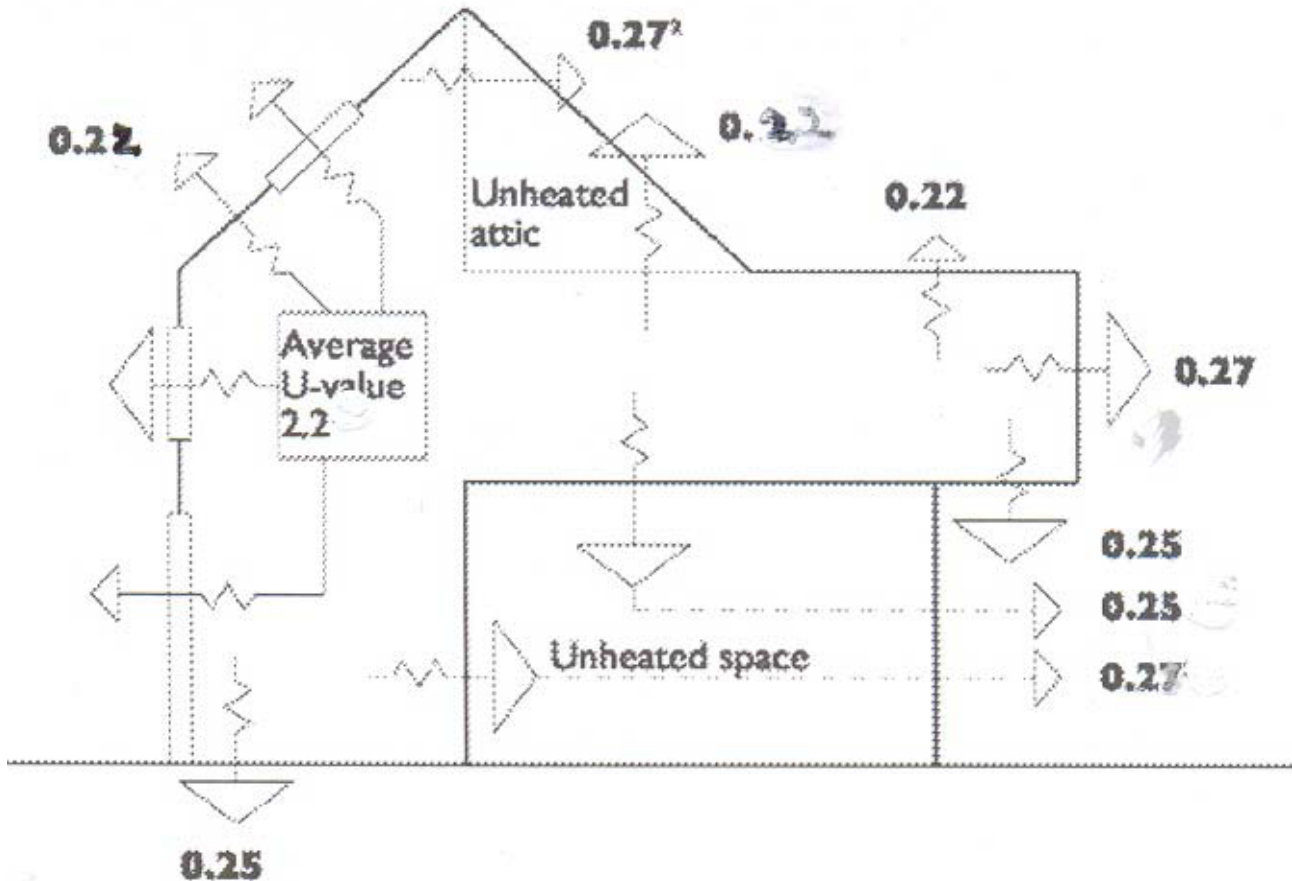
3.2 FABRIC INSULATION

3.2.1 The derivation of U-values, including those applicable where heat loss is to an unheated space, is dealt with in Paragraphs 0.3.5 to 0.3.8 and Appendix A.

3.2.2 In order to limit heat loss through the building fabric reasonable provision should be made to limit transmission heat loss by plane elements of the building fabric. Acceptable levels of thermal insulation for each of the plane elements of the building to achieve this are specified in terms of average area-weighted U-value (U_m) in Table 1.

3.2.3 Reasonable provision would also be achieved if the total heat loss through all the opaque elements did not exceed that which would be the case if each of the area-weighted average U-value (U_m) set out in Table 1 were achieved individually. Where this approach is chosen, the values for individual elements or sections of elements given in Table 1 also apply.

The diagram below summarizes the maximum elemental heat loss for dwellings proposed in the 2008 TGD - L



The following table shows the evolution of elemental heat loss for dwellings since 1997.

Evolution of Building Elemental Heat Loss for Dwellings, 1997 - 2008

Element	W / m ² K 1997	W / m ² K 2002	W / m ² K 2006	W / m ² K 2008
Exposed Roof - Pitch	0.25	0.16	0.16	0.22
Exposed Roof - Flat	0.25	0.22	0.22	0.22
Exposed Wall	0.45	0.27	0.27	0.27
Exposed Floor	0.45	0.25	0.25	0.25
Ground Floor	0.45	0.25	0.25	0.25
Windows	3.30	2.20	2.20	2.20

The LCEA is very disappointed to note that improvement (reduction) in elemental heat loss has not taken place since 2002. It is vital that the amount of energy required to heat a building is minimized, in keeping with this documents stated aim of seeking to have zero carbon buildings as soon as possible. What could be more efficient than buildings that require little or no heating (passive solar) because of the levels of insulation.

The LCEA would recommend that the 2008 TGD – L marks a radical step toward zero carbon buildings by combining fabric insulation improvements with better building services and utilizing renewable energy technologies.

The permissible increase in heat loss from roofs and lack of improvement in all other areas is difficult to understand, and never explained in the document.



3.3 THERMAL BRIDGING

3.3.1 To avoid excessive heat losses and local condensation problems, reasonable care should be taken to ensure continuity of insulation and to limit local thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and other locations. Any thermal bridge should not pose a risk of surface or interstitial condensation. Heat loss associated with thermal bridges is taken into account in calculating energy use and CO₂ emissions using the DEAP methodology.....

3.3.2 The following represents reasonable provision in this regard and, if followed, standard allowance for thermal bridging can be used in DEAP calculations:

- adopt standard details set out in [*document on Standard Details to Limit Thermal Bridging and Air Infiltration to be prepared and updated from time to time by relevant construction industry bodies, in consultation with DOEHLG – this document to be similar in scope to Accredited Construction Details published by DCLG, England & Wales*], including the on-site inspection regime and related quality control procedures set out in that document;

3.4: Building Envelope Air Permeability

3.4.1 To avoid excessive heat losses, reasonable care should be taken to limit the air permeability of the envelope of each dwelling. In this context, envelope is the total area of all floors, walls (including windows and doors), and ceilings bordering the dwelling.

3.4.2 The following represents a reasonable approach to the design of dwellings to ensure reasonable air permeability:

- a) Identify the primary air barrier elements (e.g. sheathing, plaster, vapour control layer, breather paper) at early design stage;
- b) Develop appropriate details to ensure continuity of the air barrier and communicate these to all those involved in the construction process;
- c) adopt standard details set out in [*document on Standard Details to Limit thermal Bridging and Air Infiltration to be prepared and updated from time to time – this document to be similar in scope to Accredited Construction Details published by DCLG, England & Wales*], including the on-site inspection regime and related quality control procedures set out in that document; or
- d) Use element design, details and quality control procedures to provide an equivalent level of performance as if the standard details and quality control procedures referred to in

3.4.3. Air permeability can be measured by means of pressure testing of a building prior to completion. The procedure for testing is specified in IS EN 13829:2000 “Thermal performance of buildings: determination of air permeability of buildings: fan pressurization method”, and performance is quantified in terms of cubic metres per square metre of external surface area per hour (m³/(hr.m²)) at 50 Pascals pressure difference. Guidance on appropriate extent of testing is given in Paragraph 5.4.3.



3.4.4. When tested in accordance with the procedure referred to in Paragraph 3.4.3, a performance level of 10m³/(hr.m²) represents a reasonable upper limit for air permeability. See paragraph 5.4.3 for the appropriate measures to be undertaken where this limit is not achieved when tested.

Section 4: Building Services

4.1 GENERAL

4.1.1 This Section gives guidance on levels of provision for space and water heating systems, their controls and associated pipes, ducts and storage vessels, so as to ensure efficiency in operation insofar as reasonably practicable. Guidance is given on three main issues:

- a) Heating appliance efficiency (Sub-section 4.2),
- b) Space Heating and Hot Water Supply System Controls (Sub-section 4.3), and
- c) Insulation of Hot Water Storage Vessels, Pipes and Ducts (Subsection 4.4)

Guidance is also given for appropriate provision for mechanical ventilation systems (Sub-section 4.5) and for fixed artificial lighting (Sub-section 4.6)

4.2: Heating Appliance Efficiency

4.2.1. The appliance or appliances provided to service space heating and hot water systems should be as efficient in use as reasonably practicable. ***For fully pumped hot water based central heating systems utilizing oil or gas, the boiler efficiency should be not less than 86%*** as specified on the HARP database. Guidance on the appropriate efficiency for other appliances is given in the document “-----“. [It is proposed to publish a separate document covering all aspects of requirements in relation to space heating and hot water services for housing - based on the document “Domestic heating compliance guide” published by NBS, UK]

4.3 Space Heating and Hot Water Supply System Controls

4.3.1. Space and water heating systems should be effectively controlled so as to ensure the efficient use of energy by limiting the provision of heat energy use to that required to satisfy user requirements, insofar as reasonably practicable. The aim should be to provide the following minimum level of control:

- automatic control of space heating on basis of room temperature;
- automatic control of heat input to stored hot water on basis of stored water temperature;
- separate and independent automatic time control of space heating and hot water;
- shut down of boiler or other heat source when there is no demand for either space or water heating from that source.

4.3.2 *Provision should be made to control heat input on the basis of room temperature,.....* Depending on the design and layout of the dwelling, control on the basis of a single zone will generally be satisfactory for smaller dwellings. ***Where the dwelling floor area exceeds 100 m², control on the basis of two independent zones will generally be appropriate.*** In certain cases additional zone control may be desirable, e.g. zones which experience significant solar or other energy inputs may be controlled separately from zones not experiencing such inputs.



4.5 Mechanical Ventilation Systems

4.5.1 Where a mechanical ventilation system is installed for the provision of ventilation to a dwelling or part thereof, the system should meet the performance levels specified in [GPG 268 or other Ref] and also have specific fan powers and heat recovery efficiency not worse than those given in Table 3.

Table 3: Minimum performance levels for mechanical ventilation systems

System type	Performance
Specific Fan Power (SFP) for continuous supply only and continuous extract only	0.8 litre/s.W
SFP for balanced systems	2.0 litre/s.W
Heat recovery efficiency	66%

4.6 Fixed Lighting

4.6.1 Internal lighting: Lighting fittings (including lamp, control gear and an appropriate housing, reflector, shade or diffuser or other device for controlling the output light) that only take lamps having a *luminous efficacy greater than 40 lumens per circuit Watt* can be considered to be *energy efficient*. Reasonable provision for efficient lighting would be to *provide at least on such fitting for each 25m² floor area of the dwelling, or part thereof*. Areas most likely to require lighting for long periods should be chosen as locations for energy efficient lighting. Lighting fittings in less frequented areas like cupboards and other storage areas would not count.

This is a good approach. The LCEA believes it would be useful if the TGD-L had an appendix which illustrated & tabled:-

- Type of lamps capable of providing the efficacy required, for dwellings and non dwellings.
- Minimum lighting standards required for various tasks, (e.g. CIBSE table 1.12 Guide A)
- Use of daylight in design calculations, and controls. (e.g. CIBSE table 1.13 Guide A)

A light fitting may contain one or more lamps. Circuit-Watts means the power consumed in lighting circuits by lamps and their associated control gear and power factor correction equipment. *Fluorescent and compact fluorescent lighting fittings would meet this standard. Lighting fittings for GLS tungsten lamps with bayonet cap or Edison screw bases, or tungsten halogen lamps would not.*

Note: Installing mains frequency fluorescent lighting in garages may cause dangers through stroboscopic interaction with vehicle engine parts or machine tools. Fluorescent lamps with high frequency electronic ballasts substantially reduce this risk. *This danger is one of working on engines, particularly engines with moving parts where strobe action of lights may confuse the viewer's observation of the moving part. This could / should be addressed in an appendix. A similar difficulty of glare occurs for people using PC screens at home (a much larger and growing population in dwellings).*



Section 5: Construction Quality and Commissioning of Services

5.1 The requirements of Part L apply to the completed building. Reasonable measures should be taken during construction and appropriate checks and assessments carried out prior to completion to ensure that compliance with Part L is achieved. Paragraphs 5.2 to 5.4 give guidance on appropriate measures to satisfy this requirement.

5.2. Insulation continuity and air permeability: The elements that comprise the external fabric of the building should be designed and constructed to ensure that the calculated performance of the building and of its components is achieved in practice. ***On-site quality control should include checks on the adequacy of insulation installation and of any barriers designed to limit air permeability, including an inspection of finished work to ensure that all work is properly constructed before covering over.***

5.3. Thermal Bridging: There should be no reasonably avoidable thermal bridging, e.g. due to gaps between insulation layers and at joints, junctions and edges around openings. Where unavoidable thermal bridging is provided for in the design, care should be taken to ensure that the chosen design detail is accurately constructed on site.

5.4 Air Tightness Pressure Tests:

5.4.1 Subject to the guidance in Paragraph 5.4.6, air pressure testing should be carried out on a proportion of dwellings on all development sites. The approved procedure for pressure testing is given in the [ATTMA publication 'Measuring Air Permeability of Building Envelopes' or other ref]. The manner approved for recording the results and the data on which they are based is given in section 4 of that document. The number of dwellings that should be tested is set out in Paragraph 5.4.3 and Table 4 below

5.4.2 On each development, an air pressure test should be carried out on at least one unit of each dwelling type. The number of tests appropriate is related to the number of units in the development and on the results achieved in the earlier tests carried out and is presented in Table 4. One dwelling from the first four units of each dwelling type planned for completion should be tested.

5.4.3 The requirements of Part L2 (c), insofar as it relates to air permeability, should be considered to be demonstrated if the measured air permeability is not worse than the criterion set out in paragraph 3.4. If satisfactory performance is not achieved, then remedial measures should be carried out on the dwelling and a new test carried out until the dwelling achieves the criteria set out in paragraph 3.4.

The LCEA welcomes this development. The need for adequately trained assessors and a recognised certification scheme is urgently required, to put this measure in place.

Table 4: Number of pressure tests per dwelling type



Number of units	Number of tests
4 or less	One test
Greater than 4, but equal or less than 40	Two tests
Greater than 40, but equal or less than 100	At least 5% of the dwelling type
More than 100	
(a) where the first five tests achieve the design air permeability	At least 2% (for dwellings in excess of first 100 units)
(b) where one or more of first five tests do not achieve the design air permeability	At least 5% of units, until 5 successful consecutive tests are achieved, 2% thereafter

5.4.6. For small developments comprising *no more than three dwelling units*, specific pressure testing of these dwellings would not be necessary if it can be demonstrated that, during the preceding 12 month period, *a dwelling of the same dwelling type constructed by the same builder had been pressure tested according to the procedures given in paragraph 5.4* and had satisfied the criterion set in Paragraph 3.4. However, if the assumed air permeability in the calculation of the WPC using the DEAP methodology is less than the criterion set in Paragraph 3.4, a pressure test to verify this assumed value should be carried out. The guidance given in Paragraph 5.4 would apply in this situation.

5.5. Commissioning Space and Water Heating Systems: The heating and hot water system(s) should be commissioned so that at completion, the system(s) and their controls are left in the intended working order and can operate efficiently for the purposes of the conservation of fuel and power. The procedure for carrying out commissioning of these systems is set out in [“—Ref doc-----“]

The LCEA comments

- Commissioning of building services is an important function and a welcome addition to the building regulations
- Who will verify the commissioning
- What manner of certification of commissioning will be employed
- Building Services commissioning should also include Ventilation systems (whole house)

5.6 Cold Water storage, filtration & recovery.

The following text is copied directly from the “Regulatory Impact Assessment (RIA). Part G (Hygiene) of the Building Regulations. Proposed requirement for dual flush toilets”. November 2006, Department of Environment, Heritage & Local Government.

“According to the European Environment Agency, the average consumption for all households’ purposes in the EEA is about 150 litres per capita (1999)¹. On this basis the *average water consumption per person in Ireland comes to a staggering 55,000 litres per person per year*. The third biggest user of water is the WC, accounting for almost 35% of a person's average daily water consumption. (Bold Italics by LCEA)

¹ http://themes.eea.europa.eu/Sectors_and_activities/households/indicators/energy/hh07household.pdf
 LCEA/emr/06112702



Once the water is extracted, it requires treatment in order to make it suitable for consumption. Treatment generates demand for the production and distribution and storage of certain chemicals e.g. chlorine. ***The treatment process costs approximately €1.00/m . (Bold Italics by LCEA)***

Energy is needed to treat the water, to deliver it to the end user and then re-treat it as sewage. This energy usage adds to the volumes of CO₂ emitted in Ireland and this, in turn, contributes to the global problem of climate change..... ***(Bold Italics by LCEA)***

The LCEA suggests that the energy implications of cold water misuse in Irish homes should be addressed in the TGD – L. in particular the use of treated potable water for gardening, and external building & vehicle cleaning should be examined, and the use of rainwater recovery systems recommended. The LCEA suggests TGD – L is an appropriate guide to summarise the energy issues associated with:-

- The use of water conservation techniques in houses, non concussive taps, half flush toilet cistern, conservation shower heads etc.
- The recovery of rainwater and its safe storage. Indeed the large scale recovery of non potable rain water for housing developments would dramatically reduce the burden of providing treated potable water from local authority plants, with an associated reduction in energy consumption.

5.7 Electrical power consumption & generation.

Many homes in Ireland have installed items that consume large amounts of electricity (saunas, Jacuzzi, power baths, swimming pools, etc.). Though these items are not common to homes, LCEA suggests that it is an opportune time for TGD – L to introduce a section on electricity consumption and production. Such a section would refer to:-

- The use of large electricity appliance (for leisure or therapy)
- The introduction of “Smart Meters”
- The micro generation of electricity in dwellings

The department is obviously aware that the micro generation of electricity at dwellings is exempted from planning under certain conditions. The technical requirements of this are covered under the installation requirements set out by the Electro Technical Council of Ireland and G10 compliance for ESB networks. Considering these important developments and the imminent introduction of “Smart Meter” the LCEA suggest that the TGD – L should include a section on energy conservation in dwellings associated with electrical power.



Section 6: User Information

6.1. The owner of the building should be provided with sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable in the circumstances. A way of complying would be to provide a suitable set of operating and maintenance instructions aimed at achieving economy in the use of fuel and energy in a way that householders can understand. The instructions should be directly related to the particular system(s) installed in the dwelling. Without prejudice to the need to comply with health and safety requirements, the instructions should explain to the occupier of the *dwelling* how to operate the system(s) efficiently. This should include

- a). the making of adjustments to the timing and temperature control settings; and
- b). what routine maintenance is needed to enable operating efficiency to be maintained at a reasonable level through the service life(s) of the system(s).

The information to satisfy this requirement may be provided in the context of the Advisory Report to the mandatory Building Energy Rating certificate, augmented as appropriate.

The LCEA comments that the requirement of user information is an excellent development. LCEA would suggest that the user information should include:-

- Operations manuals / parts list for the major building services components (boilers, mechanical ventilation etc.)
- Appropriate operating procedures for the safe and efficient use of the services installed
- A set of drawings (A3 – pdf) giving the location of electricity, gas & water services

The LCEA is aware of the Advisory Report planned for the mandatory Building Energy Rating (BER) certificate, and does not believe that the BER advisory report will be adequate to address the issues raised above. A harmonised approach to user advisory reports would be advantageous. .