Building Regulations
Part L and F Consultation

CIBSE South West Region
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Building Regulations Parts L and F Consultation

- Consultation covers proposed 25% improvement in Part L energy efficiency standards for buildings ….
- and new Part F ventilation standards to take account of higher air tightness standards in Part L
- Part L & F consultation document published on 18 June 2009
- Responses to consultation due by 17 September 2009
- First step on path to achieving zero carbon new buildings from 2016/2019
- Part J combustion appliances consultation also published today – 3 September 2009
Today’s presentation

• Part L background and policy drivers
• Proposed changes to regulations and guidance
  • Four Part L Approved Documents and two Building Services Compliance Guides
  • Part F Approved Document and Domestic Ventilation Installation and Commissioning Guide
  • CO₂ calculation methods (SAP and SBEM)
• Consultation also covers proposals for improving compliance and building performance, Accredited Construction Details scheme, training and dissemination, future thinking
• Q&A session
• Regulation 4 calls for compliance with functional requirements in Schedule 1:
  • Part L: Make reasonable provision for conservation of fuel and power
  • Part F: Provide adequate means of ventilation for people in buildings

• Other regulations set specific requirements for:
  • CO₂ emissions (regulation 17C)
  • consequential improvements (regulation 17D)
  • energy performance certificates (regulation 17E)
  • renovating the fabric (regulation 4A)
  • pressure testing (regulation 20B)
  • commissioning building services (regulation 20C)

• Guidance showing some ways of complying with the regulations is contained in Approved Documents, which in turn refer to:
  • CLG building services compliance guides, European standards, authoritative industry guidance
Part L of the Building Regulations

- Part L sets energy efficiency standards for buildings:
  - on construction
  - when carrying out work on existing buildings
- Standards are for **performance**:
  - new buildings: CO₂ emission rate limits
  - existing buildings: thermal performance of fabric, & efficiency of fixed building services
- Non-prescriptive approach – allows innovation & offers flexibility to choose cost-effective, practical solutions
Part F of the Building Regulations

• Part F similarly sets ventilation standards for new and existing buildings

• Guidance in ADF covers four types of domestic system:
  1. Background ventilators and intermittent extract fans
  2. Passive stack ventilation
  3. Continuous mechanical extract
  4. Continuous mechanical supply and extract with heat recovery

• Guidance sets standards for:
  • Intermittent / continuous extract flow rates
  • Equivalent areas of background ventilators / air supply rates for continuous whole building ventilation
  • Areas of openings for purge ventilation

• ADF refers to other guidance for non-domestic buildings
• Buildings account for 45% of UK carbon emissions
• Energy White Paper 2007 sets out energy strategy
• Raising energy efficiency standards through Building Regulations (Part L) is key
• But must ensure health standards (Part F) not compromised

In 2005, the UK emitted 550m tonnes of CO$_2$(1)

(1) Source: Energy White Paper, 2007
The UN has set out various emission path scenarios and the impact of various temperature rise scenarios. Even if carbon emission reduction targets are met, we are looking at least at a 2°C temperature rise. Updated UK Climate Projections (UKCP09) published 18 June 2009 see [www.ukcip.org.uk](http://www.ukcip.org.uk)
Policy update

- **May 2007 – Energy White Paper:** strategy for saving energy, clean energy supplies, security of supply, fuel poverty
- **Jul 2007 – Building a Greener Future Policy Statement:** new homes to be net zero carbon from 2016
- **Dec 2007 – Carbon Reductions in Non-domestic Buildings:** report by UK Green Building Council
- **Dec 2007 – Climate Change Planning Policy Statement:** tackling climate change through good planning
- **2008 Climate Change Act:** legal obligation to reduce emissions by 80% by 2050
- **2008 Budget Statement:** ambition for new non-domestic buildings to be zero carbon from 2019
- **Jun 2008 – Renewable Energy Strategy Consultation:** meeting EU target of 20% energy from renewable sources by 2020
- **Dec 2008 – Definition of Zero Carbon Homes and Non-Domestic Buildings Consultation:** meaning of ‘net zero carbon’, and non-domestic zero carbon timeline
Policy update

- Feb 2009 – Heat and Energy Saving Strategy Consultation: carbon emissions from existing stock to approach zero by 2050
- Feb 2009 – Community Energy Saving Programme Consultation: obligation on energy suppliers and electricity generators to provide whole house energy saving measures for low income households
- Jun 2009 – Proposals for Amending Part L and Part F of the Building Regulations Consultation
- Sep 2009 – Future of Building Control – Implementation Plan: improving the building control system (risk-based inspections, fixed periodic reviews, …)
- Sep 2009 – Proposals for Amending Part J of the Building Regulations Consultation
Policy update

- **Decent Homes Standard**: minimum standard for social homes by 2010
- **Market Transformation Programme**: energy labelling of appliances
- **Carbon Emissions Reduction Target**: obligation on energy suppliers to deliver carbon saving measures – eg free low energy lamps
- **Carbon Reduction Commitment**: mandatory scheme for large business and public sector organisations to save energy
- **EU emissions Trading Scheme**: meeting Kyoto commitment to reduce greenhouse gases by 8% below 1990 levels
- **EU directives**:
  - Energy Using Products
  - Energy Performance of Buildings (EPBD-2)
  - Renewable Energy
Policy update

• **Code for Sustainable Homes**: national standard for the sustainable design and construction of new homes
  • Energy and CO₂ emissions
  • Water
  • Materials
  • Surface water run-off
  • Waste
  • Pollution
  • Health and well-being
  • Management
  • Ecology
• Minimum Code level 3 for social housing since April 2008
• Voluntary for private housing
• Rating mandatory for all new homes since 1 May 2008
• Buildings account for 45% of UK carbon emissions
• Energy White Paper 2007 sets out energy strategy
• Raising energy efficiency standards through Building Regulations (Part L) is key
• But must ensure health standards (Part F) not compromised

In 2005, the UK emitted 550m tonnes of CO₂(1)

- Domestic 27%
- Commercial and Public buildings 13%
- Industrial buildings 5%
- Industrial process 22%
- Transport 33%
- Agriculture 1%

(1) Source: Energy White Paper, 2007
Part L in a developing policy landscape

**Target:**
all new homes to be zero carbon from 2016

**Ambition:**
all new non-domestic buildings to be zero carbon from 2019

**Consultation proposal:**
cost-effective energy efficiency measures available to all households

**Consultation proposal:**
emissions from households (and business premises) reduced by at least 80%, and as far as possible approaching zero
Refining the zero carbon homes agenda ...

December 2008 – consultation on definition of zero carbon

1. High level of energy efficiency

2. Minimum level of carbon reduction on site (e.g. through improved insulation or providing onsite renewable energy) – 44%, 70% or 100%?

3. Tackle remaining carbon emissions by choosing measures from a list of "allowable solutions" (cost limit)

Cost not exceeding £X per tonne CO₂

Identifying practical issues for further work (incl through Zero Carbon Hub):
• powers & enforcement, skills & capacity, etc
## Heat & Energy Saving Strategy consultation (Feb 2009):

<table>
<thead>
<tr>
<th>Year</th>
<th>Objective</th>
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| 2015 | • all cost-effective retrofit measures implemented where possible  
      • capacity to deliver comprehensive whole house solutions to at least 400,000 homes per year |
| 2020 | • save up to 44 MtCO₂ a year – equivalent to 30% of 2006 emissions from households, and 8.5% of total 1990 emissions  
      • comprehensive whole house solutions available to improve the energy performance of approximately 7m homes |
| 2030 | • cost-effective energy efficiency measures available to all households |
| 2050 | • emissions from households (and business premises) reduced by at least 80%, and as far as possible be approaching zero |
Scope of Part L 2010 review

- Performance targets for new build
- Limits on design flexibility
- Strategy for work in existing buildings
- Development of calculation methods (SAP and SBEM) and software tools
- Measures for further improving compliance
- Correlation with Part F (ventilation)
Proposed new build standards

Timetable for new homes:

- 25% improvement in 2010 CSH energy level 3
- 44% improvement in 2013 CSH energy level 4
- Zero carbon from 2016 CSH energy level 6

Non-domestic:

- Budget 2008: ambition for all new non-domestic buildings to be zero carbon from 2019
- Ambition for new schools and public buildings is from 2016 and 2018 respectively
- Important to take progressive steps towards this to decrease carbon and to stimulate innovation and new technologies

- Current thinking is to adopt similar phased reductions for non-domestic buildings, beginning with 25% in 2010
New build targets

- Key issue is the mechanism for target setting
- Option to retain a 2002 notional building plus further 25% improvement – a flat 25% improvement for each building
- Has familiarity but takes no account of difficulties or opportunities for improving performance in different types of building
New build targets

- So have developed alternative option to provide aggregate 25% for new building stock rather than per building.
- 2010 notional (TER) with no improvement factor based on relative cost effectiveness of making energy efficiency improvements for typical building components.
- Some buildings deliver more than 25%, some less – optimised to deliver national target of 25% when applied across build mix.
- Separate aggregates for domestic and non-domestic buildings.
- Maximises CO₂ reduction per unit investment, more pronounced for non-domestic.
- Government proposed approach for 2010 is "flat 25%" for new homes and "aggregate 25%" for new non-domestic buildings.
- Seek feedback on the options in consultation.
New build compliance steps

Criterion 1 – (BER<=TER)
• Same regulatory framework regardless whether flat or aggregate approach adopted

Criterion 2 – Limits on design flexibility
• Fabric backstops in AD, services backstops in compliance guides

Criterion 3 – Limiting effects of solar gain
• Revised SAP procedure and limiting solar gains for non-domestic

Criterion 4 – Construction & commissioning
• Evidence of linear thermal transmittances – claim better performance where ACD scheme with QA adopted
• Pressure test frequency for domestic increased by factor of ~2
• Commissioning plan provided with deposit of plans

Criterion 5 – Provision of information
• Add EPC recommendations to log book
Calculation tools

- Building Research Establishment have developed SAP and SBEM drafts to support Part L consultation package.
- Impact of Part G (water efficiency) and associated reduction of hot water energy demand for new homes.
- SAP software core plus interface for consultation.
- SAP moving to monthly rather than annual calculation with factors to address thermal mass.
- SBEM focus is on convergence of results with Dynamic Simulation Models (DSMs).
- SBEM building typology linked to planning classes with simplified activity types below this.
Strategy for new build

- Insulate building fabric, pipes, ductwork and hot water storage vessels
- Install high efficiency systems that are well controlled and commissioned
- Then consider use of renewable heat and electricity sources – heat pumps, biomass, solar thermal, solar photovoltaic, etc – to meet carbon target
- Compliance tools include algorithms for renewables
- Low distribution temperatures for heating and cooling will facilitate integration with renewables
- Consider making buildings “renewables ready”
Importance of existing stock

Source: Housing Statistics – ODPM 2004
Existing buildings

- Important to cut carbon footprint from new build but 70% of homes in 2050 will be existing
- Consultation proposes general raising of standards and seeks to capture more work – eg circulator pumps, swimming pool basins inside buildings
- Extensions continue to use elemental approach but can trade-off or use SAP/SBEM for greater flexibility
- Propose to remove exemptions from the energy efficiency requirements but include specific guidance on what is reasonable provision (eg historic buildings)
- Propose more focused guidance for thermal elements and for consequential improvements for buildings over 1000m²
Consumer research shows that conservatories are increasingly being treated as part of the living space.

Except for Part N (Safety glazing) and Part P (Electrical safety) current building regulations do not capture conservatories <30m² on the ground floor – ie most domestic conservatories.

A conservatory with poor energy efficiency standards and no thermal separation can double the CO₂ impact of the house and increases fuel bills.

Consultation seeks views on whether to make compliance with Part L a requirement for all new conservatory installations.

Also seeking views on whether to make such works notifiable to Building Control.
Building services compliance guides

• Domestic and non-domestic building services guides set:
  • limits for design flexibility for new build
  • energy efficiency standards for new and replacement systems in existing buildings

• 2010 editions cover:
  • gas, oil, solid fuel and electric heating
  • ventilation, air conditioning, lighting, pumps
  • biomass, community heating, combined heat and power, heat recovery, heat pumps, solar thermal, solar photovoltaic, wind turbines
Building services compliance guides

- Include improved standards for the services included in the previous guides
- Updated in line with BS ENs
- New sections cover energy standards for ventilation, lighting, air conditioning, pumps and LZCs
- As far as possible generic so that they can be adapted for use in all regions of the UK
Improving compliance and performance

- Building control to be given construction details assumed in CO₂ calculation at design stage – produced automatically by software tools
- Option of adopting Accredited Construction Details (ACDs) with quality control system to claim higher performance
- Wider use of Competent Person Schemes
- More focused guidance for renovation work
- Substantial training and dissemination campaign
Calculation methods

- Improve CO₂ calculations by (eg) taking account of:
  - boiler efficiency for space heating \textit{and} hot water
  - actual boiler performance in field trials
  - thermal mass
  - party wall details
  - ….
Future Thinking Paper (FTP)

- Consultation includes short FTP but impractical to develop detail for 2013 right now given evolving zero carbon discussion and European initiatives.
- Mindful of twin policy goals of reducing emissions and security of energy supplies.
- For 2010 proposal is to adopt TER with energy efficiency backstops.
- Moving forward a more effective approach may be to set a limit on delivered energy and FTP considers and seeks views on a combination of metrics:
  - Heat Loss parameter to set a minimum overall fabric standard; plus
  - A delivered energy limit to ensure that the overall level of energy efficiency is appropriate; plus
  - The CO₂ target to ensure that the energy supplies to the building are appropriately low-carbon.
- FTP explores additional end-use energy demands in new non-domestic buildings e.g. vertical transportation, external lighting, air curtains …
New homes to be zero carbon from 2016
Ambition for new non-domestic buildings to be zero carbon from 2019
Separate consultations proposing changes to the Code for Sustainable Homes and trajectory for new non-domestic buildings
Heat & Energy Saving Strategy for existing buildings
Part F 2010 drivers

- Part L is main bulk of consultation but need to ensure Part F ventilation standards are not undermined.

- Typically over 80% of our time is spent indoors and we need the air that we breathe to be healthy - especially important for vulnerable groups.

- Key task for the revision of ADF is how dwellings should be ventilated in the future.

- ADF (2006) guidance has been designed to work at assumed permeability of 3 m³/h/m² at 50 Pa.

- Part L changes encourage airtightness so more homes will tend towards 3 m³/h/m²: adequate purpose provided ventilation is needed to maintain healthy IAQ.
Common indoor pollutants

Mould

Gas cooking fumes

Body Odour

Volatile organic compounds
• Need to ensure indoor air quality not undermined by making buildings more airtight

• Approved Document F sets ventilation standards – key task is how dwellings should be ventilated in the future

• ADF 2006 guidance assumes certain amount of air leakage adds to purpose-provided ventilation

• If buildings made more airtight – and happening already – may need to amend ventilation provisions

• Natural ventilation (with local intermittent fans) is main form of domestic ventilation

• Trend will be to mechanical ventilation with heat recovery
~30% of new dwellings tested < 5 m$^3$/h/m$^2$
~3-5% of new dwellings tested < 3 m$^3$/h/m$^2$
Future dwellings are expected to become tighter
• Propose increasing purpose-provided ventilation for more airtight homes

• Propose guidance for installation and commissioning of fixed mechanical ventilation systems

• Clarify requirements for ventilation when windows are replaced in existing homes

• Continue with research into ventilation and IAQ in airtight homes, mould growth, trickle vents, experience of other countries
Summary and programme

- Proposals together could deliver 3.3 million tonnes of carbon savings a year by 2020
- Proposal to require an improvement of 25% in the energy efficiency standards of every new home
- Proposal to require an aggregate improvement of 25% in the energy efficiency standards of all new non-domestic stock
- Views sought on removal of current exemption from Part L of new conservatories
- Proposals to tighten existing standards for some building services and elements
- Proposals for changes to Part F to ensure adequate ventilation provision in more air-tight buildings

Consultation
(18 June – 17 Sept 2009)

Analysis and policy decisions
(Sept 2009 – Jan 2010)

Make new Regs & publish new guidance
(Feb/Mar 2010)

Coming into force
(1 Oct 2010)
Additional slides for question and answer session on technical guidance
Consultation package

Presented in three volumes:

• Volume 1 sets out policy context, measures to further improve compliance, proposals for ACD scheme, dissemination strategy, early FTP, impact assessment and response form

• Volume 2 sets out proposed changes to the technical guidance for Part L (draft ADLs and compliance guides)

• Volume 3 sets out proposed changes to the technical guidance for Part F (draft ADF and I&C guide)
Volume 1: Policy and non-technical

Summary

Ch 1: Introduction
Ch 2: Improving compliance
Ch 3: Accredited Construction Details scheme
Ch 4: Training and dissemination strategy
Ch 5: Future thinking
Annex B: Impact Assessment
Annex C: Response form
Volume 2: Part L Guidance

Ch 1: ADL1A – New dwellings
Ch 2: ADL1B – Existing dwellings
Ch 3: ADL2A – New non-domestic buildings
Ch 4: ADL2B – Existing non-domestic buildings
Ch 5: National Calculation Method (SAP and SBEM)
Ch 6: Domestic Building Services Compliance Guide
Ch 7: Non-domestic Building Services Compliance Guide
Volume 3: Part F Guidance

Ch 1: Approved Document F – Ventilation

Ch 2: Domestic Ventilation Installation and Commissioning Compliance Guide
Proposed Part L changes – General

- Revised AD format and layout
- Move all building services guidance to Domestic and Non-domestic Building Services Compliance Guides
- Replace exemptions in regulations for historic buildings with guidance on what is “reasonable provision”
- Remove exemption for conservatories less than 30m²
- Define standards for swimming pool basins
- Revise guidance on continuity of insulation
- Raise standards generally
Approved Document L1A

- Require design stage as well as final CO$_2$ calculation
- Require commissioning plan with deposit of plans

Approved Document L1B

- Revise the definition of renovation
• **Energy efficiency requirements** apply to spaces that use energy for the purposes of providing human comfort ……

• **and** to spaces where energy is used to condition the indoor environment (eg computer rooms, cold stores)

• New **2010 notional buildings** to determine TER

• Guidance on **shell and core** developments

• Limiting **solar gain** in summer
• **Energy efficiency requirements** apply to spaces that use energy for the purposes of providing human comfort ……

• **and** to spaces where energy is used to condition the indoor environment (e.g., computer rooms, cold stores)

• Guidance on first fit-out of **shell and core** developments

• Revised definition of **renovation**
National Calculation Methodology

- Two approaches to setting new CO$_2$ target (TER):
  - Flat 25%:
    - $TER_{2010} = TER_{2006} - 25$
    - 2002 notional building
  - Aggregate 25%:
    - new 2010 notional buildings
    - Improvement varies with type of building
- Proposal:
  - Flat 25% for dwellings
  - Aggregate 25% for non-domestic buildings
Key changes

- Monthly calculation for heating
- Cooling included
- Thermal mass allowed for explicitly
- Party wall heat loss
- Thermal bridging
- Updated weather data
- Improved data on internal gains
- Changes to treatment of boiler efficiency
- Heat pumps
- Treatment of community heating
- Hot water demand revised
- Carbon emission factors
Key changes

• England and Wales Part L only
• Compliance module to mirror draft Part L2A
• Calculates TER by both routes (aggregate and flat)

Other changes

• Rationalised building types and activities
  • map onto standard planning classes
  • merge several building types
  • merge some activity areas
• Improved calculation of auxiliary energy for HVAC
• Improved lighting procedures
• Other minor improvements
Key Aims

- Comprehensive update of content – BSENNs etc
- Improve limits on design flexibility
- Extend scope to all relevant fixed services
- Additional “supplementary information” as required
Domestic Building Services Compliance Guide

Mechanical Ventilation
- maximum specific fan powers
- minimum heat recovery efficiency

Heating System Circulators
- minimum Europump rating

Micro-CHP
- maximum Heating Plant Emission Rate

Wind powered electricity generation
- minimum annual energy performance

Solar Photovoltaic microgeneration
- minimum efficiency of conversion

Lighting
- number of low energy fittings and minimum efficacy

Comfort Cooling
- minimum EERs and heating interlock
• Increased minimum boiler efficiencies – not less than 90% (SEDBUK ‘A’)
• Increased minimum COP for heat pumps – from 2.0 to 2.2
• Upgraded DHW storage heat loss performance
• Increased solid biomass efficiencies for some appliances
• Low energy lighting – minimum increased to 75%, SAP assumes 100%
• Minimum ‘Band C’ rating for circulators
Heating system glandless circulators and water pumps
  • Band C or variable speed as appropriate

Wind powered electricity generation
  • Minimum annual energy performance – as DBSCG

Solar photovoltaic microgeneration
  • Minimum efficiency of conversion – as DBSCG

Lighting
  • New build - minimum initial efficacy 55 luminaire lumens per circuit watt (no control factors)
  • Existing buildings - minimum initial efficacy 55 luminaire lumens per circuit watt (with control factors)
Increased boiler system efficiencies
- included solid biomass efficiencies
  - 65% (<20.5kW gravity fed)
  - 75% (automatic pellet/woodchip)

Increased COP and revised controls for heat pumps
- 2.0 increased to 2.2

Significant changes to air-distribution section
- decreased maximum SFP
- introduced pressure limits
- greater range of system types
- requirement for heat recovery with minimum recovery efficiencies for system

SEERs for chiller plant
- greater range of chiller types
- increased minimum SEERs
Proposed Part F changes

- Revised AD format and layout - installation guidance moved to new Domestic Ventilation Installation and Commissioning Compliance Guide
- Greater ventilation provisions for dwellings with air permeability tighter than or equal to $5 \text{ m}^3/\text{h.m}^2$ at 50 Pa
- Additional guidance for PSV, bathroom and kitchen refurbishment, replacement windows
- Natural and mechanical ventilation systems to be inspected and (where appropriate) commissioned and, for new dwellings, air flow rates to be measured as part of commissioning
- Checklist to be given to building control
- Type testing of mechanical ventilation systems to meet noise limits
- Provision of information – using and maintaining, commissioning results
Why change Part F?

• Mainly to harmonise with changes to Part L
• Changes focus on new dwellings
• New requirements/guidance is provided for
  • The ventilation of more airtight dwellings
  • The installation and commissioning of ventilation systems
  • Sound levels from continuous mechanical ventilation
  • Making domestic ventilation systems a controlled service
Indoor air quality and energy

Indoor Air Pollutants

Energy

Reduce energy / CO₂

Healthy indoor environment

Ventilation rate
Ventilation and infiltration

Ventilation through:
- The ventilation system
- Infiltration – gaps and cracks in the structure
Allow for minimum air permeability of 3-4 m³/h/m², but

- ~30% of new dwellings tested < 5 m³/h/m² @50 Pa
- ~3-5% of new dwellings tested < 3 m³/h/m² @50 Pa
- Future dwellings are expected to become tighter

Domestic ventilation system design

| Allowance for infiltration (3-4 m³h⁻¹m⁻²) | Purpose provided ventilation |

Infiltration in new dwellings
Build tight, ventilate right

- A dwelling cannot be too airtight
- But it can be under ventilated
New guidance for ventilation of airtight homes

For dwellings designed to an air permeability of 5 m$^3$/h/m$^2$ @ 50 Pa or tighter:

System 1: Increased size of trickle ventilators
System 2: All PSVs to be 125 mm duct diameter, and Increased size of trickle ventilators
System 3: Need 2500 mm$^2$ trickle vents in habitable rooms
System 4: Increased air flow rate requirements
Proposal to amend Part F requirement to include:

- Commissioning of ventilation systems:
  - natural and mechanical, in new and existing dwellings
- Air flow measurements of any mechanical system
- Submission of completed checklist to the BCB
- Document handover to occupant:
  - system operation (user instructions)
  - maintenance information
  - commissioning data
Domestic Ventilation Installation and Commissioning Compliance Guide

- New installation and commissioning compliance guide
- Applicable to installations in new and existing dwellings
- Applicable to Systems 1 to 4 as referenced in ADF
- Includes installation checklist, inspection and commissioning sheets for building control
More information

www.communities.gov.uk/publications/planningandbuilding/partlf2010consultation
• Consultation package
• Part LF workshop presentations (for further detail)

www.2010ncm.bre.co.uk
• Part LF consultation software tools cSAP and cSBEM

PartFandLConsultationHelpdesk@bsria.co.uk
• Part LF consultation helpline

Partlf2010.consultation@communities.gsi.gov.uk
• Email address for Part LF consultation responses

www.bre.co.uk/sap2009
• DECC SAP consultation

www.planningportal.gov.uk
• Current Approved Documents, other guidance, legislation