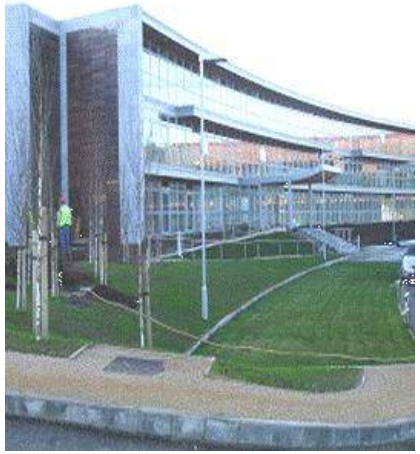
Building Regulations Part L and Part J



CIBSE Clyde Road 20 March 2013

Martin Vaughan
Architecure/Building Standards Section,
DECLG

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

Content of Presentation

1. Policy Context
2. Recast EPBD
3. Cost Optimal
4. Nearly Zero Energy Buildings
5. Implications for Part L
6. Challenges and Opportunities
7. Current status of Part J Review
8. Q & A

Drivers for Energy Efficiency

EU energy agenda 20-20-20

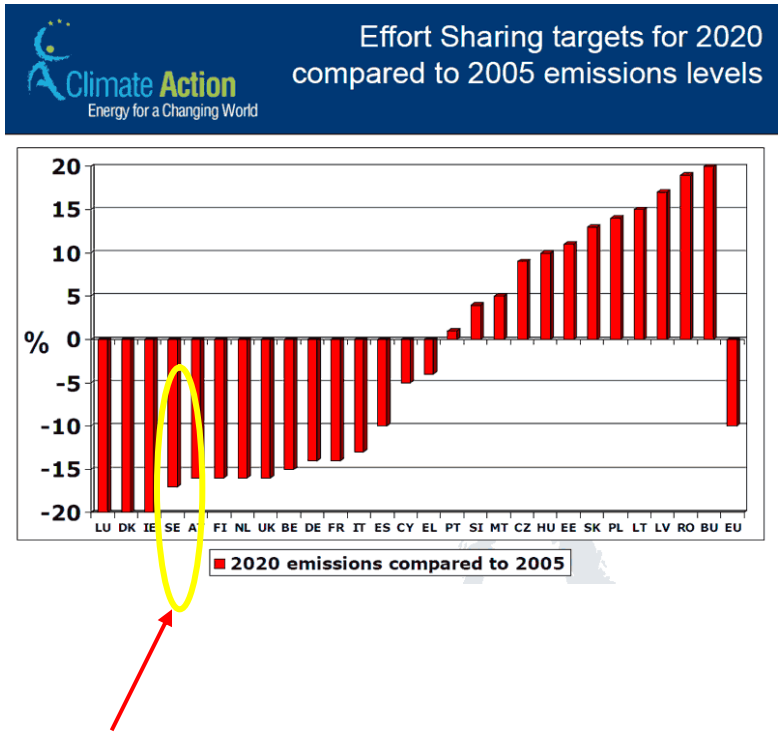
Climate change

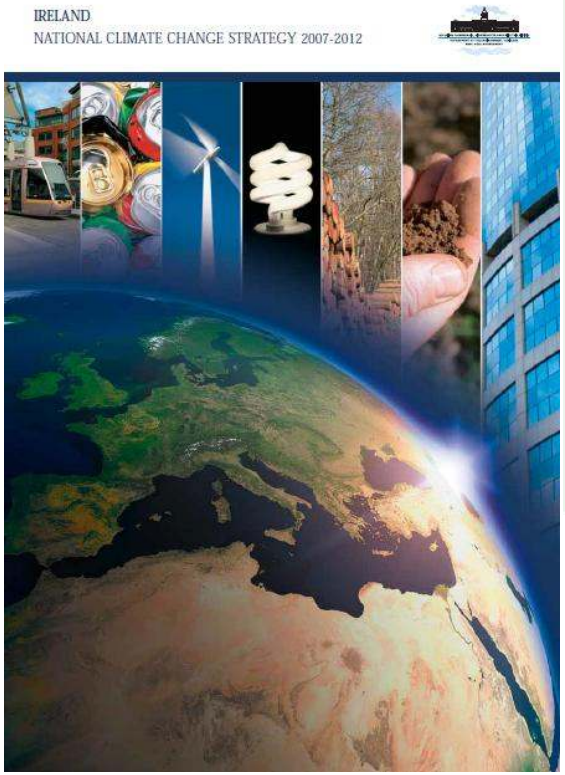
Clonmel 2009, RTE Gallery, Credit:Jacob Zdun

Domestic Environment & Economic Policy

Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government

Climate Change Policy





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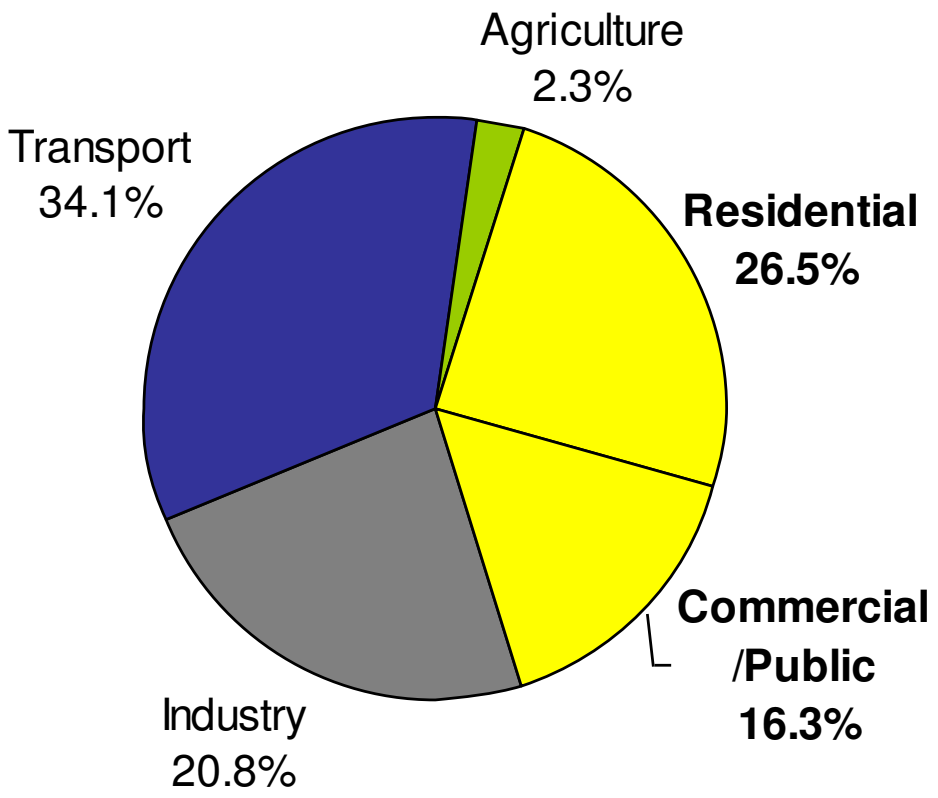
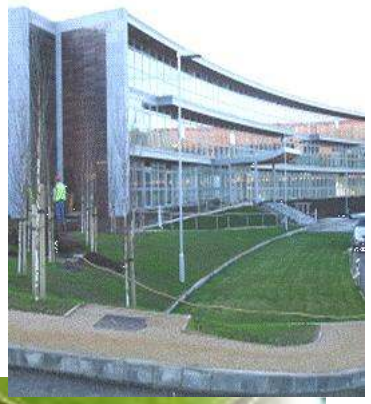
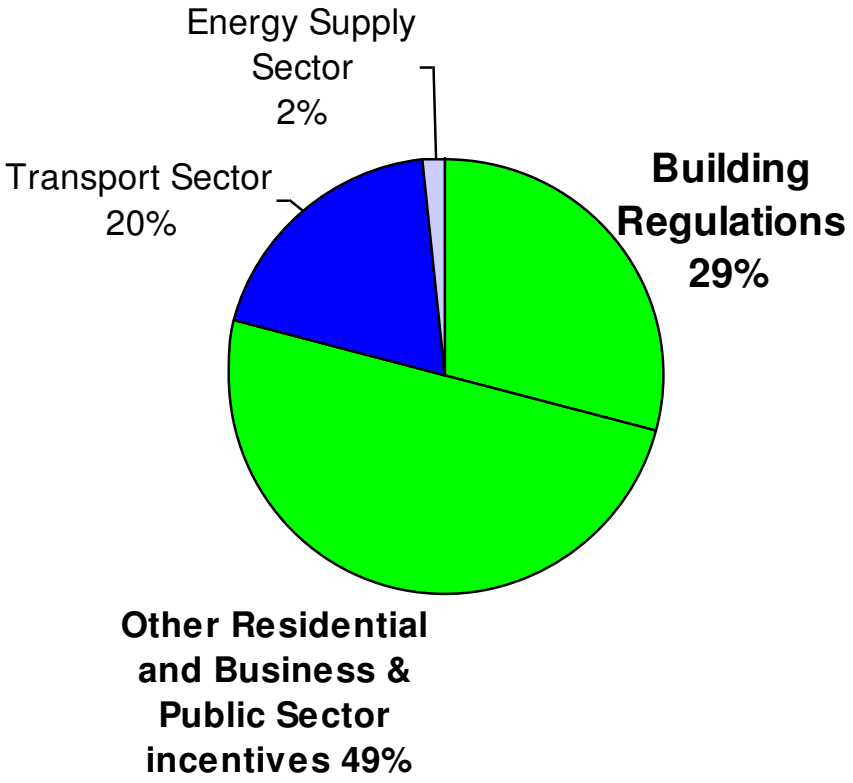
Total Primary Energy Requirement by Sector





Ref: SEAI Energy in Ireland 1990-2009

Contribution of Buildings to National Energy Reduction 2020 Targets

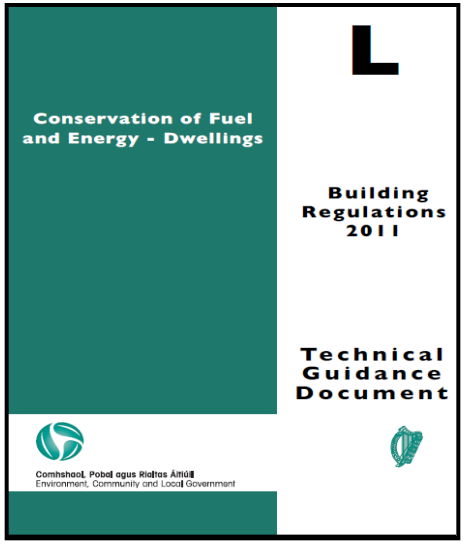


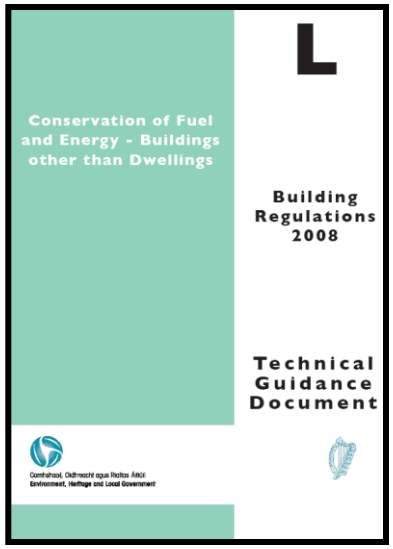
Source: NEEAP 2009

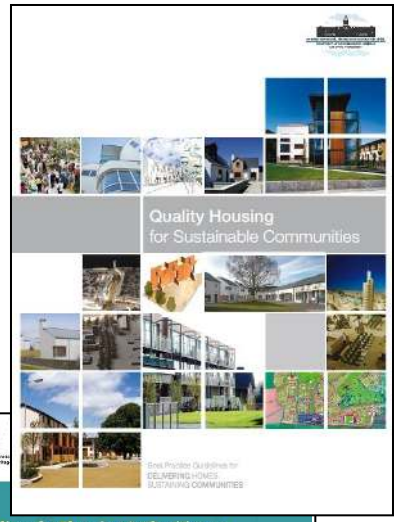
Buildings Policy and Regulations

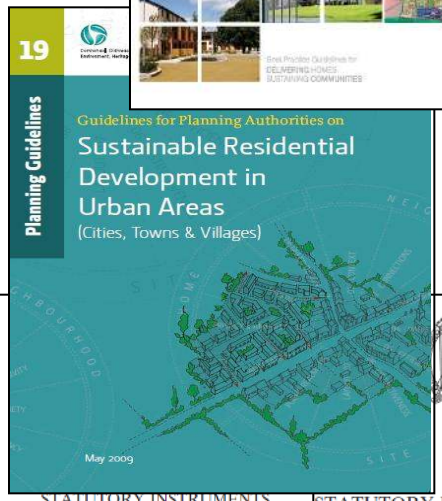
DIRECTIVE 2002/91/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

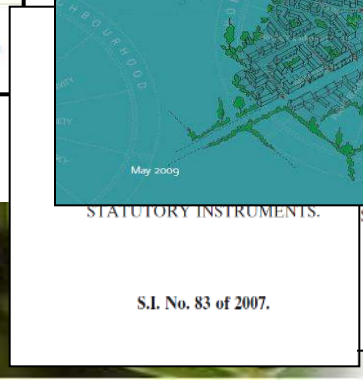
DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 19 May 2010
on the energy performance of buildings
(recast)

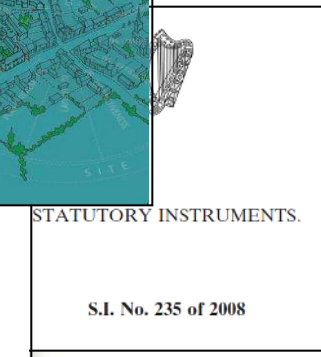












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Recast Directive 2010/31/EU on Energy Performance of Buildings

Cost Optimal

Requires that minimum energy performance requirements for new buildings or building units or buildings undergoing major renovation are set with a view to achieving cost-optimal levels.

Nearly Zero Energy Buildings

Member States shall ensure that:
(a) by 31 December 2020, all new buildings are nearly zero-energy buildings; and
(b) after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings.

Nearly Zero-Energy Building' means a building that has a **very high energy performance.** The nearly zero or very low amount of energy required should be covered to a **very significant** extent by energy from **renewable sources**, including energy from renewable sources produced **on-site or nearby;**

Cost Optimal Implementation

- Cost Optimal is a delegated Act of the Recast EPBD
- The Cost Optimal Regulation was published on 16 Jan 2012
- A guideline document to support the Regulation was published 19 April 2012
- MS are to submit calculations and gap analysis by 21st March 2013
- AECOM contracted by DECLG and SEAI to deliver calculations for submission to Commission

Calculations

Investor Perspective

$$C_g(\tau) = C_I + \sum_j \left[\sum_{i=1}^{\tau} \left(C_{a,i}(j) \times R_d(i) \right) - V_{f,\tau}(j) \right]$$

$C_g(\tau)$	Global costs referring to starting year τ 0
C_I	Initial investment costs
$C_{a,I}(j)$	Annual costs year i for energy-related component j (energy costs, operational costs, periodic or replacement costs, maintenance costs)
$R_d(i)$	Discount rate for year *I* (depending on interest rate)
$V_{f,\tau}(j)$	Final value of component *j* at the end of the calculation period (referred to the starting year τ *0*). Here also disposal cost (if applicable) can be taken into account.

Societal Perspective

4.4. **Calculation of global costs for the macroeconomic calculation**

(1) When determining the global cost for the macroeconomic calculation of a measure/package/variant, the relevant prices to be taken into account are the prices excluding all applicable taxes, VAT, charges and subsidies.

(2) When determining the global cost at macroeconomic level of a measure/package/variant, in addition to the cost categories listed under 4.1, a new cost category cost of greenhouse gas emissions is to be included so that the adjusted global cost methodology reads as:

$$C_g(\tau) = C_I + \sum_j \left[\sum_{i=1}^{\tau} \left(C_{a,i}(j) R_d(i) + C_{c,i}(j) \right) - V_{f,\tau}(j) \right]$$

where

C c, i(j) means carbon cost for measure or set of measures j during year i.

Cost Optimal Calculation Process

- Select Reference Buildings –New and Existing/Residential and non residential
- Apply various energy performance measures to reference buildings using Building Regulations Modelling Software (DEAP/NEAP) as specified by Annex I of Recast EPBD (Fabric and Fixed Building Services)
- Calculate Global Cost of improvements for various discount rates and energy prices of various energy performance measures applied to the reference buildings
- Perform calculation from an investor perspective and from a societal perspective
- Plot cost Eur/m2 vs kWh/m2/yr
- Identify gap between current energy performance standard in Building Regulations and least cost point on curve
- Report to Commission Cost Optimal Point and plan to achieve cost optimal standard in Building Regulations where applicable

Reference Buildings

•Main purpose: represent typical and average building stock in MS, so that methodology can deliver representative calculation results

(1) Member States shall establish reference buildings for the following building categories:

- 1. single-family buildings;
- 2. apartment blocks and multifamily buildings;
- 3. office buildings

(2) In addition to office buildings, Member States shall establish reference buildings for other non-residential building categories listed in Annex I of Recast EPBD

(3) If a Member State is able to demonstrate in the report referred to in Article 6 of this Regulation that an established reference building can be applicable to more than one building category, it may reduce the number of reference buildings used and with that the number of calculations.

(4) For each building category, at least one reference building shall be established for new buildings and at least two for existing buildings subject to major renovation. Reference buildings can be established on the basis of building subcategories (e.g. differentiated by size, age, cost structure, construction material, use pattern or climatic zone) that take into account the characteristics of the national building stock.

Variants

- Energy Efficiency Measures may be bundled to packages of measures or variants.

- Member States shall also identify measures/packages/variants using **renewable energy** for both new and existing buildings.

- Energy efficiency measures/packages/variants shall include measures necessary to meet the currently applicable minimum energy performance requirements. Member States shall also include measures/packages/variants necessary to meet the minimum energy performance requirements for **nearly zero-energy buildings**

- The selected energy efficiency measures and measures based on renewable energy sources, and packages/variants, shall be compatible with the basic requirements for construction works as listed in Annex I to **Regulation (EU) No 305/2011** and specified by Member States. They shall also be compatible with air quality and indoor comfort levels according to CEN standard 15251 on **indoor air quality** or equivalent national standards.

Economic information

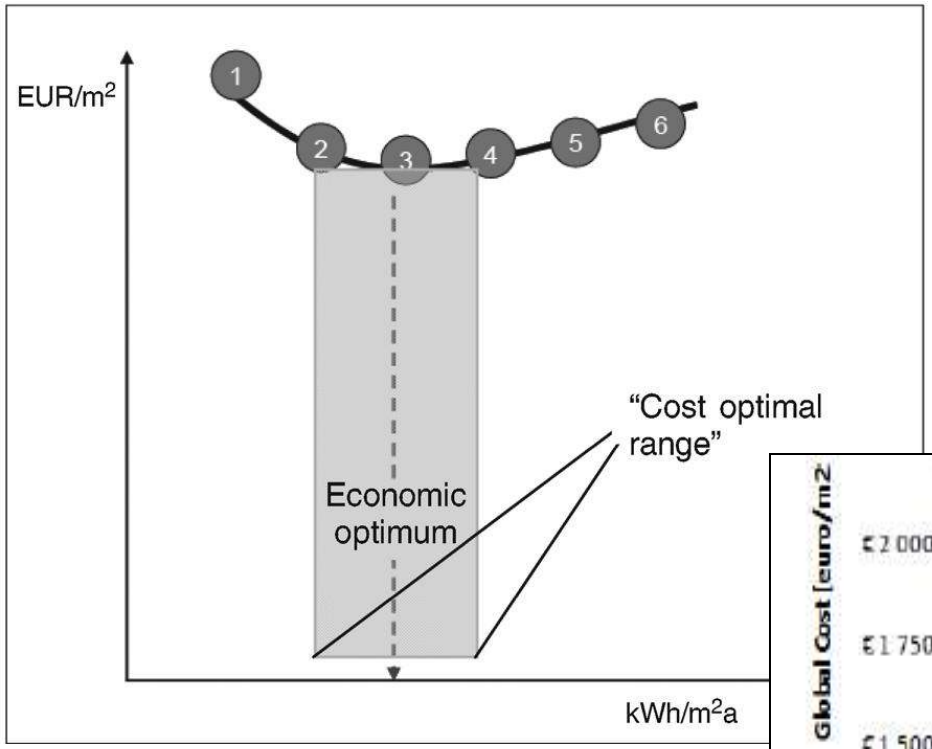
- Construction and material costs supplied by AECOM Quantity Surveyors for Dublin
- Price of Carbon from "A Roadmap for moving to a competitive low carbon economy in 2050"[1] (specified as lower bound in regulation)
- Energy prices from 2009 EU draft 2030[2] Scenario (recommended by regulation)
- Sensitivity on energy prices, (Low High and Central)
- Sensitivity on Carbon Prices
- Sensitivity on Discount Factors (Investor and Societal)
- Sensitivity on Primary Energy Factor
- Timescale 30 years for residential and Public buildings, 20 years for non residential

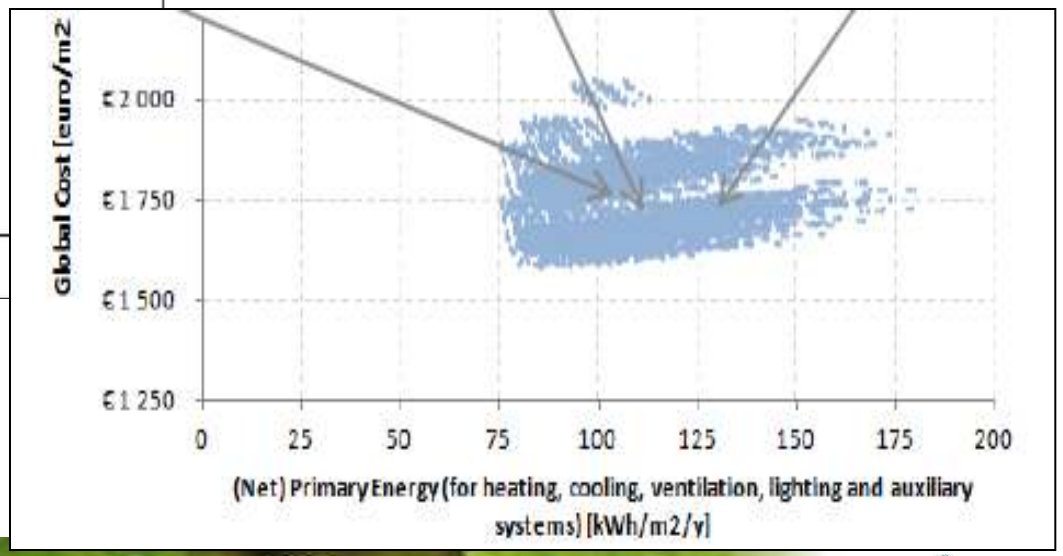
Carbon price evolution	2020	2025	2030	2035	2040	2045	2050
Reference (frag. action, ref. fossil f. prices)	16,5	20	36	50	52	51	50

[1] Annex 7-10 to: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:0288:FIN:EN:PDF

[2] http://ec.europa.eu/energy/observatory/trends_2030/index_en.htm

Curves

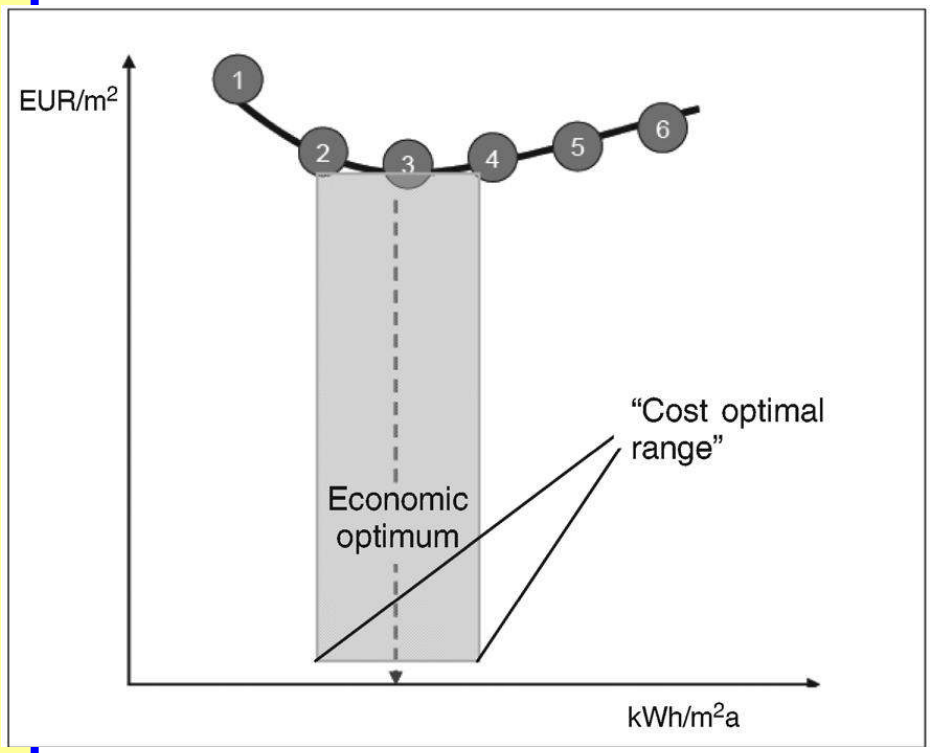

EUR/m2
1
2
3
4
5
6
"Cost optimal range"
Economic optimum
kWh/m2a


Global Cost [euro/m2
€2 000
€1 750
€1 500
€1 250
0
25
50
75
100
125
150
175
200
(Net) Primary Energy (for heating, cooling, ventilation, lighting and auxiliary systems) [kWh/m2/y]

Recast EPBD-Cost Optimal

- Energy Efficiency Standards in Building Regulations for new buildings and for buildings undergoing major renovation to be set at cost optimal levels.

'cost-optimal level' means the energy performance level which leads to the lowest cost during the estimated **economic lifecycle**, taking into account energy-related investment costs, maintenance and operating costs (including energy costs and savings, the category of building concerned, earnings from energy produced), where applicable, and disposal costs, where applicable. It refers to the remaining estimated economic lifecycle of a building where energy performance requirements are set for the building as a whole, or to the estimated economic lifecycle of a building element where energy performance requirements are set for building elements.



Recast Implementation

Recast EPBD Implementation

EPBD Implementation Group DECLG/DCENR/SEAI

Cost Optimal

NZEB 2020

Major Renovation

NZEB Public Sector 2018

OPW

DES

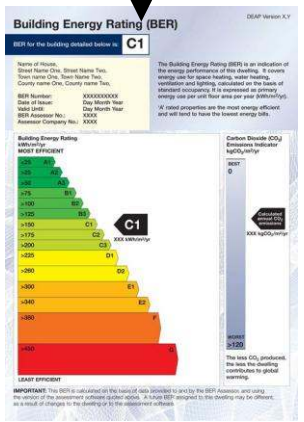
Local Authorities

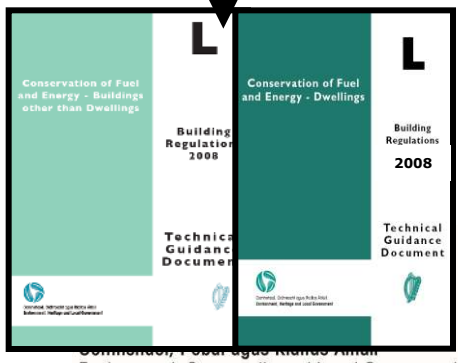
HSE

DJE

Other Public sector bodies

Energy Performance Certificates/Building services





Nearly Zero Energy Roadmap for Dwellings

Timeline		2005	2008	2011	2013-2020
Part L[1]	**% Improvement**	Baseline	40% and renewables requirement	**60%**	**Nearly Zero Energy Dwellings**
	Primary Energy[1] (Avg Dwelling) kWh/m2/annum	150	90	**60**	**45**
	CO2[1] (Avg Dwelling) kg/m2/annum	30	18	**12**	**10**
EPBD	**BER** (Avg Dwelling)	B3	B1	**A3**	**A2**

[1] Energy and CO_2 iPerformance is calculated using Dwelling Energy Assessment Performance (DEAP) Software to EN 13790

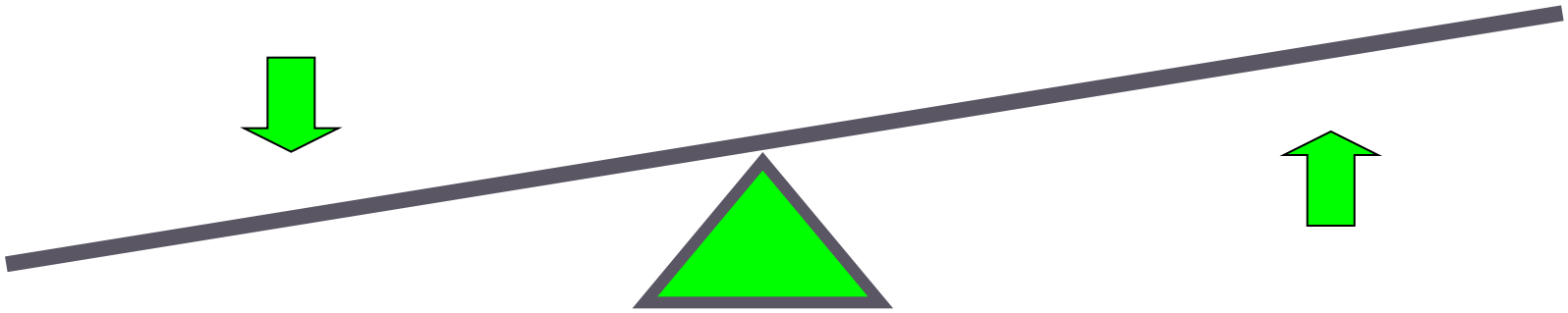
Nearly Zero Energy Road Map- Buildings Other Than Dwellings

What's next?				
Timeline		**2005**	**2013**	**2018**
Part L[1]	**% Improvement**	Baseline	40%	**Nearly Zero Energy Building Standard**

[1] Energy and CO2 Performance is calculated using Non domestic Energy Assessment Performance (NEAP) Software to EN 13790

Principles underpinning Part L

1. Reduce Demand for Energy through Passive Measures



2. Increase supply from renewable & efficient sources

3. Set minimum performance standards that can be achieved through a variety of solutions leaving approach taken for individual to the designer

Achieving compliance with Part L Dwellings

Overall Compliance
Sect. 1.1 calculation in DEAP by achieving MPEPC (0.4) and MPCPC(.46) (equivalent to 60% Reduction on 2005)

+

Minimum Threshold Level Compliance
TGD L Sections:

- 1.2 Renewable Energy 10kWh/m2/yr
- 1.3 Building Fabric
  - •U-Values (Backstops)
  - •Thermal Bridging ACDs
  - •Air Tightness 7m3/hr/m2
- 1.4Building Services
  - •Boiler Efficiency 90%
  - •Space Heating Controls (zoning and time control)
  - •Insulation
  - •Mechanical Ventilation System Efficiency
- 1.5 Construction Quality and Commissioning
- 1.6 User Information

=

Compliance with Part L Dwellings

Achieving Compliance Part L Buildings other than Dwellings

Overall Compliance
Sect 1.1
Compliance
With NEAP
MPEPC=1
MPCPC=1

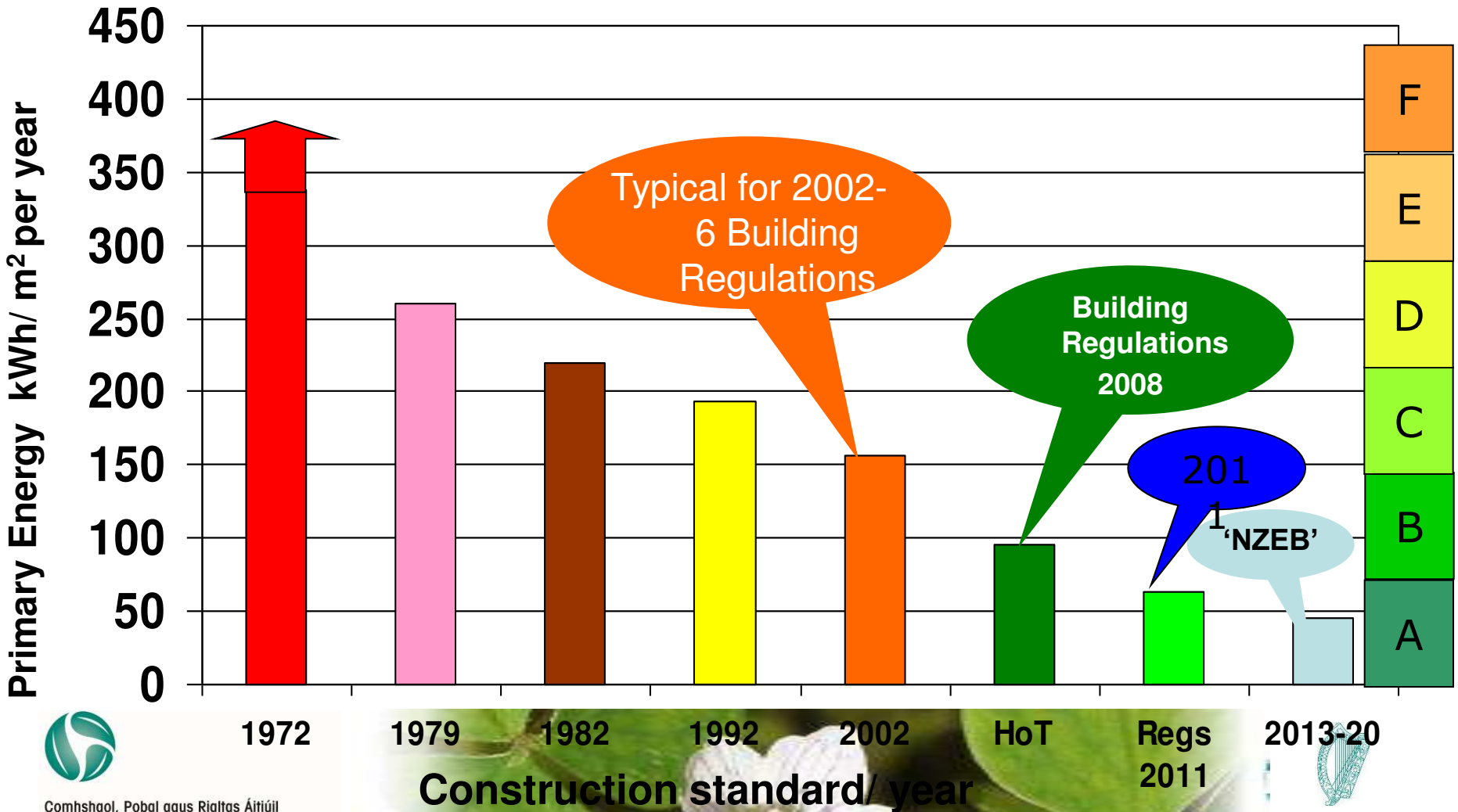
+

Minimum Threshold Level Compliance
TGD L Buildings
Other than Dwellings
Sects:
1.2 Fabric
1.3 Building Services

=

Compliance with
Part L
Buildings other than
Dwellings

“Energy rating” of Dwellings*:Indicative trends



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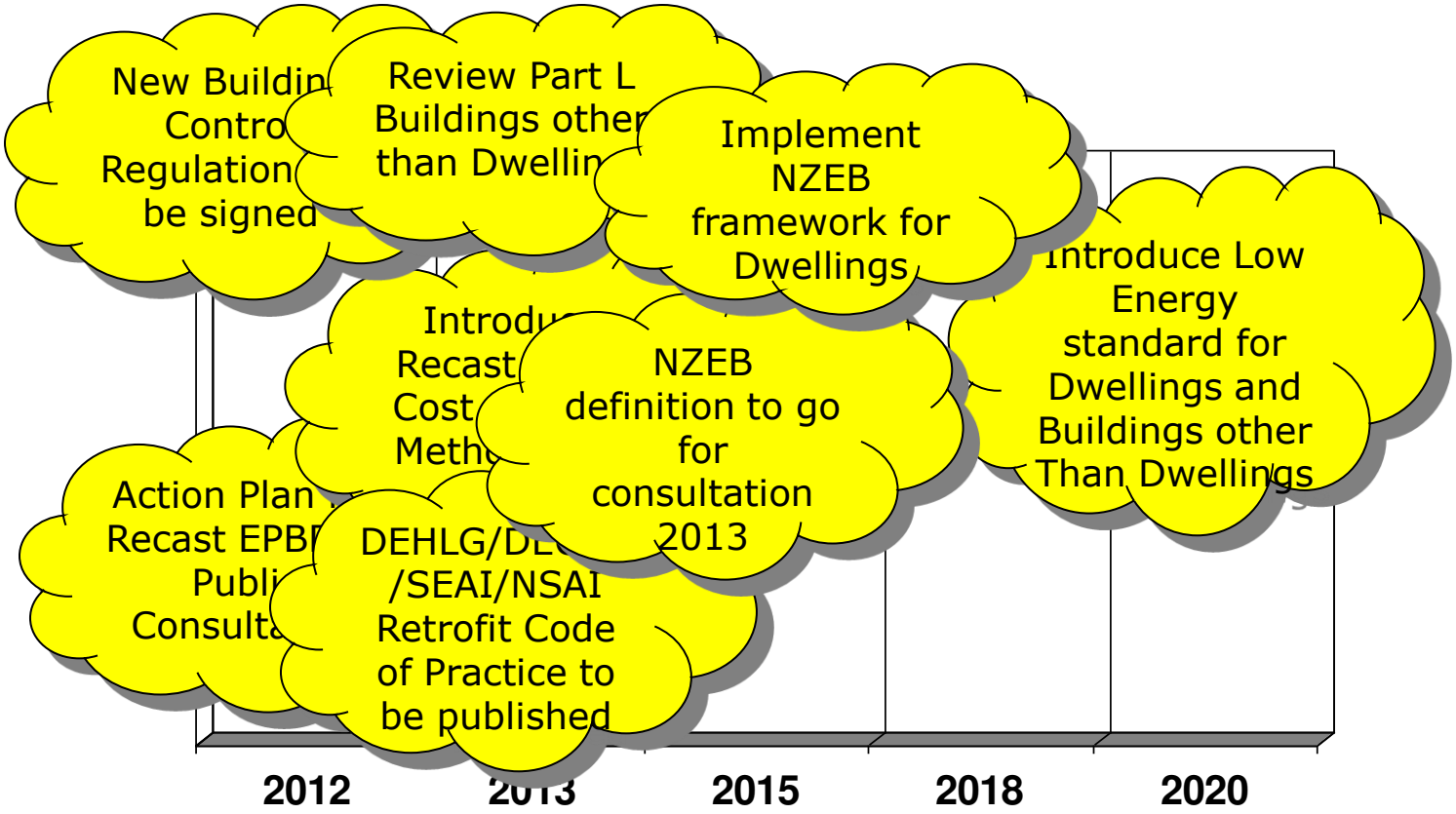
Acknowledgement: Kevin O’Rourke, SEAI

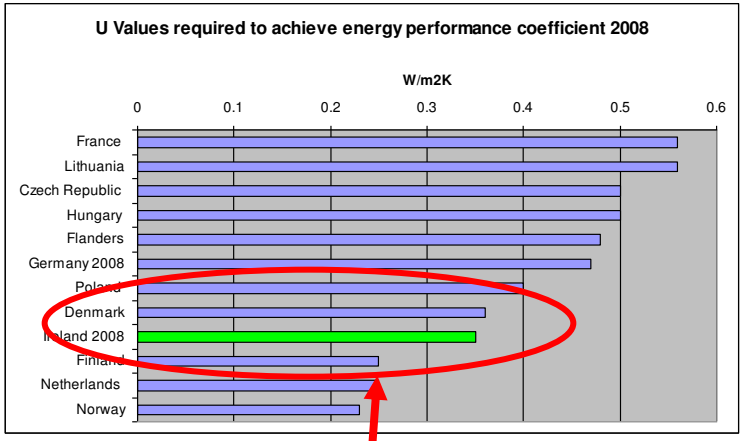
Energy Efficiency - What's next?



Shared Challenges

- Engagement across Public Sector-NZEB,DECs, Major Renovation
- Engagement across Private sector-DECs for Buildings frequently visited by the public> 500m2. Use of BERs in advertising
- Robust Construction methods-Building Control, Codes of Practice (SR 50-2 Solar Thermal Code of Practice /Retrofit),Certification, BUSI

How Ireland Compares



Source:Asiepi Comparison of Energy Performance Requirement Levels

Asiepi study shows
2008 TGD L U values comparable to leading countries

- UK Zero Carbon Hub places TGD L 2011 Regulatory U values 4th in world after Denmark, Sweden and UK.

Ref : Zero Carbon Compendium 2011

Current Status of Part J Review

- Full Review underway
- Proposals released for consultation in 2012
- Issues – Consistency with TGDs L & F; Recommended provision for CO Detectors in certain circumstances; Industry Developments – installation arrangements, COPs, etc.
- Submissions currently being reviewed
- Definitive Regs / TGD J for approval by Minister by end 2013

www.environ.ie