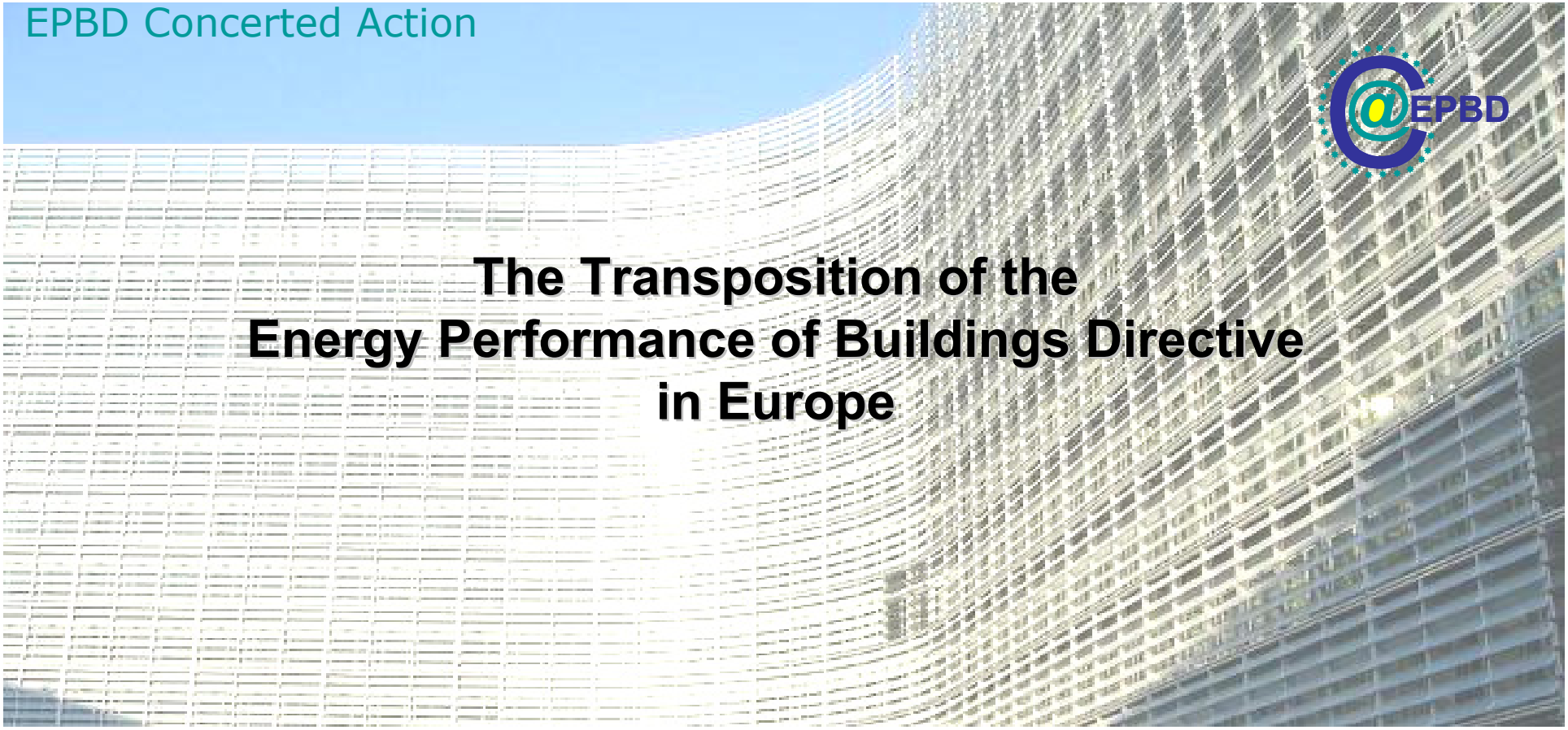
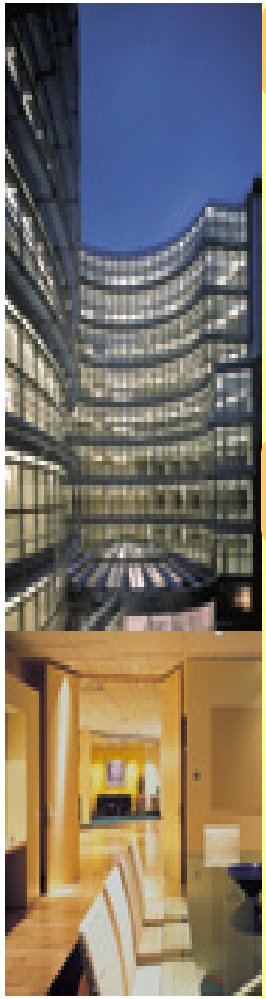


The Transposition of the Energy Performance of Buildings Directive in Europe

- RESNET Conference
- San Diego, CA,19 February 2007

Eduardo Maldonado
Univ. of Porto - Portugal
Coordinator - Buildings Concerted Action

INTRODUCTION to the EPBD



Objectives

- Promoting the improvement of energy performance of buildings within the EU through cost-effective measures, with no compromise to comfort and Indoor air quality.
- Convergence of building standards towards those of Member States which already have ambitious levels.

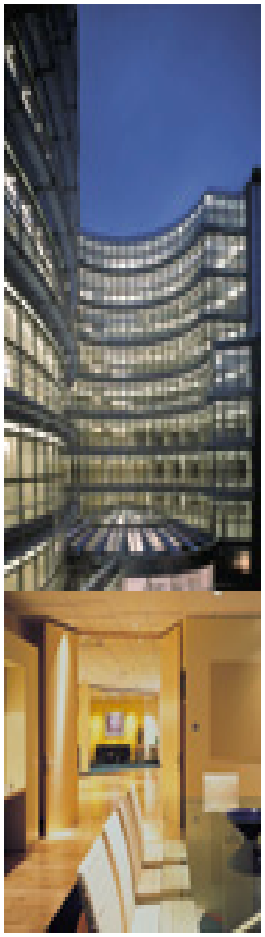
The measures

- Apply a Methodology for integrated building energy performance standards based on common minimum requirements
- Application of these standards on new and existing buildings
- Certification schemes for all buildings
- Inspection & assessment of boilers/heating and cooling installations

Background

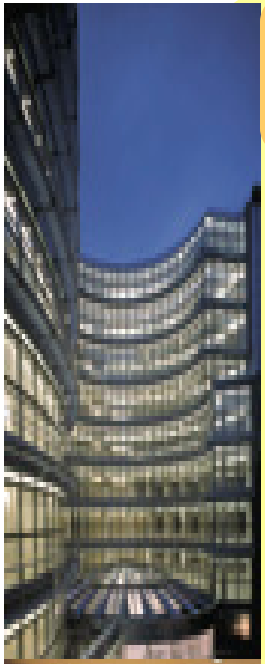
- **The EPBD states the goals that must be reached, but it lets MS a wide range of freedom to implement them.**
- **With good reason: types of houses and HVAC practices vary widely across Europe, climates are very different, heating and cooling needs totally different from North to South.**

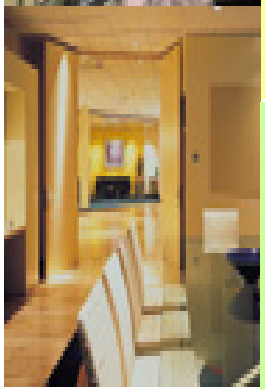
National Legislation required by the EPBD



- **In most MS, implementation of the EPBD required:**
  - **Ammending building regulations, with new, more inclusive calculation methodologies, according to common set defined in the EPBD;**
  - **Publishing new Laws requiring Energy Certificate and setting up some form of national board to control the process;**
  - **Define the qualifications and rules to become an accredited expert to issue Certificates.**

Methodology for the integrated energy performance of buildings



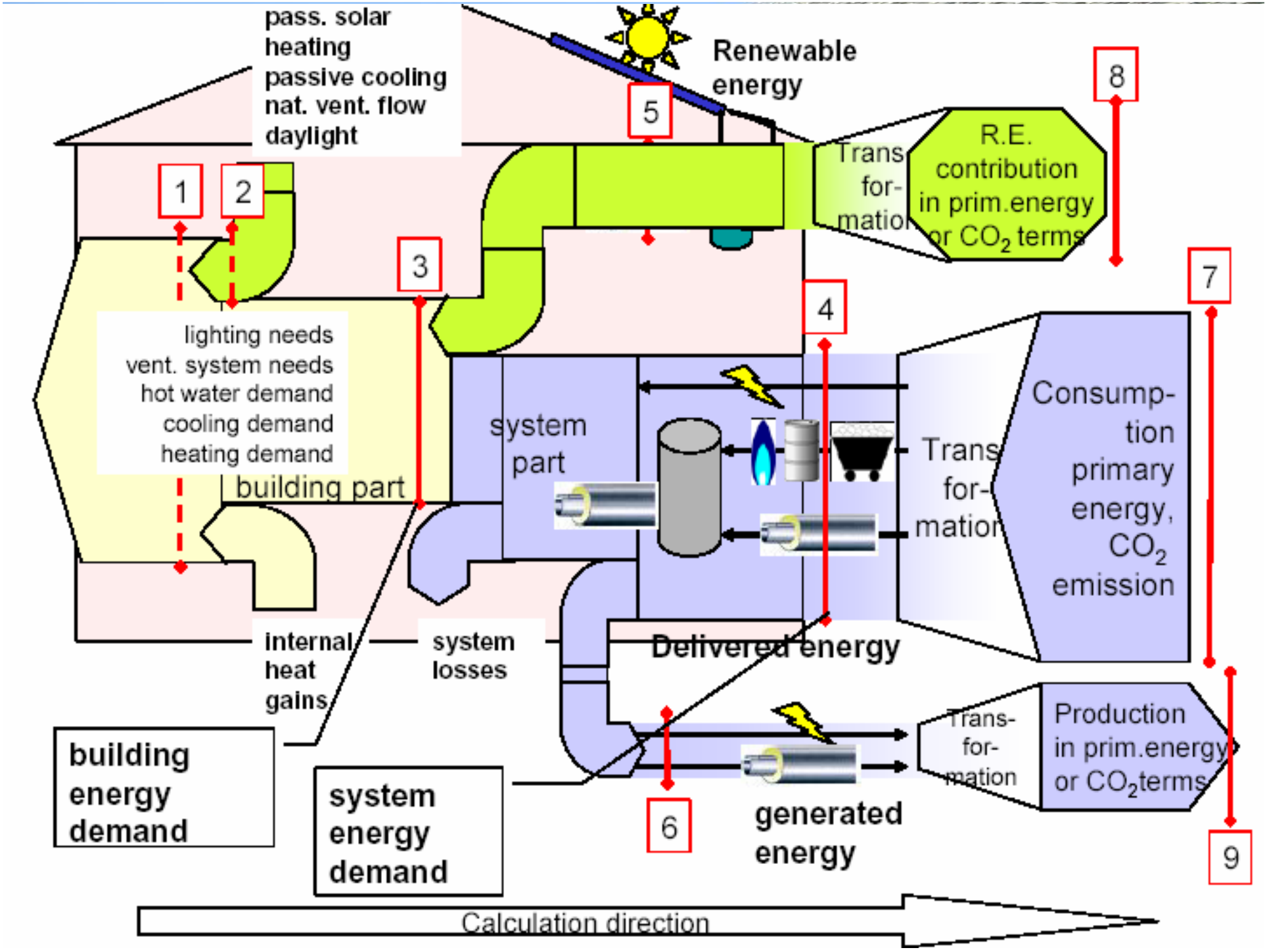


A common methodology for integrated minimum standards

- **integrate insulation, heating, cooling, ventilation, lighting and daylighting, renewable energy installations, passive solar heating and cooling systems, CHP, DH/C, position and orientation of the building**
- give **flexibility** to designers to meet energy reduction standards in the most cost-effective way
- can be expressed in **simple energy indicators**
- **are adopted by Member States** for different categories of buildings taking into account climatic differences

Lack of the detailed common methodology for characterizing the energy performance of buildings – a major difficulty for MS.

Mandate to CEN to deliver suitable standards and an Umbrella Report, outlining the calculation procedure for assessing the energy performance of buildings. Available as advanced drafts in 2005, formal approval in April 2007.


pass. solar
heating
passive cooling
nat. vent. flow
daylight
Renewable
energy
5
8
Trans
for-
mation
R.E.
contribution
in prim.energy
or CO_2 terms
1
2
3
4
7
lighting needs
vent. system needs
hot water demand
cooling demand
heating demand
building part
system
part
Trans
for-
mation
Consump-
tion
primary
energy,
CO_2
emission
internal
heat
gains
system
losses
Delivered energy
building
energy
demand
system
energy
demand
6
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for-
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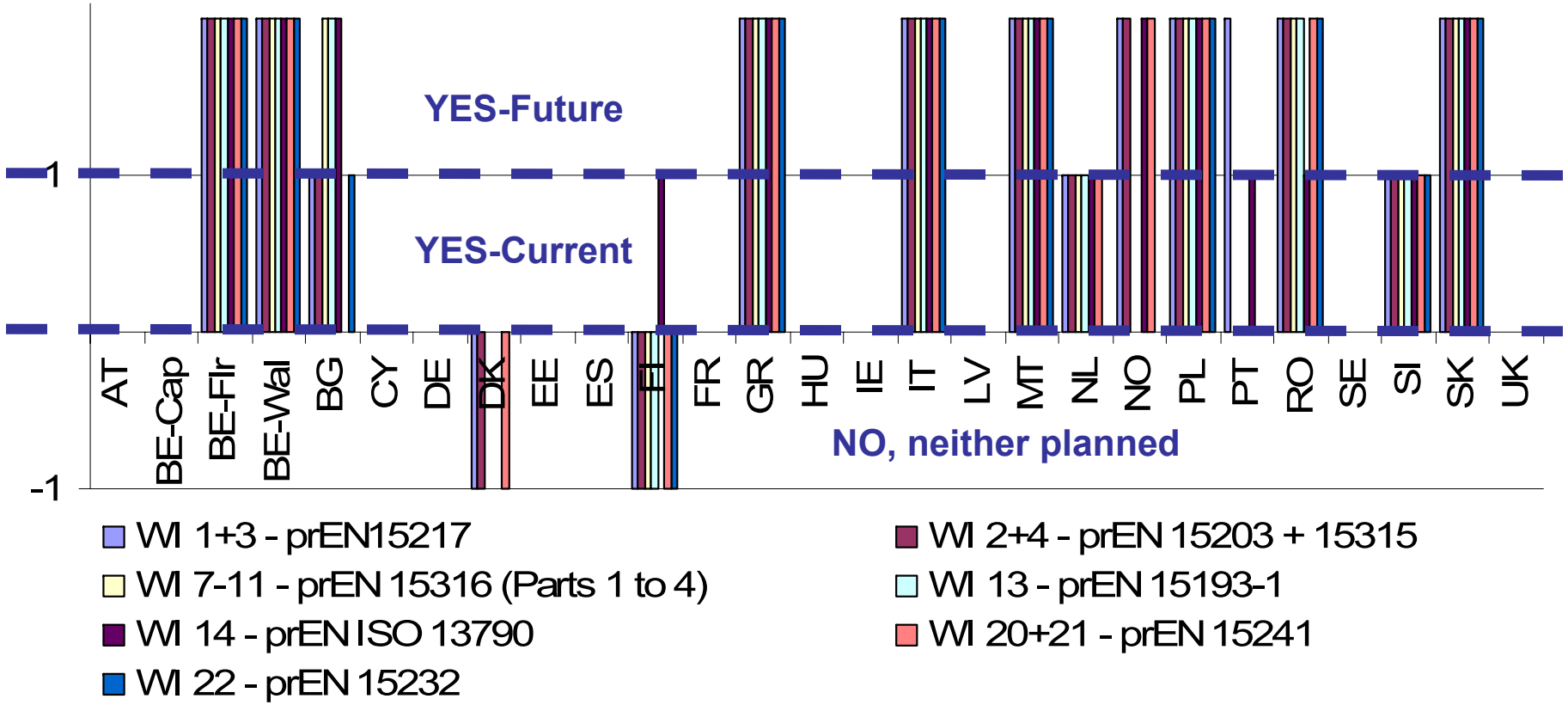
Production
in prim.energy
or CO_2terms
generated
energy
9
Calculation direction

Adoption of CEN standards inFuture Laws/Regulations (not required by the EPBD):

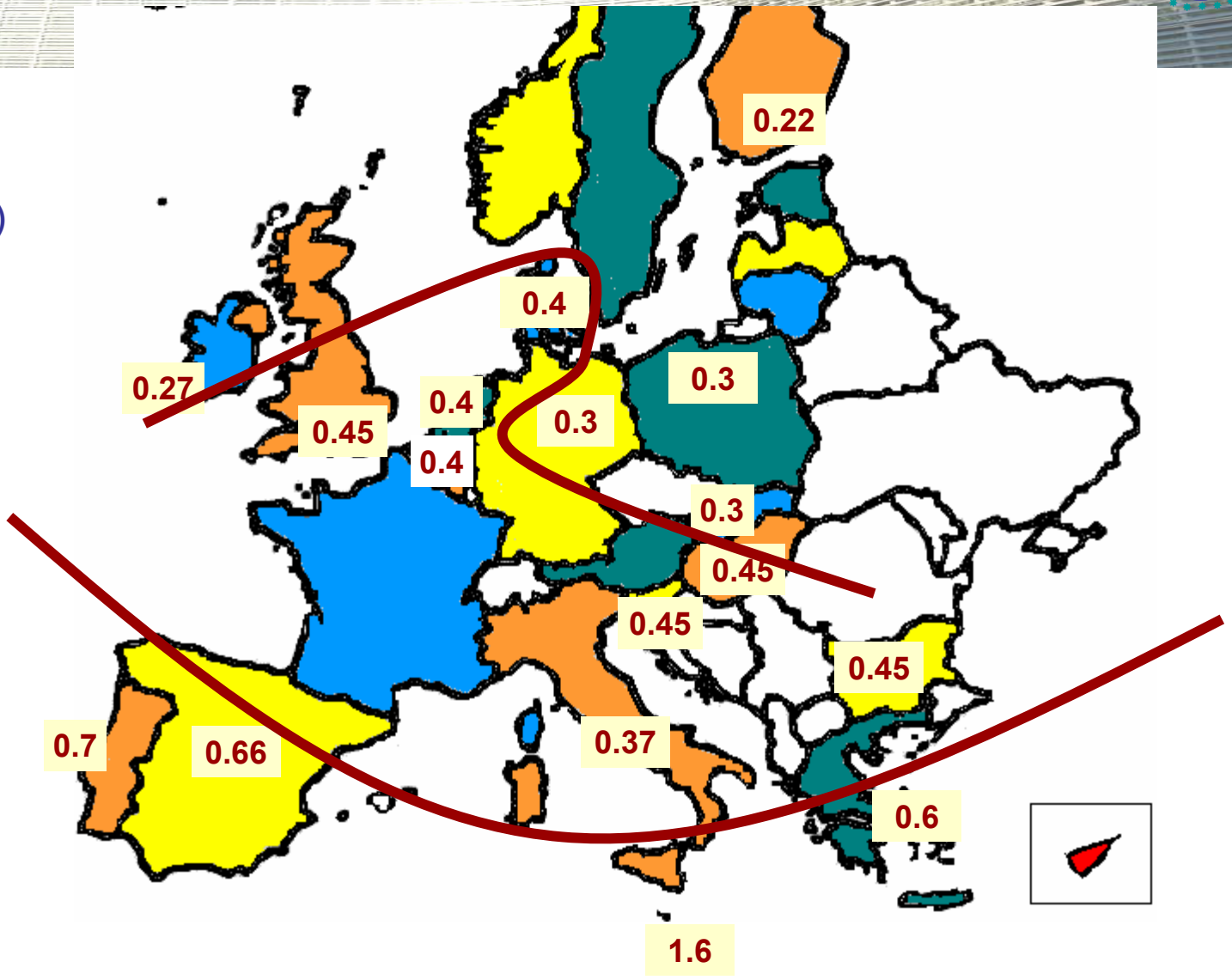


The most adopted Standard: EN ISO 13790

EU Countries increased requirements by an average of 25% from levels prior to the EPBD

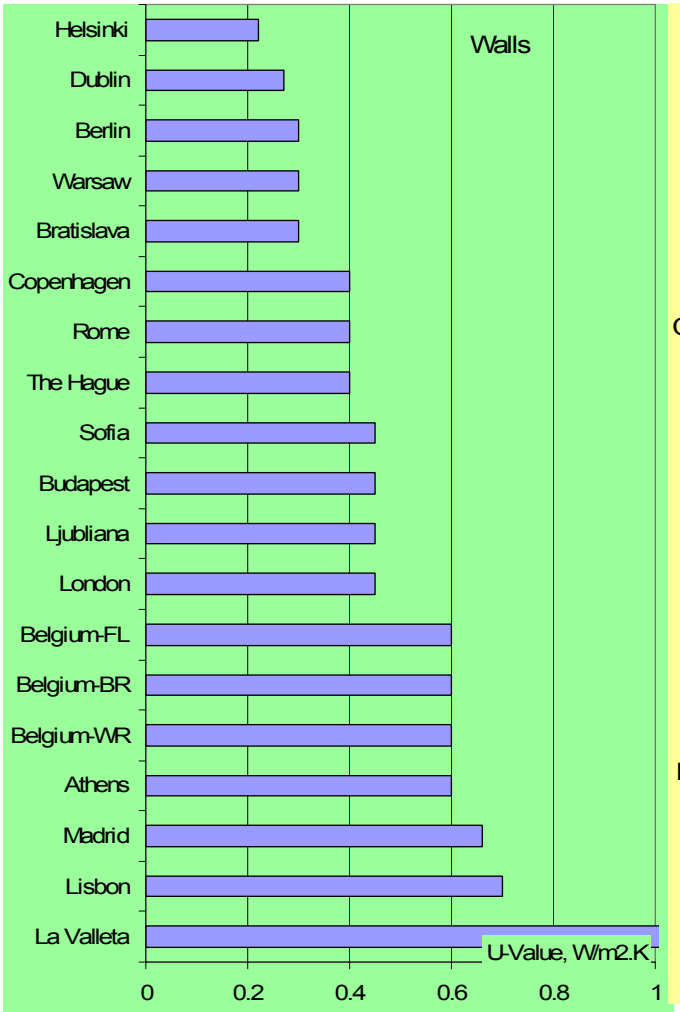
Wall U-values
(indicative)

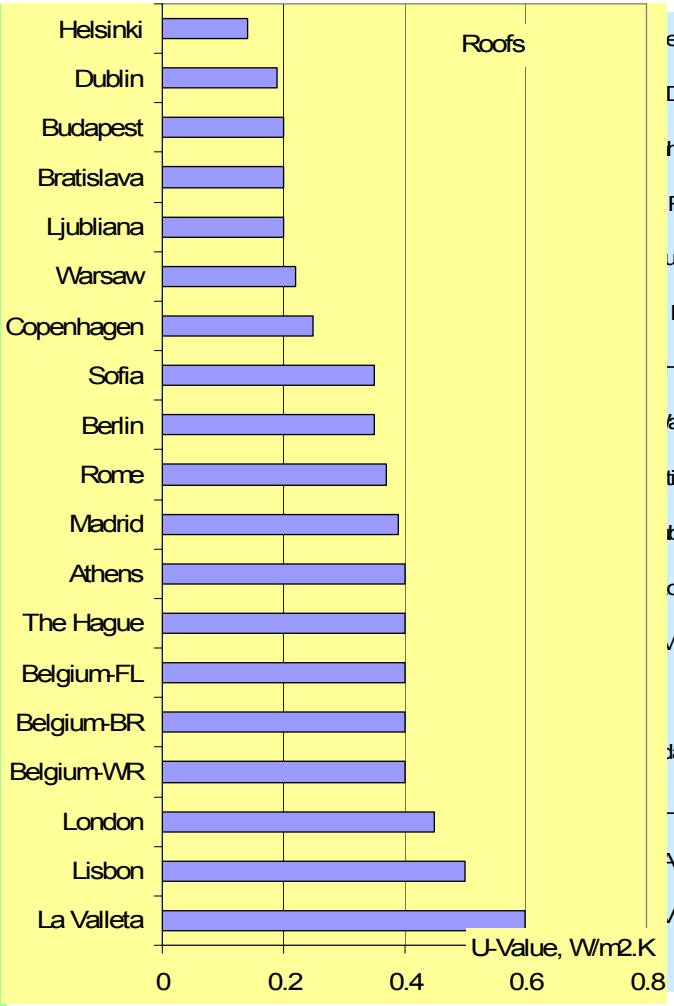
W/m².ºC

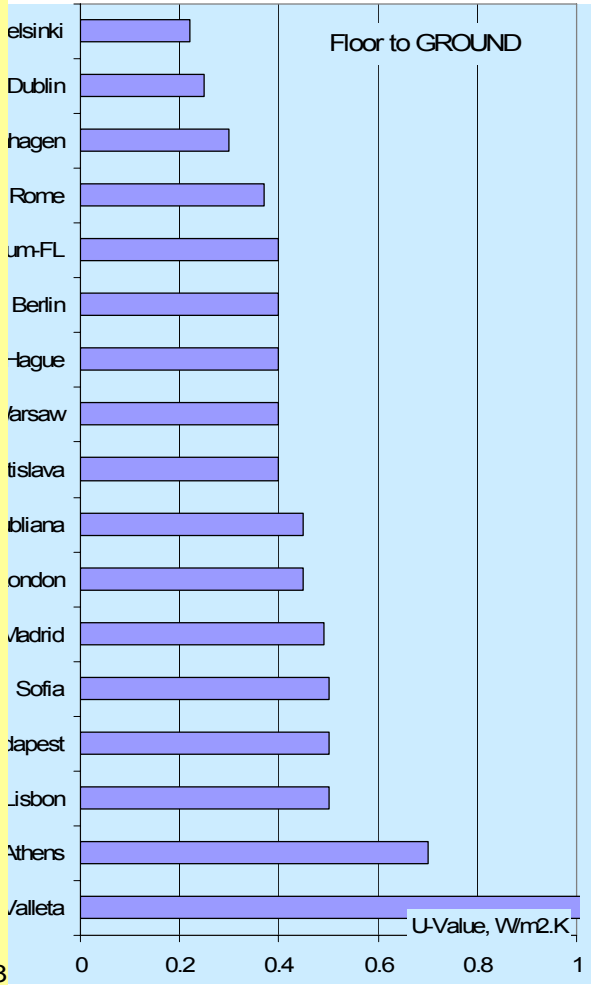


Art.4 – Minimum Requirements

- **Minimum U-values (indicative, usually combined with global energy targets)**



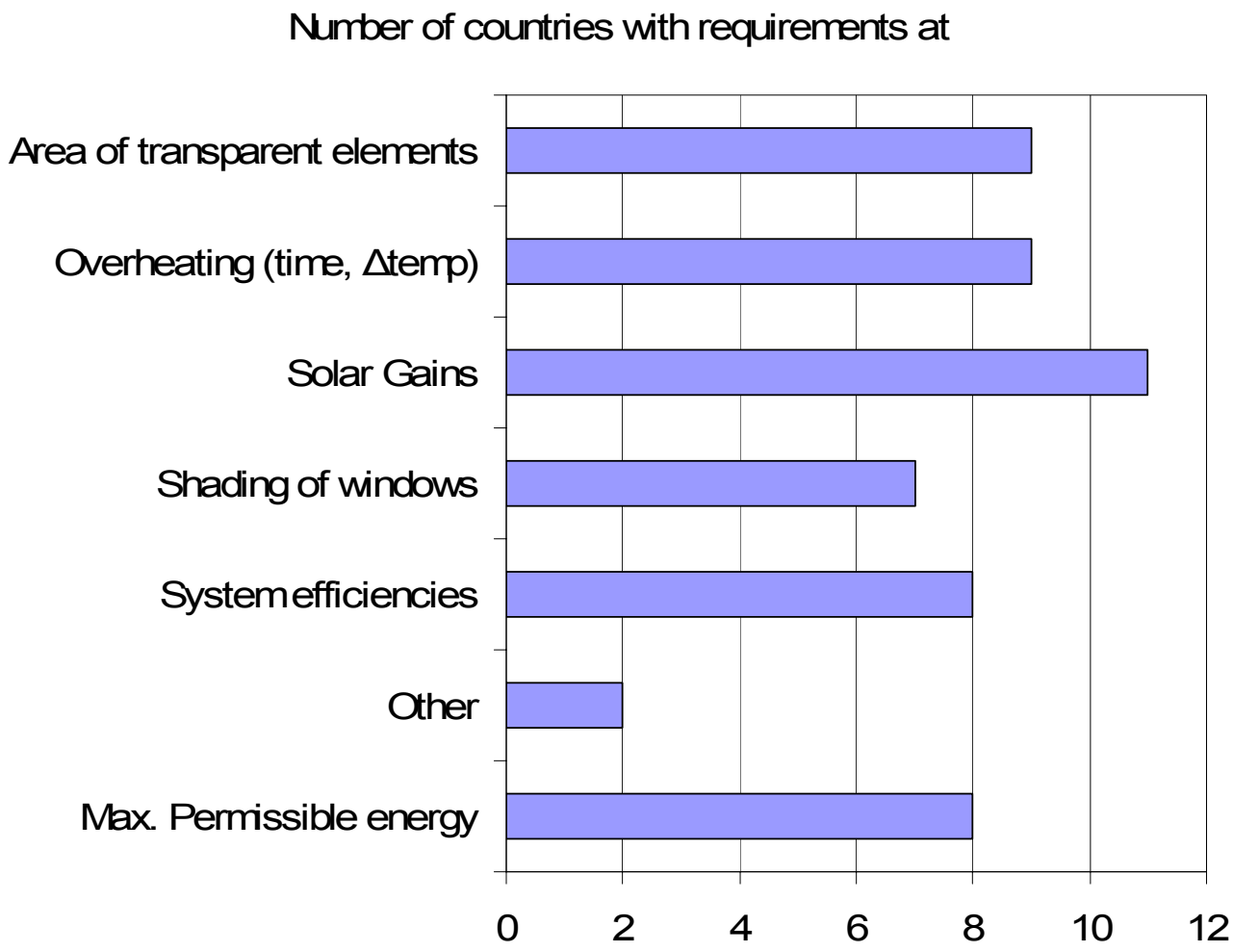




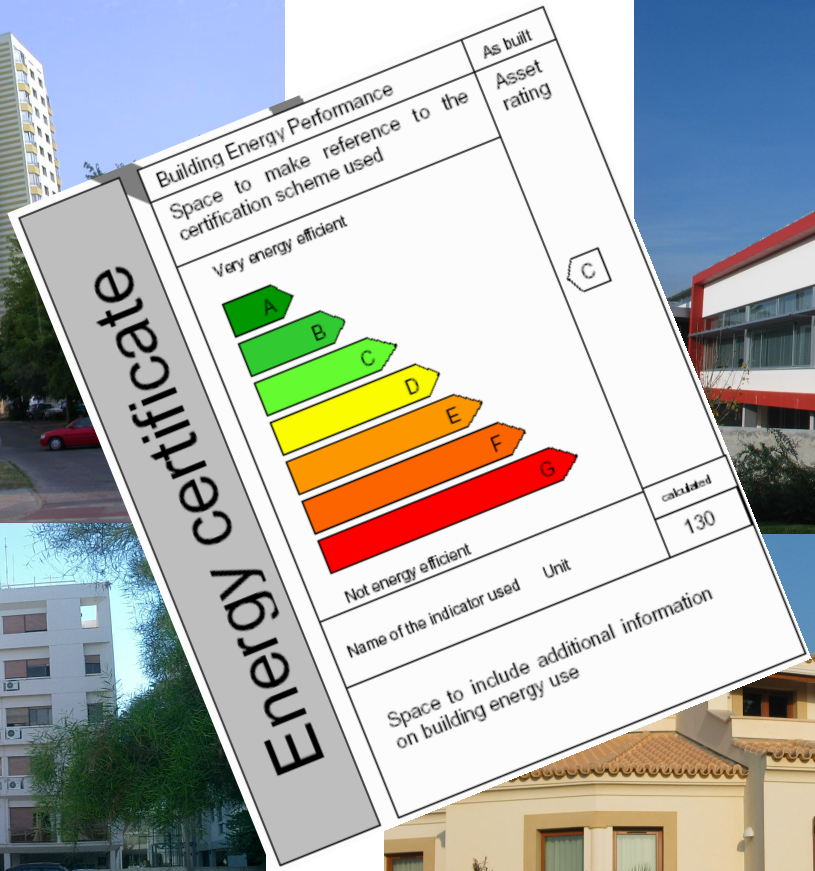
Art.4 – Minimum Requirements

Summer:

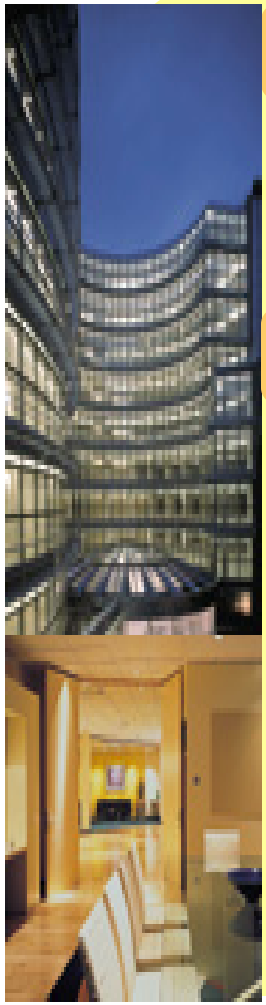
cooling requirements



ENERGY CERTIFICATES



Certification schemes for all buildings



Why?

- To facilitate the transfer of clear and reliable information on the energy performance of buildings.
- To make energy efficiency more attractive.

How?

Energy performance **certificates** for new and existing buildings should be available **when they are constructed, sold or rented out**

The certificates should:

- **not be more than 10 years old**
- **be accompanied with advice on how to improve the energy performance**
- **be displayed in large public buildings and institutions (over 1000m^2).**

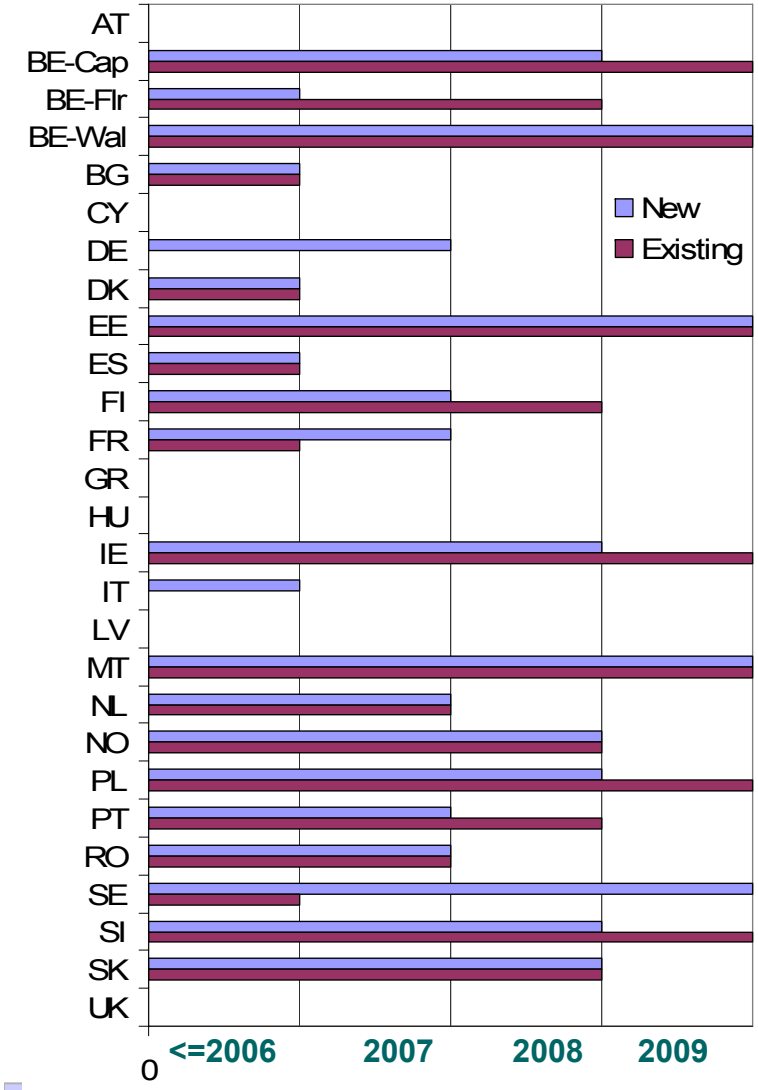
Certificates for Residential Buildings

	By:	2006	2007	2008	2009	Undecided
Timing for starting: Residential Buildings	**New**	5	8	6	3	5
		19%	**48%**	**70%**	**81%**	
	Exist.	5	3	4	8	7
		19%	**30%**	**44%**	**74%**	

Type of Rating: Existing Residential Buildings	Calculated Rating	Measured Rating	Both Ratings	Undecided
	10	**11**	**3**	**1**
	37%	**41%**	**11%**	**4%**

Building Certificates: Non-Residential Buildings

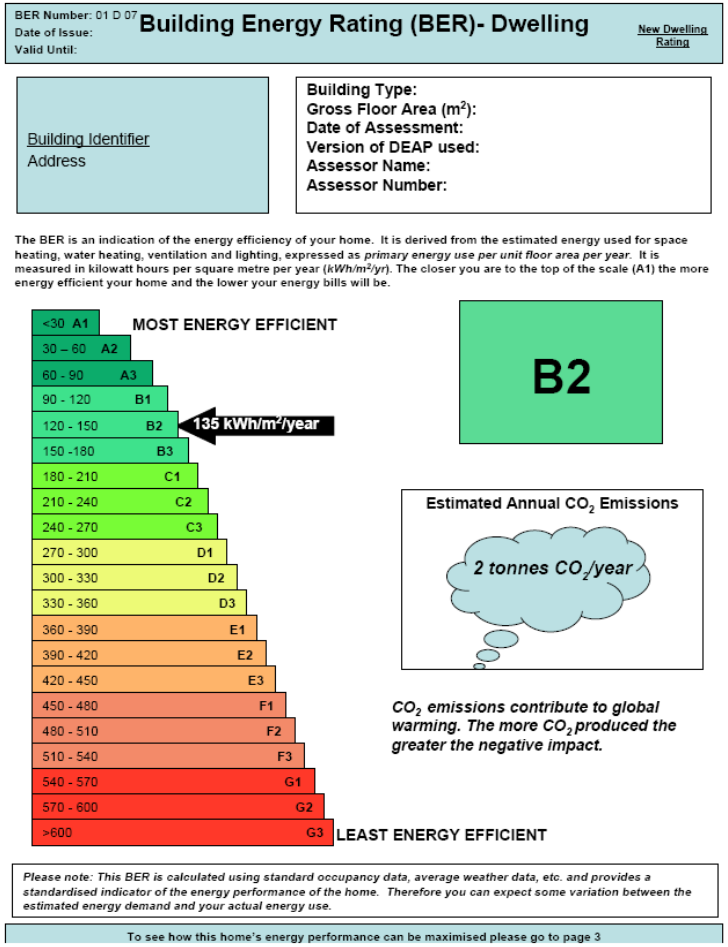
Date of Implementation



	<=2006	2007	2008	2009	?
New	5	6	6	4	5
	19%	42%	65%	81%	100%
Exist.	5	2	5	7	7
	19%	27%	46%	73%	100%

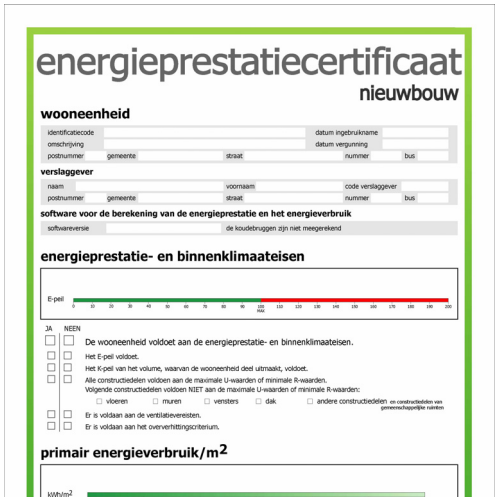
Model of the Certificate (Residential)

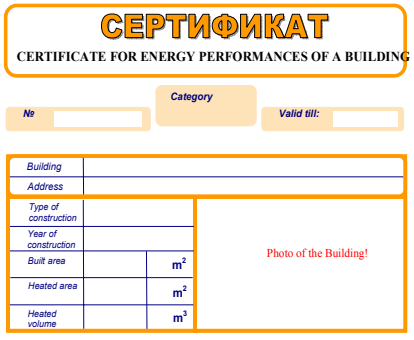
- How many steps?
- Where to put minimum level for new buildings (B or other)?
- Possibility to improve the standard without changing the scales?
- Confusion or information?
- Text?
- CO_2 values?
- More than one scale (calculated , measured,…)?
- Should you use A^+ and A^{++} ?
- Or even B^-?

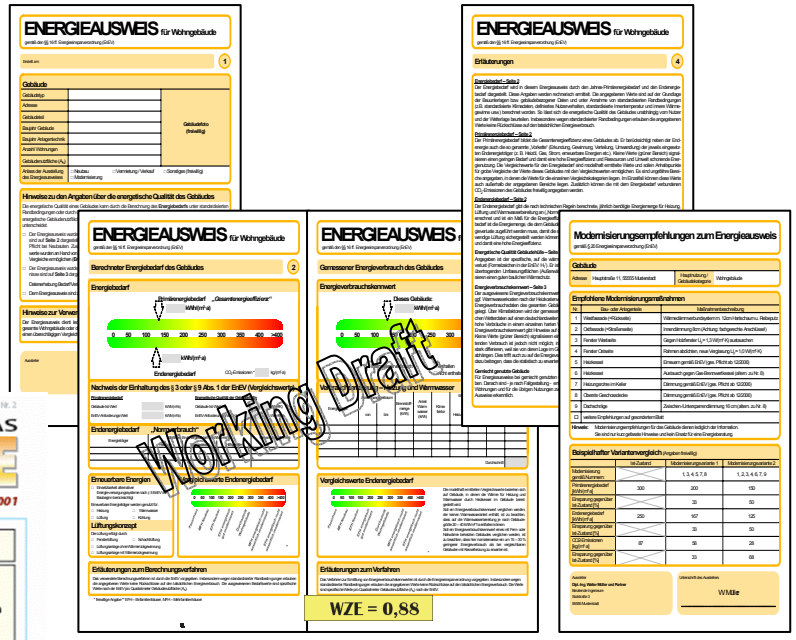


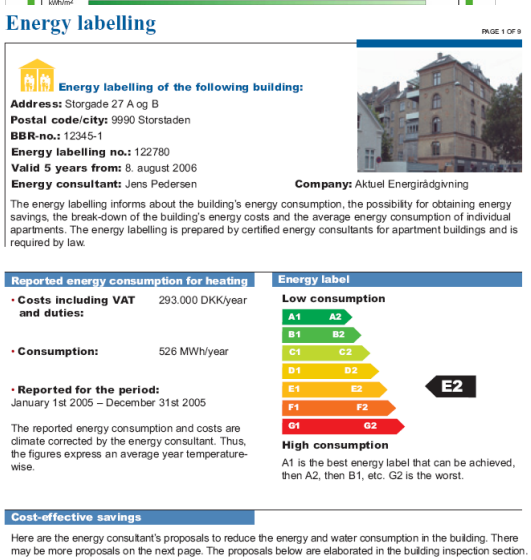
There are many variations in the form of the Certificates….

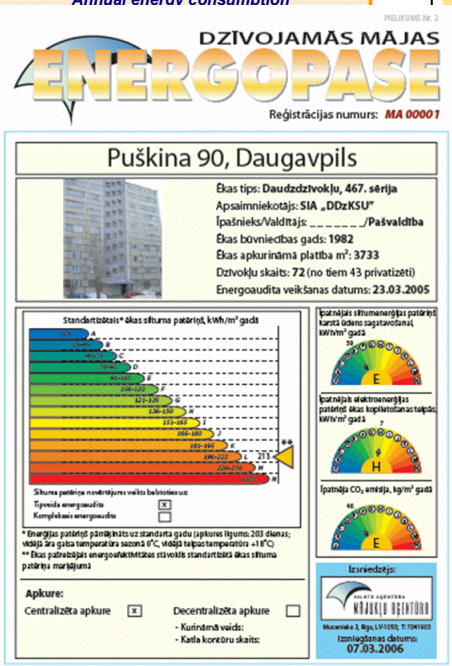
And yet many others…

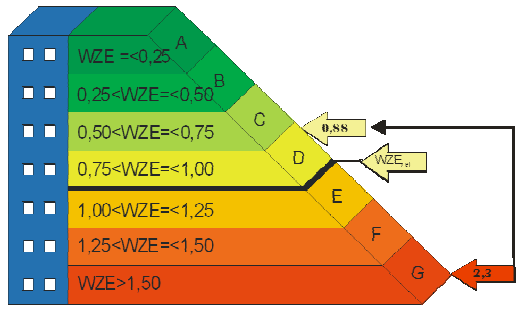








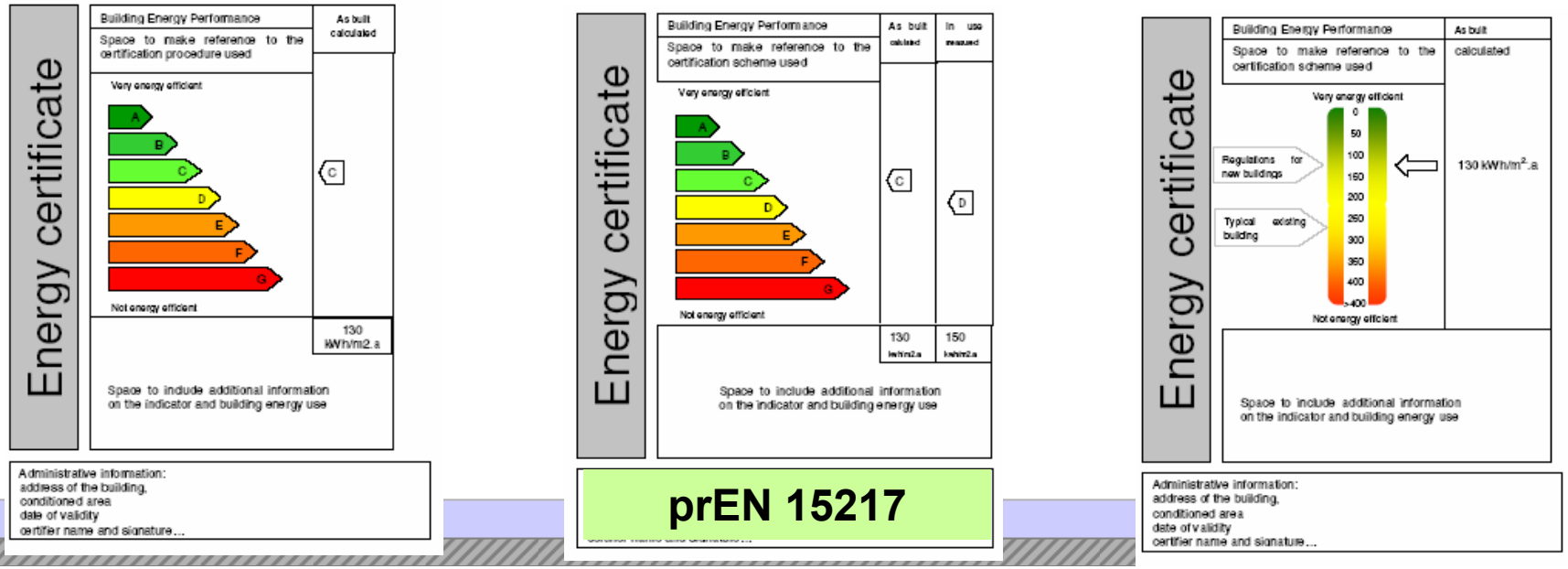




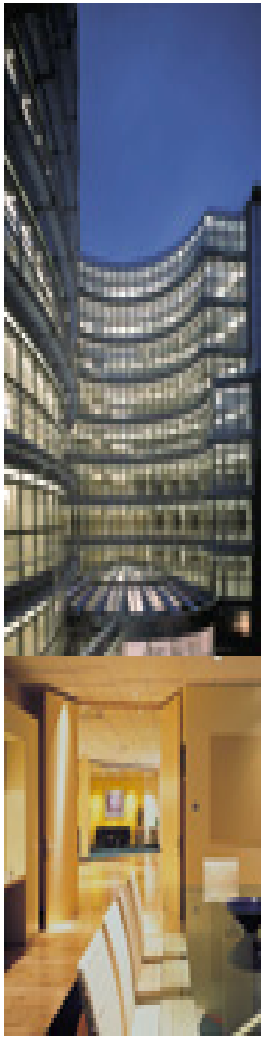
But, despite the differences, we can all "read" the same type of message in any of the certificates…

The Push towards Harmonization

- All certificates fall under one of the options allowed by the applicable new EN standard.

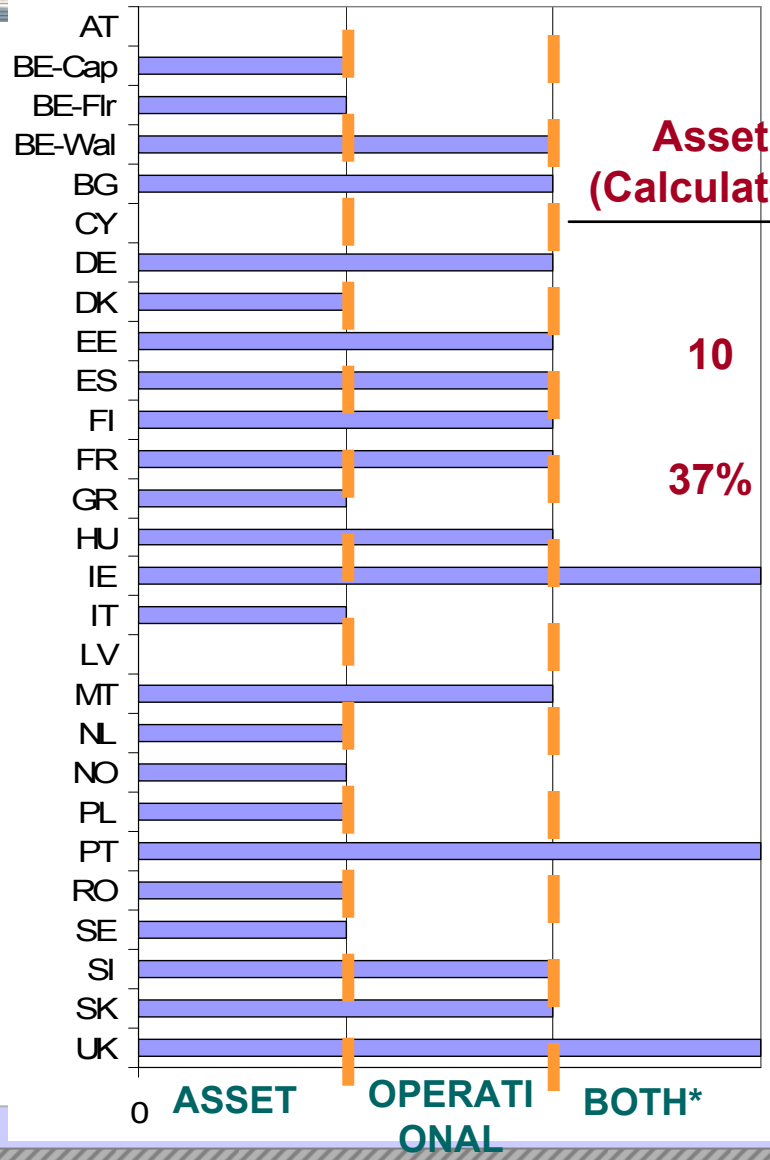


Types of Ratings in Certificates



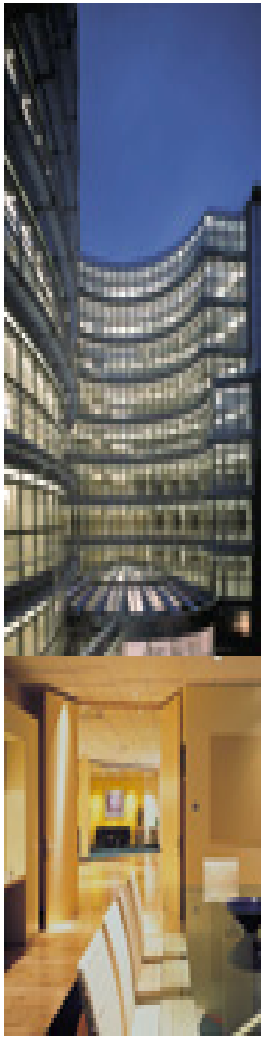
- **Calculated Energy Rating – compares buildings on the basis of reference conditions – mandatory for New Buildings and all Residential buildings.**
- **Measured Energy Rating – describes the actual performance of a building – accounts for use pattern, occupant effects – can use metered energy (bills) – can be used only for Existing Public buildings.**
- **Existing buildings pose the greatest problems, because of lack of accurate information about its envelope and systems details… The new revised EN-ISO 13790 describes the survey and calculation methodologies.**

Building Certificates: Non-Residential - Existing



Asset (Calculated)	Operational (Measured)	Both	Unst./Uncl.
10	11	3	1
37%	41%	11%	4%

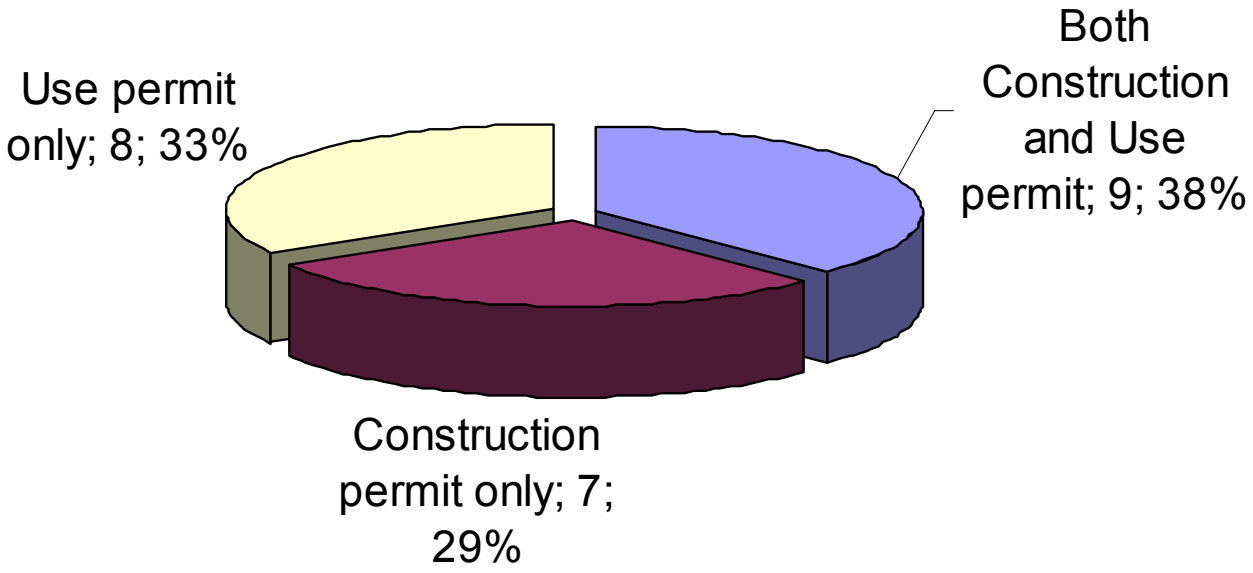
Certification procedures



- **Certification of new buildings: most MS agreed that, ideally, it should be required at both project stage (it is easier to introduce changes and improvements) and after construction;**
- **Certification of existing buildings: it is far more complex and it requires extra planning time to be implemented – few MS are able to start now;**
- **Certification of existing buildings: absolute need for simplified methods, default values and interaction with national methodologies;**
- **Conclusions: Methodologies are well advanced for new buildings, still many issues unresolved for existing buildings.**

Accredited Experts must check project or building…

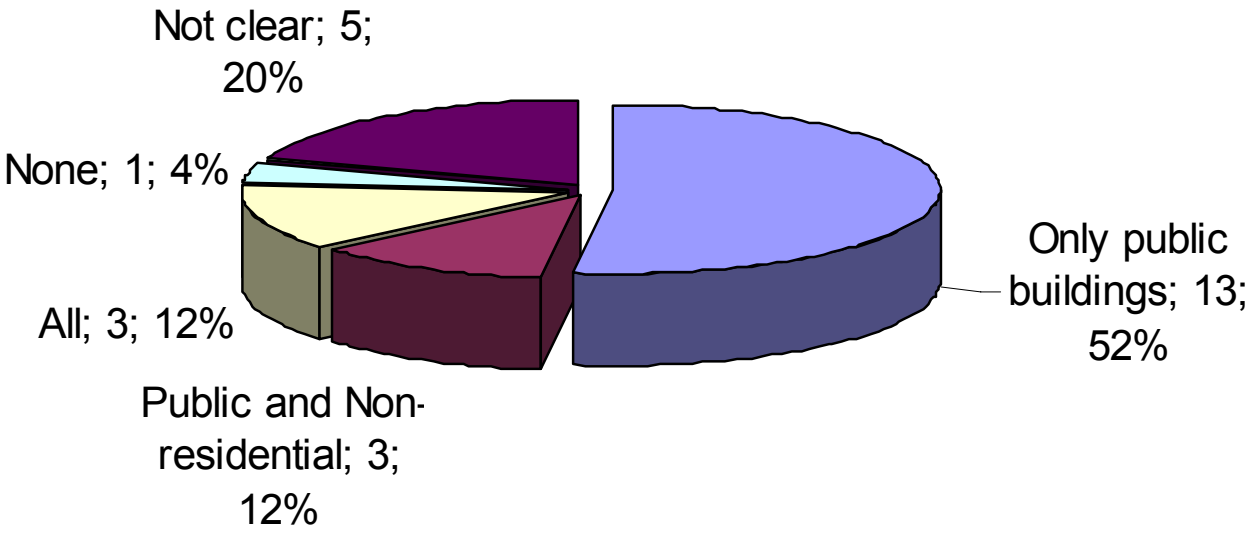
AE checks at...



- 71% have an assessment at the beginning of the use

Types of buildings where Displaying of Certificates is Mandatory

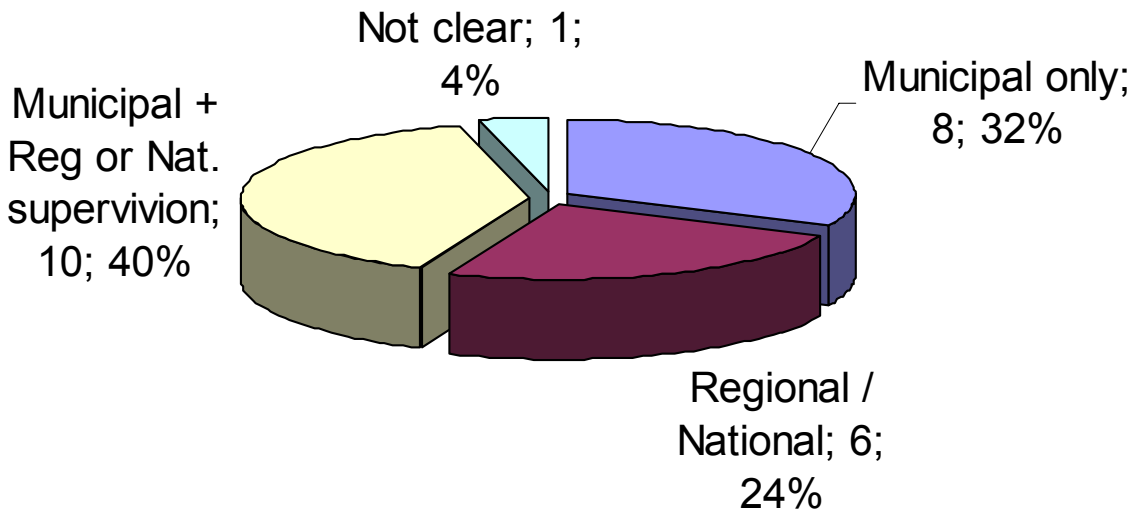
Displaying



- In most countries displaying is mandatory only at Public buildings.
- 3 include also to (at least large) Non-residential buildings.
- 1 MS explicitly says “none”
- 5 MS have not yet reached a decision

Who gets the certificate when a building construction or use permit is requested

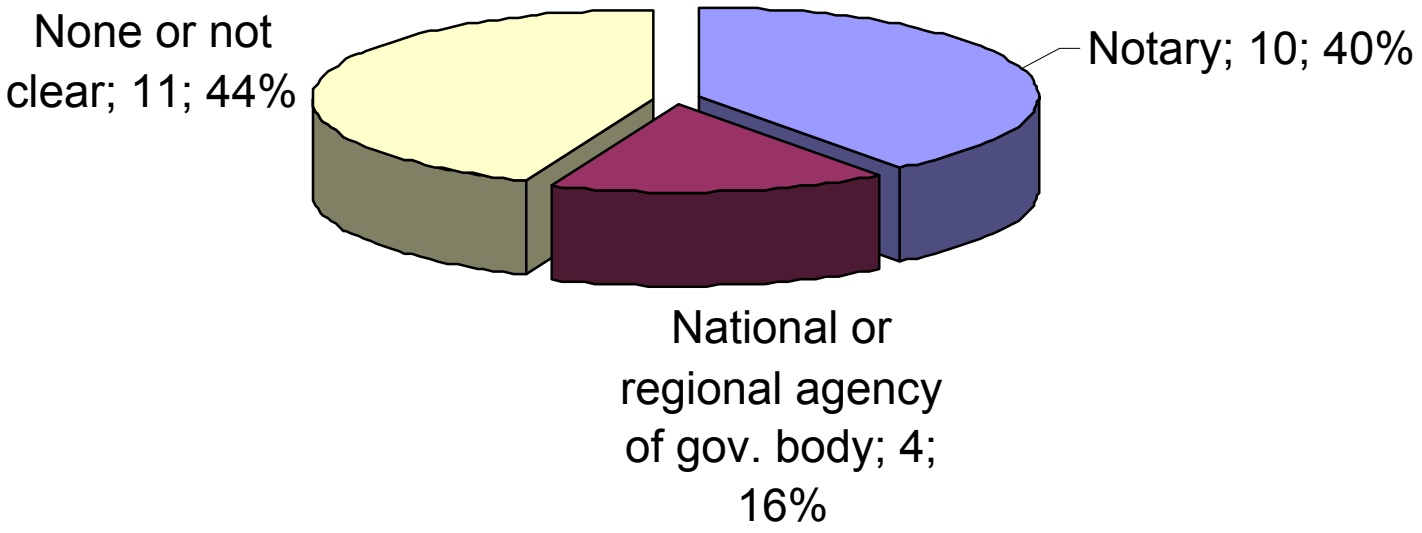
Certificate presented at...



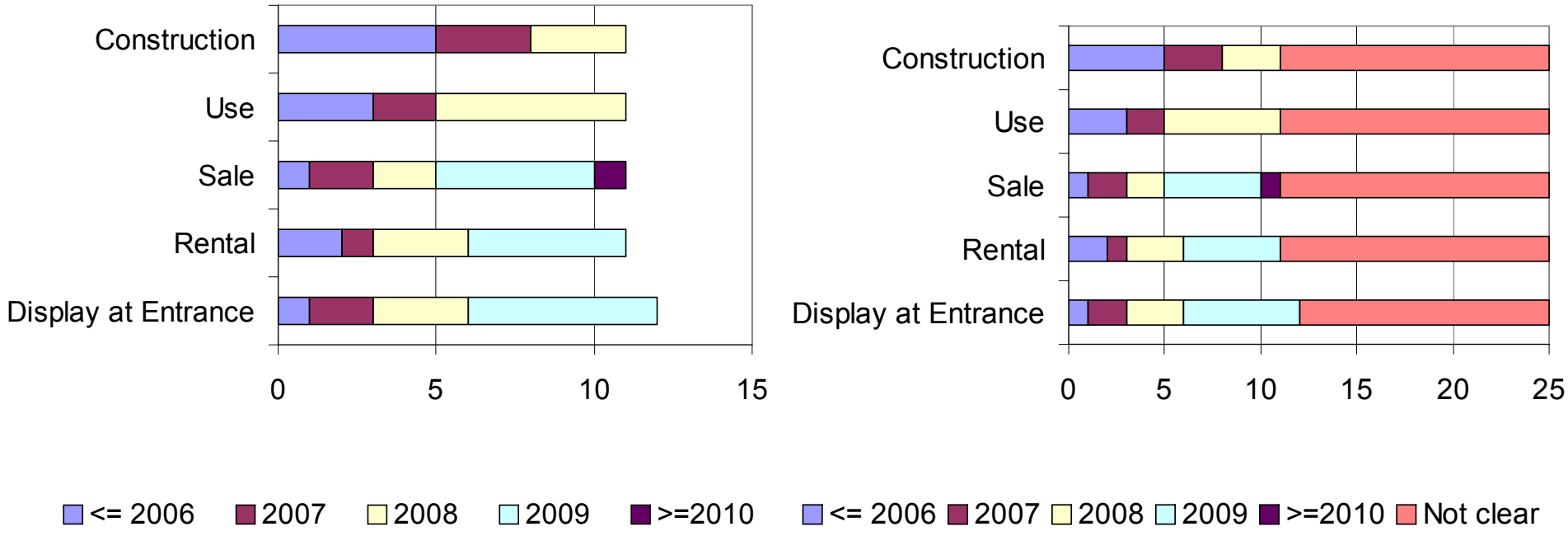
- In most countries the Certificate is needed at the Municipal level.
- In most countries there is also some “supervision” from the Regional or National levels.

Authority checking certificate at the moment of Sale

Authority checking certificate at the moment of Sale

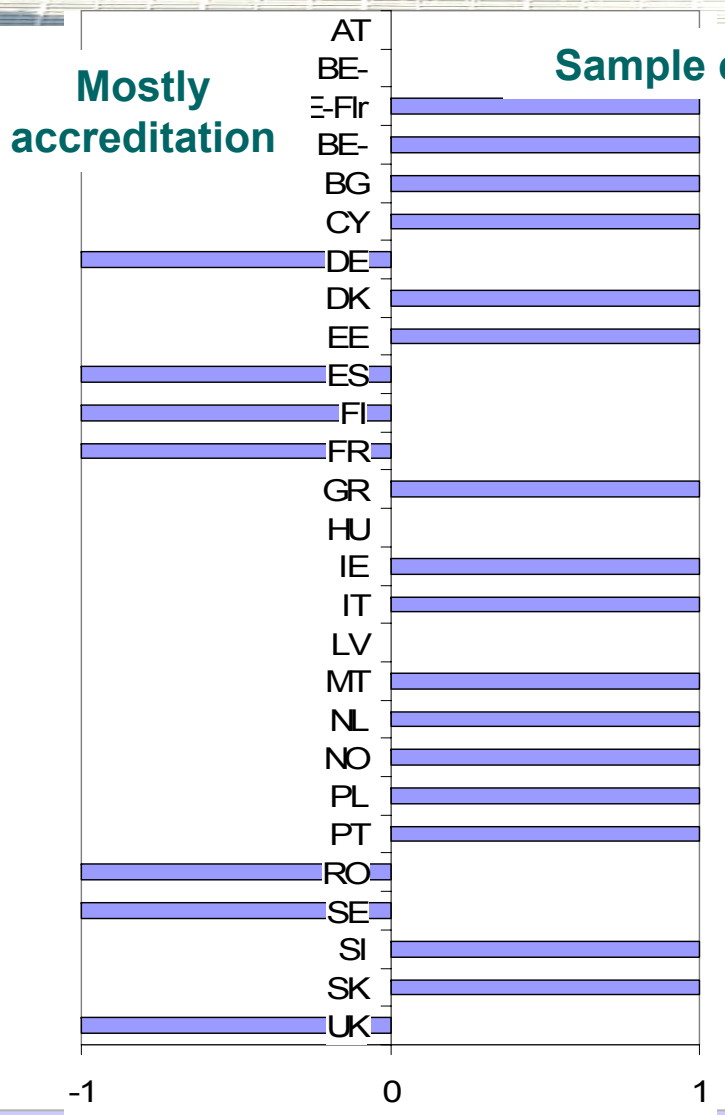


Dates for starting



- Certification at the design phase starts first;
- Use at Sale, Rental and Displaying start later
- But for many (most) countries it is still not clear when the processes start.

Quality Assurance of Certification and Inspections



Sample ckecks

YES	NO	UND.
16	7	4

- **Most countries control quality of certificates on a sample.**
- **Some countries decided that there will be a control, but have not yet decided how to perform it.**

The Netherlands

System run by SenterNovem (National Energy Agency)

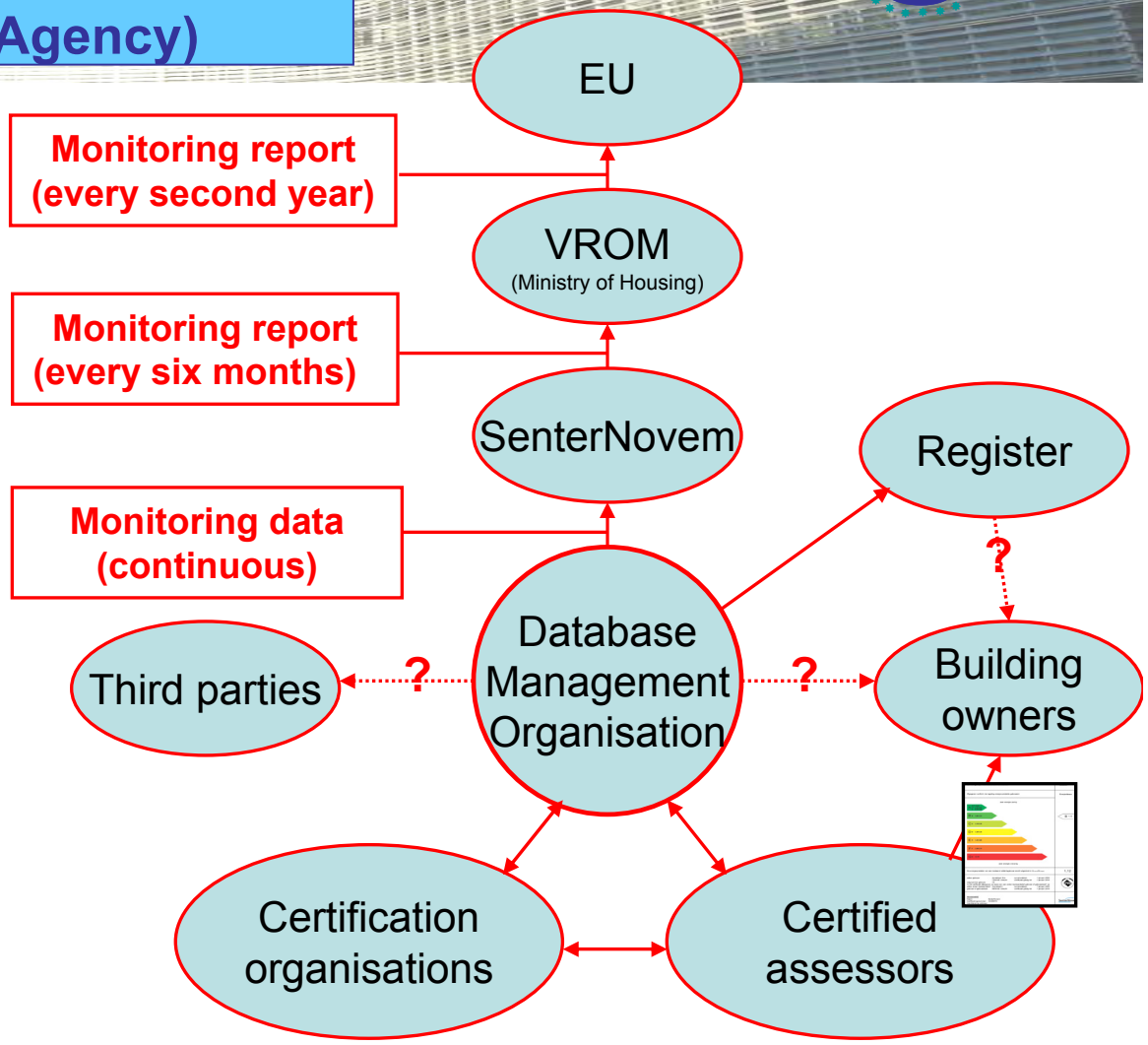
Software contains automatic upload routine (BRL 9501)

Database used by certification organisations for QA assessors

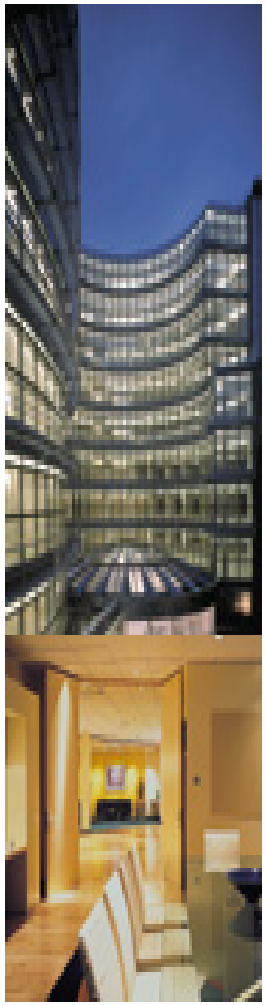
All data from calculations stored only part (appr. 50 parameters) used for reports

Centrao Register collects (limited) info;
-certificate yes/no
-address

Possibility for using database for third parties
-building owners
-municipalities
-…

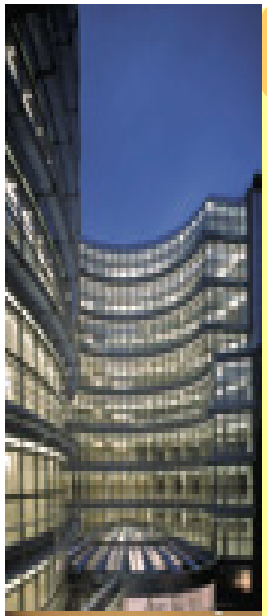


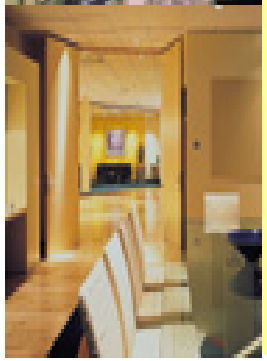
Required Qualifications for Accredited Experts (AE)



- There is quite a range from country to country;
- In most cases, Accredited Experts must either be an Architect or an Engineer;
- In most cases, but not everywhere, AE must take a special course and pass an exam;
- For simpler buildings (smaller residential), requirements may be less demanding.

Inspection and assessment of heating & cooling installations





Heating systems

- Inspected regularly: boilers with an effective rated output between 20 kW and 100 kW
- Inspected every 2 years: boilers with an effective rated output over 100 kW
- Boilers larger than 20 kW and older than 15 years: the entire heating installations should be inspected. Advice should be given on alternative solutions which could reduce energy consumption

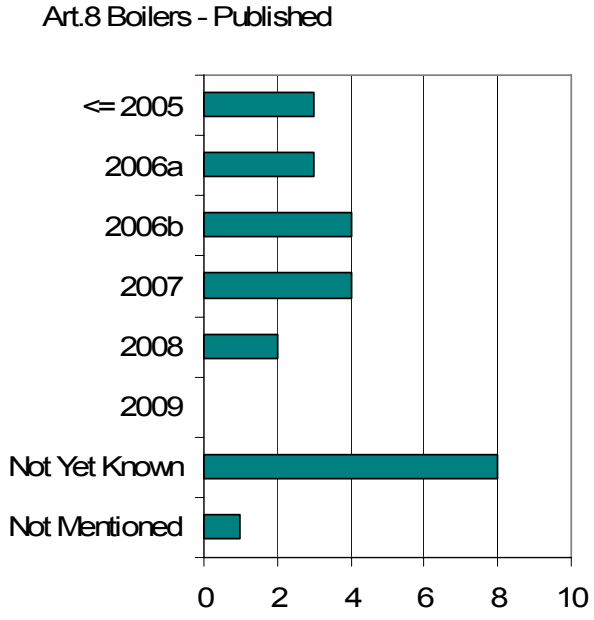
Cooling systems

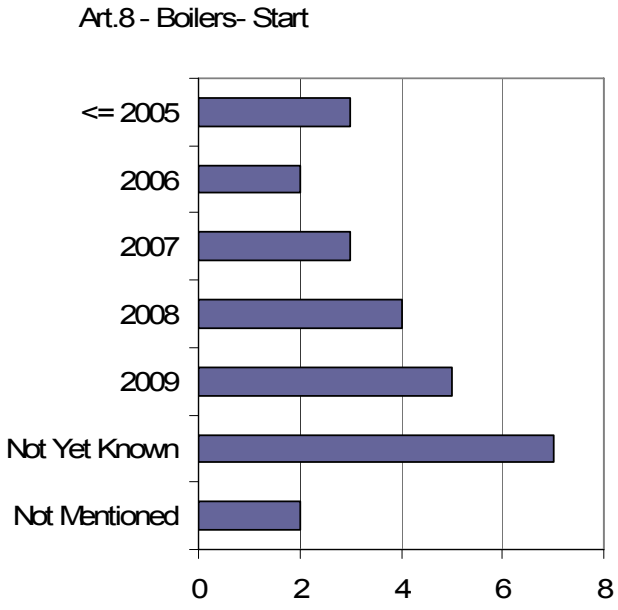
Regular inspection of air-conditioning systems with an output of more than 12kW, including room systems used together.

Inspections of boilers can be replaced by information campaigns.

Inspection of boilers

- *Boiler inspection schemes have been introduced by some MS, usually interacting with other services (check of regular maintenance, safety or environmental controls).*
- *Information and advice schemes are being implemented in some countries*

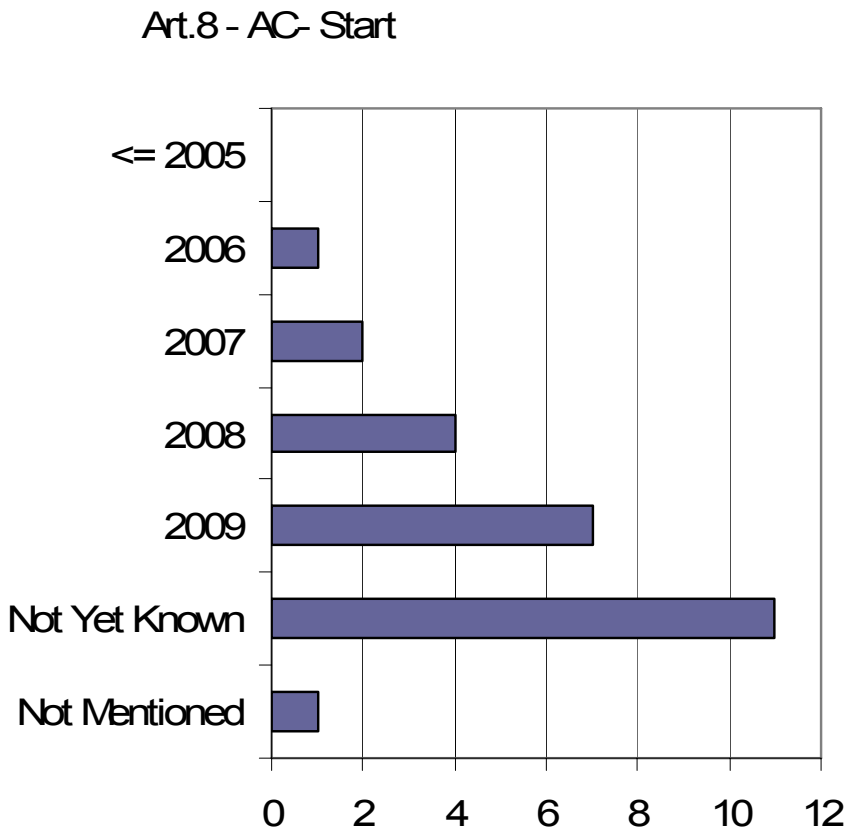




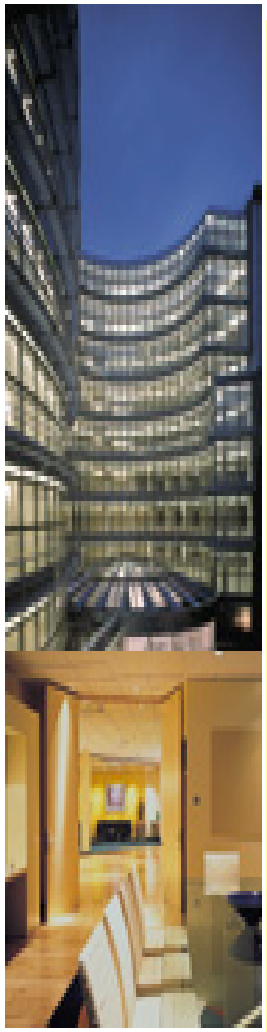
Some delays are clear, as expected

Inspection of air conditioners

- *Further effort is needed in the field of **air conditioners** inspection:*
  - *Most MS have delayed the decision;*
  - *Inspection methods have not yet been tested;*
  - *More time needed until a clear picture emerges for AC inspections.*

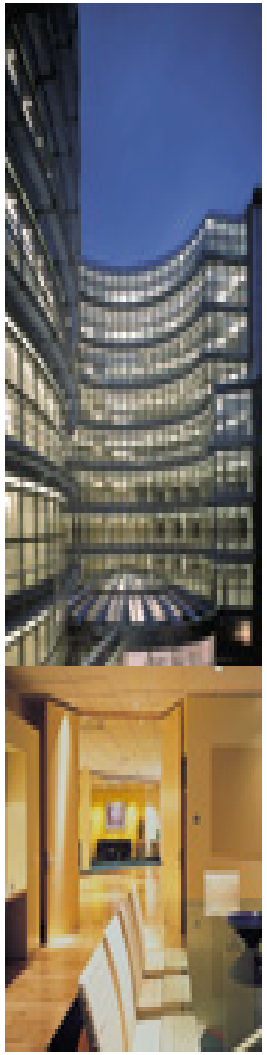


The Status of Transposition



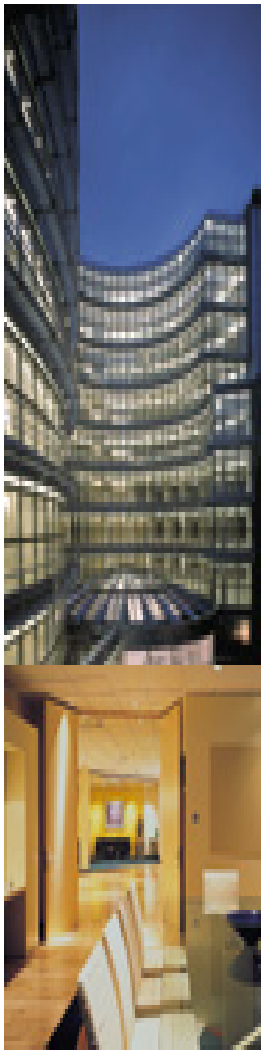
- D-day, 4 January 2006, is long past…
- There are significant delays in most countries and that many technical issues still remain – something that became evident in mid 2005
- The number of Full Transpositions is quite small
- There are still many unresolved issues in most MS
- MS show a clear resistance to change despite all the pressures and indications that the Energy Performance of European Buildings must greatly improve to meet increasing restrictions in CO_2 emissions

The near future…



- Many countries enacted legislation and regulations before the end of 2006, but not all…
- Most countries will request an extension of 3 years.
- We shall start to see certificates popping up for NEW buildings, PUBLIC buildings, and, to a lesser extent, EXISTING buildings over the period 2007-2008.
- The complete EPBD shall not be fully in force in the whole of Europe before 2009. No change really feasible before then.
- But the new Energy Action Plan of the EC (January 2007) calls for upgrading the EPBD in 2009…

The major bottleneck



- **Certified experts!**
- **I.e., the lack of certified experts…**
- **Thousands needed across the EU, because ALL NEW buildings and major renovations must be certified, as well as ALL Public Buildings.**
- **All existing buildings must obtain a certificate for sale or renting after January 2009.**
- **Certification becomes REQUIRED rather than voluntary.**
- **It takes time to get them trained and certified with a minimum of credibility.**
- **This also allows most MS an excuse to request the 3-year extension.**