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CEN Standards for Implementing the EPBD

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Directive 2002/91/EC on the Energy Performance of Buildings (EPBD)

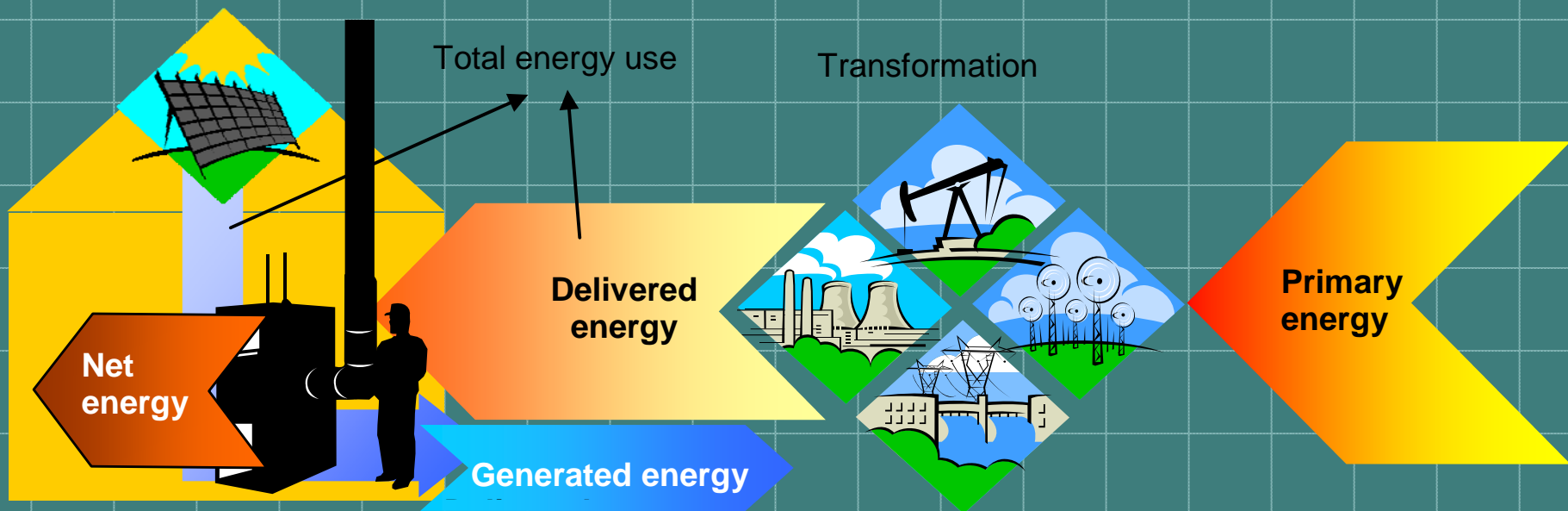
- ◆ Minimum requirements
- ◆ Includes heating, cooling, ventilation, domestic hot water and lighting.
- ◆ Energy certification
- ◆ Inspection of boilers and air-conditioning systems

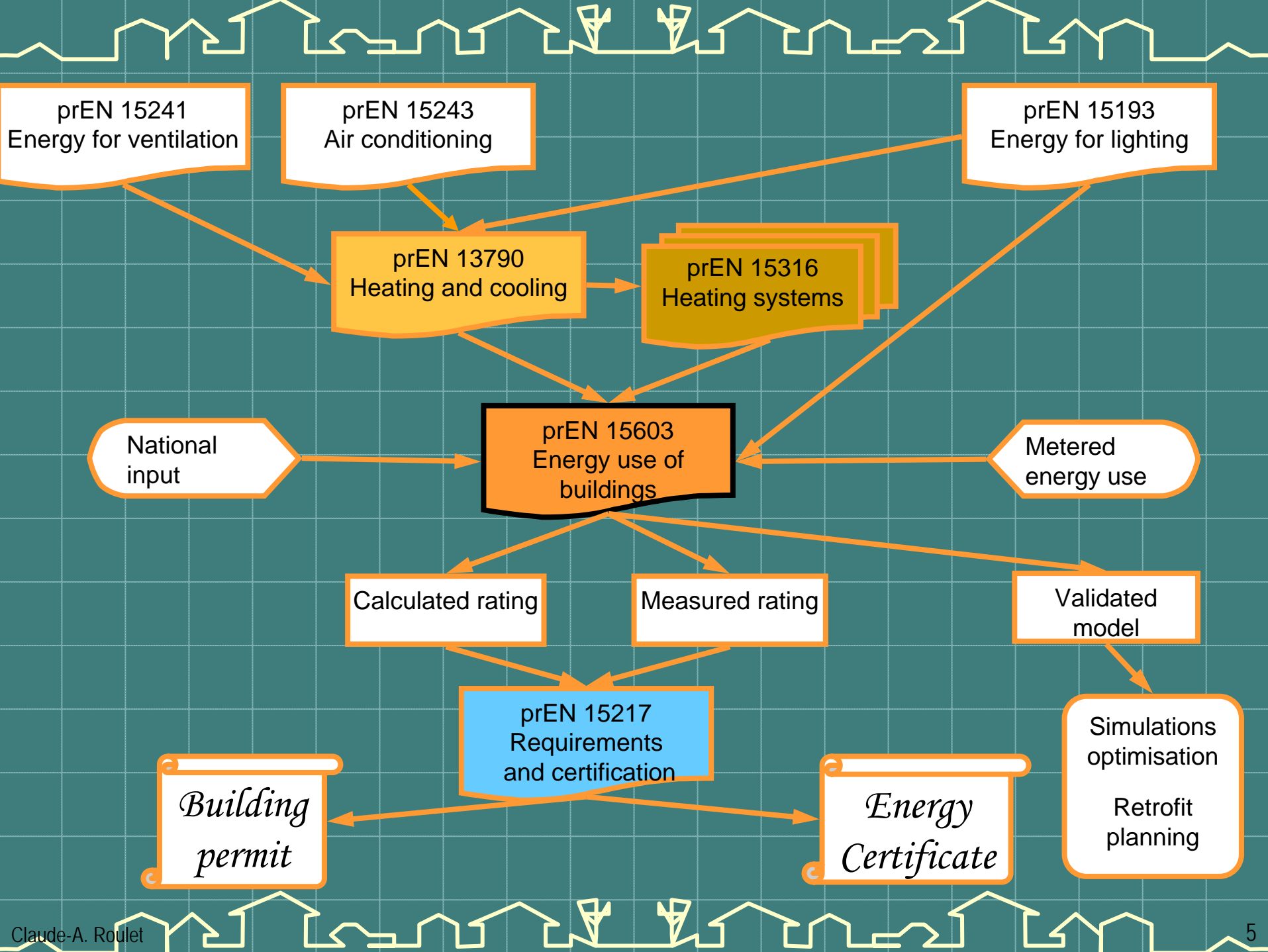



EC mandate to CEN

- ◆ To provide European standards for an harmonised implementation of the EPBD
- ◆ 30 EN and 24 ISO are being revised or drafted
 - ◆ calculation methodology;
 - ◆ minimum energy performance requirements;
 - ◆ energy performance certificate;
 - ◆ inspections of boilers and air-conditioning.

Energy flows







prEN 13790: Energy use for heating and cooling

- ◆ EN 13790 monthly method for annual energy use for heating
- ◆ Similar monthly method for annual energy use for cooling
- ◆ Simple hourly method providing both heating and cooling energy use.



prEN 13790: Outputs

- ◆ heat transfer by transmission and ventilation of the building;
- ◆ contribution of internal and solar heat gains;
- ◆ annual heat flow for heating and cooling;
- ◆ annual energy required by the heating and cooling systems
- ◆ additional annual energy required by the ventilation system



prEN 15603 Assessment of energy use and definition of ratings.

Defines:

energy ratings for new and existing buildings
the uses of energy to be taken into account.

And provides methods for:

computing energy ratings

assessing a measured energy rating

improving confidence in the building calculation model by
comparison with actual energy use

assessing the energy effectiveness of possible improvements.

Types of ratings


| | | Input data | | | |
|------------|----------|----------------------|---------|----------|--|
| | Name | Use | Climate | Building | Utility or purpose |
| Calculated | Design | Standard | | Drawings | Building permit |
| | Asset | | | Actual | Certificate, regulation |
| | Tailored | Depending on purpose | | Actual | Optimisation, comparisons, retrofit planning |
| Meas | Operat. | Actual | | Actual | Certification, regulation |

Design and asset ratings are calculated with standard occupancy data, standard climate and standard environment provided at national level.

Expression of the rating

$$E = \sum_i f_{i,d} E_{i,d} - \sum_i f_{i,ex} E_{i,ex}$$

- ◆ E_i are amounts of energy carriers
- ◆ f_i are factors
 - ◆ Primary energy factors
 - ◆ National policy factors
 - ◆ CO₂ production coefficients



**prEN 15217 Methods for expressing
energy performance
and for energy certification of buildings.**

Global indicators to express the energy performance of
whole buildings

Ways to express energy requirements for the design of
new buildings or renovation of existing buildings.

Procedures to define reference values and benchmarks

Ways to design energy certification procedures.

prEN 15217: Indicators

$$EP = \frac{\text{Energy Rating}}{\text{Conditioned area}}$$

The rating is a calculated standard rating or a measured rating, expressed as:

- ◆ Primary energy used by the building
- ◆ CO₂ emitted by the building, based on primary energy
- ◆ Weighted sum of energy carriers delivered to the building with weights based on national energy policy

Energy certificate

| Building Energy Performance | As built calculated | In use measured |
|--|------------------------------|------------------------------|
| Space to make reference to the certification scheme used | | |
| <p>Very energy efficient</p> <p>Not energy efficient</p> | C | D |
| | 130 kWh/m ² .a | 150 kWh/m ² .a |
| Space to include additional information on the indicator and building energy use | | |

Administrative information:
 address of the building,
 conditioned area
 date of validity
 certifier name and signature...

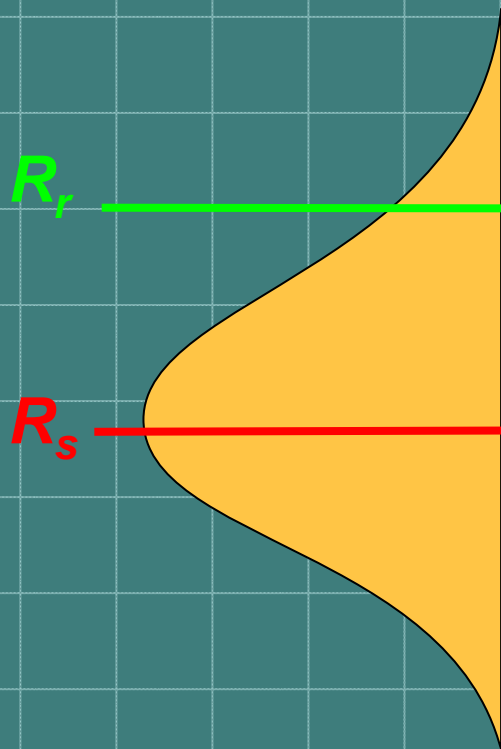
Energy certificate

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| | |
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prEN 15217: Classes (proposal)

Based on EPR limit R_r and building stock median R_s for the considered building type.



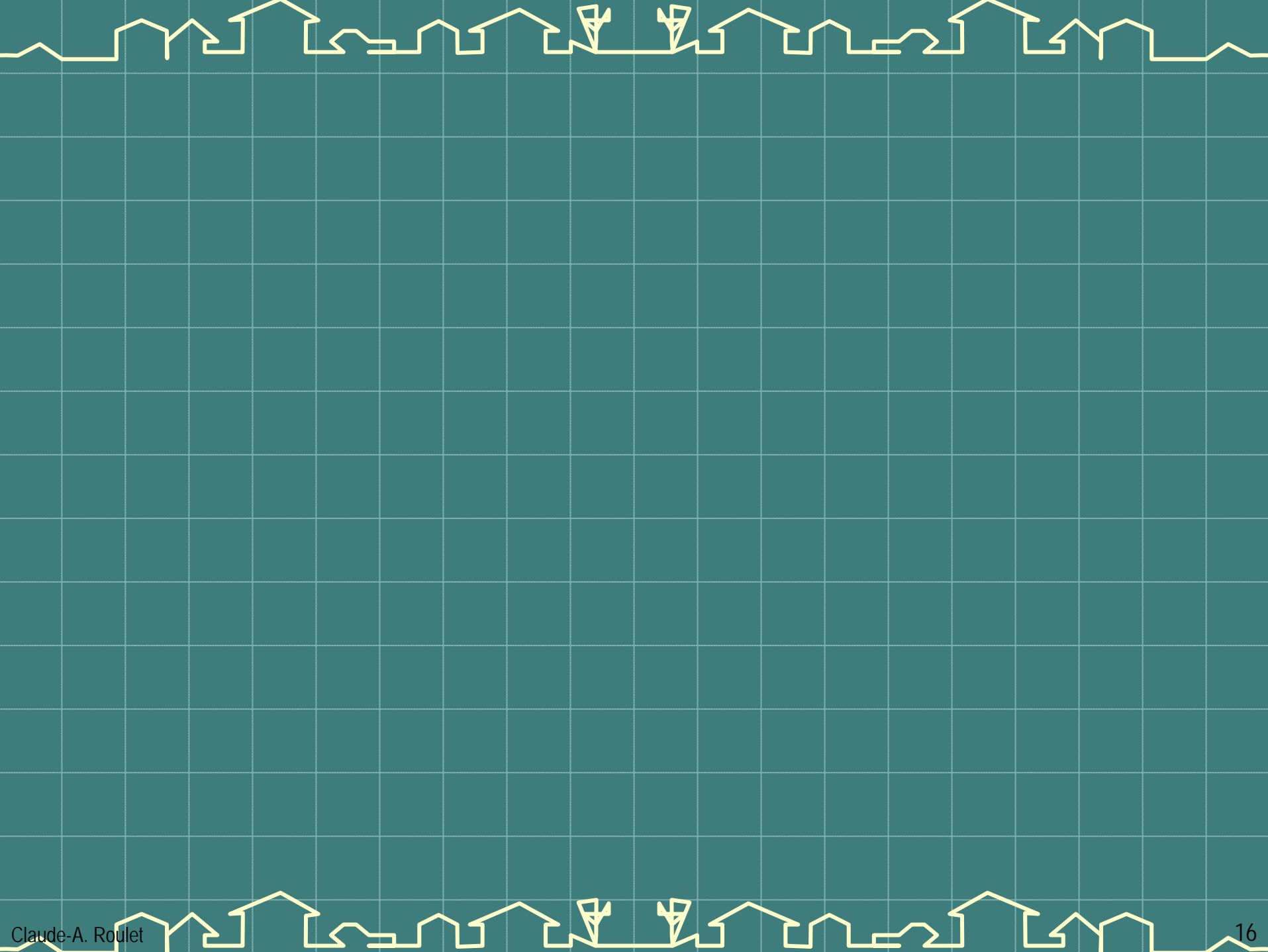
| | |
|---|---------------------------------|
| A | $EP < 0,5 R_r$ |
| B | $0,5 R_r \leq EP < R_r$ |
| C | $R_r \leq EP < 0,5 (R_r + R_s)$ |
| D | $0,5 (R_r + R_s) \leq EP < R_s$ |
| E | $R_s \leq EP < 1,25 R_s$ |
| F | $1,25 R_s \leq EP < 1,5 R_s$ |
| G | $EP \geq 1,5 R_s$ |



Conclusions

A tremendous effort allowed in a very short delay to

- ◆ Have a set of standards to help EU members in implementing the EPB directive
- ◆ Improve the coherence of this set
- ◆ Include most energy uses of buildings.





CEN Standards for the EPBD

- prEN 13779: Energy performance of buildings – Ventilation for non residential buildings – Performance requirements for ventilation and room conditioning systems (WI 25).
- prEN 13790: Energy performance of buildings – Calculation of energy use for space heating and cooling (WI 14).
- prEN 15193-1: Energy performance of buildings – Energy requirements for lighting – Part: 1 Lighting energy estimation (WI 13).
- prEN 15203: Energy performance of buildings – Assessment of energy use and definition of ratings (WI 2+4).
- prEN 15217: Energy performance of buildings – Methods for expressing energy performance and energy certification of buildings (W 1+3).



CEN Standards for the EPBD

- prEN 15232: Energy performance of buildings – Calculation methods for energy efficiency improvements by the application of integrated building automation (WI 22).
- prEN 15239: Energy performance of buildings – Ventilation for buildings – Energy performance of buildings – Guidelines for the inspection of ventilation services (WI 30).
- prEN 15240: Energy performance of buildings – Ventilation for buildings – Energy performance of buildings – Guidelines for inspection of air-conditioning systems (WI 6).
- prEN 15241: Energy performance of buildings – Ventilation for buildings – Calculation methods for energy losses due to ventilation and infiltration in commercial buildings. (WI 20 + 21)
- prEN 15242: Energy performance of buildings – Ventilation for buildings – Calculation methods for the determination of air flow rates in buildings incl. Inflation (WI 19).



CEN Standards for the EPBD

prEN 15243: Energy performance of buildings – Calculation of room temperatures and of load and energy for buildings with room conditioning (WI 12).

prEN 15251: Energy performance of buildings – Criteria for the indoor environment, including thermal, indoor air quality (ventilation), light and noise (WI 31).

prEN 15255: Energy performance of buildings – Thermal performance of buildings – Sensible room cooling load calculation – General criteria and validation procedures (WI 16).

prEN 15265: Energy performance of buildings – Calculation of energy use for space heating and cooling – General criteria and validation (WI 17).

prEN 15316: Energy performance of buildings – Heating systems in buildings (WI 7/-1, WI 8/-2-1, WI 9/-2-2, WI 10/-2-3, WI 11/-3).