Comparing with European Best Practice in Building Code Implementation

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Europe Background

- In some countries energy demands date back to the 1960’s
- Real change in the 1970’s – because of oil supply crises
- In 1980’s came first energy frame calculations
- Since 2000 focus on overall energy performance
- All Member states now have energy performance codes (but large differences)
- Since 2010 focus on NZEB
- Based on cost optimality:
  - If feasible and economic
  - Then it must be included
- Cost over lifetime
The EPBD directive

• Today energy efficiency in buildings is driven by the EPBD directive

• Energy Performance of Buildings Directive:
  – First version from 2002
  – Recast from 2010
  – Amendment from 2018?

• Amendment currently being negotiated
  – First agreements in council and in parliament June 2017
  – Next negotiation started September 2017
  – Expected to reach agreement between parliament and council before end of year
  – No change for building codes / new buildings!
DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 19 May 2010
on the energy performance of buildings
(recast)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 194(2) thereof,

Having regard to the proposal from the European Commission,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of the Regions (2),

Acting in accordance with the ordinary legislative procedure (3), Together with an increased use of energy from renewable sources, measures taken to reduce energy consumption in the Union would allow the Union to comply with the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), and to honour both its long term commitment to maintain the global temperature rise below 2 °C, and its commitment to reduce, by 2020, overall greenhouse gas emissions by at least 20 % below 1990 levels, and by 30 % in the event of an international agreement being reached. Reduced energy consumption and an increased use of energy from renewable sources also have an important part to play in promoting security of energy supply, technological developments and in creating opportunities for employment and regional development, in particular in rural areas.

Management of energy demand is an important tool enabling the Union to influence the global energy market and hence the security of energy supply in the medium and long term.
The EPBD recast directive

Key elements for building codes – all MS must:
• Develop national calculation procedure
  – Supported by CEN / ISO standards
• Set minimum requirements for new buildings
  – Revise at least every 5 years
  – Based on cost optimality (if feasible it must be included)
• Set requirements by renovation
  – Performance by major renovation
  – Prescriptive elements by smaller improvements
• NZEB codes by 2021 (public buildings from 2019)
• Must set up certificates (EPC) systems:
  – By construction, sale and rent
  – Regular in public buildings (>250 m²)
  – Used to check compliance with BC
Europe is one big Energy Performance Building Code Laboratory

Competing and Learning from each other
Requirements New Buildings => nZEB

Figure 6: Timing of planned intermediate targets for energy performance requirements in the different MSs as stated in the national plans for NZEBs, and the deadline for NZEBs
Cost Optimality over lifetime

Large work has been done on Cost Optimality – LCA’s
Cost Optimality Examples

Good examples from Belgium and Denmark
Requirements New Buildings- nZEB

A *nearly zero energy building* means a building that has a very high energy performance and where the low energy to a very significant extent comes from renewable sources.

Ways to calculate for RES are different!
Compared with Armenia

We analyzed and compared different elements:

1. Building codes for new and existing buildings
2. Complexity in the system for new buildings
3. Uniform calculation methodology
4. Systems / tools for calculations
5. Setting values of performance
6. Secondary level demands
7. Standardised values / testing
8. Use of certification for compliance
9. Training and information
1. Building codes for new and existing EU Best Practice:

- All MS have energy performance requirements
- Performance move towards NZEB
- Some countries already implemented NZEB levels
- Many have NZEB requirements by 2021
- A very large experience in large variety
- Some countries have more than 50 years of experience with implementation and enforcement

Armenia:

- Already implemented requirements for energy performance in new buildings
- But experience relatively short
- Some elements still under implementation
2. Complexity in the system

EU Best Practice:
• Many MS have very simple chains of development and enforcement
• Owner fully responsible for complying with BC
• Community responsible for control
• Can call in external experts (if needed)
• Other limit access to accredited experts (architects) with large self control

Armenia:
• The process seems complex and involves many experts
• The role of each actor is maybe not always clearly defined
• Responsibility of EE could fall between chairs
• Some stake holders were uncertain
3. Uniform calculation methodology

EU Best Practice:
• All MS have clear procedures for calculations
• Is a specific requirement of the EPBD
• Systems are mainly based on CEN norms
• Special overreaching standard combining all others
• These norms harmonise results and simplify control procedures

Armenia:
• Current standards are based on different systems:
  – RACN, SNIPs, CEN and ISO
• Need to combine and fill gaps
• Requests highly trained specialists
• Two experts can come to a different result
• This makes compliance checking very difficult.
Main scheme

Methodology for calculating energy performance (Article 3 and Annex)

- Energy Performance Requirement
  - new buildings Article 4, 5
  - major renovations Article 4, 6

- Energy Performance Certificate and Recommendations
  - Article 7

- System inspections
  - Article 8, 9

- Energy performance
  - Ways of expressing energy performance
    - EN 15217
  - Overall energy use, primary energy, CO2 emissions
  - Total delivered energy
  - Procedures for calculated and measured energy rating
    - EN 15603

- Energy certification of buildings
  - EN 15217

- Heating systems with boilers
  - EN 15378

- Air conditioning
  - EN 15240

- Ventilation systems
  - EN 15239

- System and building energy needs for heating, cooling, humidification, dehumidification, hot water, lighting and ventilation systems
  - EN ISO 13790, EN 15316-1, EN 15316-2, EN 15243, EN 15316-3, EN 15265, EN 15193, EN 15241, EN 15232

- Definitions and terminology, external climate data, indoor conditions, overheating and solar protection, thermal performance of building components, ventilation and air infiltration, ...
  - e.g.: EN ISO 6946, EN ISO 13370, EN ISO 10077-1, EN 13947, EN ISO 10211, EN ISO 10077-2, EN ISO 14683, EN ISO 10456, EN 15242, EN 13779, EN 15251, EN ISO 15927, EN ISO 7345, EN ISO 9288, EN ISO 925, EN 12792

1): Not explicitly mentioned in the Directive
4. Systems / tools for calculations

EU Best Practice:
• Strong focus on description (standards) in the beginning
• Now more focus on calculation engines (www / PC)
• Strong integration with calculation cores / tools
• Denmark has common core on WWW – must be used!
• Germany has request similar results on test buildings

Armenia:
• Highly based on expertise by professionals
• Combine different standards
• Must combine / use different tools
• Possible to get different results
5. Setting values of performance

EU Best Practice:
• All MS must set minimum requirements for overall performance
• Must be updated every 5 years
• Based on cost optimality
• Towards NZEB
• Level and method vary significantly over Europe
• Some countries already close to passive energy / NZEB levels
• Generally strong enforcement

Armenia:
• The values for performance are relative recent
• No updates done yet
• Enforcement still limited
In Danish action plans for a CO\textsubscript{2} neutral society it is the target that all building will be positive in the future (year still to be decided).
6 Secondary level demands

EU Best Practice:
- Although strongly performance based
- Many still set secondary requirements
- To be obtained on top of performance
- Or instead of performance
- Often set as U-value or R-value and technical levels
- As overall U-value or as energy frame for heat losses and gains
- Some even have 3 levels
- Secondary demands easier to enforce

Armenia:
- Many steps taken towards performance
- As many of the calculation tools and testing facilities are limited, secondary and more prescriptive values could be easier to enforce
Secondary Requirements over Europe

Most EU Member States have at least one set of secondary requirements for energy efficiency in buildings.

Choice by country

- Austria
- Belgium (Brussels)
- Belgium (Flemish)
- Belgium (Walloon)
- Bulgaria
- Croatia
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Netherlands
- Poland
- Portugal
- Romania
- Slovenia
- Spain
- Sweden
- UK (England & Wales)

Legend:
- Maximum Heat Losses / Gains
- U-values
- Overall U
- Max Heat, Cool & Lighting
- Other options
7. Standardised values / testing

EU Best Practice:

• In Europe there are rules for testing – many building products must be tested for energy efficiency
• Independent and valid in the whole European Union
• ECE Design directive – framework for testing, labelling and MEPs
• Default values high
• Standard values i.e primary energy factors

Armenia:

• Testing capacity limited and often not required
• Testing of windows is a specific problem no real testing facilities
• Standard values still to be developed
8. Use of certification for compliance

EU Best Practice:
• Need for certification of new buildings before use
• Independent assessors check building including compliance with energy requirements
• Strong penalties and liability
• Loose approval / accreditation
• Quality assessment including random assessment

Armenia:
• Is working on implementation of labelling
• New buildings would be an obvious choice
• Could help on / support compliance
Energy Performance Certificate from Ireland

Used to check compliance and document better performance
The electronic label in Denmark

Energimærker

Energimærkningen synliggør bygningers energiforbrug og er en form for varedeklaration. Energimærkningsrapporten giver desuden overblik over de energimæssige forbedringer, det kan betale sig at gennemføre. Boliger, offentlige bygninger og bygninger til handel og service er omfattet af reglerne om energimærkning. Det er et krav, at en bygning energimærkes, når den sælges eller udlejes.

Skala fra A til G

Energimærket viser bygningens placering på energimærkeskalaen fra A til G, hvor A er den bedste placering.

![Energimærke Skala](image)


Mærkerne refererer til energikravene i bygningensreglementet. Det vil sige, at et hus, der er mærket med A2015, lever op til de krav, der i Bygningsreglement 2015. De nye A'er ses primært i forbindelse med nybyggeri.

Energimærkningen af bygninger til salg eller udleje skal annonceres med den skalaværdi, der fremgår af energimærkningsrapporten.

Læs mere på Bygningsreglementet.dk
9. Training and information

EU Best Practice:
• Member States recognise the need for information and training
• All MS have systems for information on regulation, best practices, standard solutions etc.
• Sometime one stop shop
• National or local information services
• Public Service obligations (PSO) obligations for utilities
• Often supported by finance systems

Armenia:
**Information Material Examples**

**Croatia**

Kako do bespovratnih sredstava?
2. dokumentacija objavljena na www.mgipu.hr
3. upute za potaknjenje dokumentacije poziva podržali su eng.mgipu.hr
4. upute u vezi održavanju partnerstva.
5. pristupi dokumentacije za savjetnici sa partnerim, izvođačima, KRF
6. ispunjenje projektla traže max. 120 dana
7. MSPV (klauza Oblikovanja financiranja)
8. potpuni izvori (P1, P2 i IZI)
9. pravne projekta traže najviše 18 mjeseci.

**Estonia**

Mis kasu on energiamärgise!
Energiamärgise rakstul hoone kagü energiatarvet kliimatastikas asetatakse umbrella kõrvalmõnedes. See on abil väärtus toa elu elupinnas, sageli kasutatakse viib tekkida vajadus tohutuda hoone energiahedastikust.

Lisainformatsioon:
www.tja.ee/hoonete-energiaklassid

**The Netherlands**
Recommendations

We analyzed and compared different elements:

- Calculation procedures need to be clearly defined
- Two experts need to get same result (guide boom)
- Might be easier to check compliance with more prescriptive elements
- Roles for compliance needs to be clearly defined / checkpoints
- Need for appropriate and likely Penalties by misconduct
- Energy certification can support compliance
- Testing of materials
- Supporting tools
- Training and information
Book from CA 3

Read more:

CA IV: [http://www.epbd-ca.eu/](http://www.epbd-ca.eu/)

CA 3 book:

Next book will be a database driven book in pdf (much shorter and by sections)

CA 3 book will also be uploaded in separate pdf’s

Country reports to be released very soon