

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region

Irina Davis
Sustainability Consultant

**First meeting of the Joint Task Force
on Energy Efficiency Standards in
Buildings
30 October 2017**

Contents

- Need to undertake this new study
- Objectives of the study
- Proposed methodology for data collection
- Preliminary approach to the mapping of existing energy efficiency standards and initial assessment of energy efficiency technologies



Need to undertake this study

- Countries of the UNECE region differ greatly in the area of building standards
- Lack of information and knowledge with regards to building standards
- Difficult to harmonize data and standards
- Building codes require specific technical expertise – can be difficult to monitor from the political level
- Continues monitoring and evaluation
- Outcomes of the UNECE survey of 2015 on buildings standards and building regulations identified “Mapping of existing energy-efficiency standards in buildings” as one of the main activities

Objectives of the study

1. To examine the energy efficiency standards in buildings of the UNECE member States
2. To prepare an initial assessment of energy efficiency technologies in buildings in relation to the existing standards



Preliminary approach

1. Data collection on energy efficiency in buildings (survey, desktop study, consultation)
2. Database of the energy efficiency standards (excel, GIS?)
3. Countries summary profiles on existing energy efficiency standards (country summary fact sheet)
4. Comparative analysis of the building energy codes (tabular gap analysis)
5. Best practices in subregions of the UNECE region
6. Analysis of data collected on trends in sales and installation of energy efficiency technologies
7. Analytical Report

Proposed methodology for data collection

Questionnaire Survey

Collecting information from 56 member States on the current status of the energy efficiency requirements and technologies in building codes

Desktop Study

Review of relevant policy documents, legislation and technological developments and best practices related to existing standards across countries of the UNECE region

Consultation with the members of the Joint Task Force

Collection of feedback and comments from the members of the Joint Task Force on Energy Efficiency in Buildings

Questionnaire Survey

- **Will be sent to CHLM and CSE focal points in 56 member States and Members of the UNECE Group of Experts on Energy Efficiency**
- **Questionnaire aims to collect data on:**

Part 1. General information

Part 2. Building Energy Codes

- Performance-based requirements and values
- Prescriptive requirements and values
- a) Building envelop
- b) Requirements on Heating, Ventilation and Air-conditioning systems
- c) Other

Part 3. Energy Performance Certificates (EPC)

Part 4. Building materials requirements

Part 5. Enforcement and compliance

Part 6. Energy Efficiency technologies sales and installation trends

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region questionnaire

Part One – General Information

- 1. Name and family name
- 2. Name of organization
- 3. Position in your organization
- 4. Contact information
- 5. Country for which you are providing information
- 6. Please outline the main regulative documents relating to building energy codes.
- 7. From which year is the current set of regulations?
- 8. Are there specific regulations in the country for (please tick which applies):
 - a) climate zones
 - b) subregions
- Please provide comparison of those compared to national norms

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region questionnaire continued...

Part Two – Building Energy Codes

9. What type of building(s) do building energy codes cover in your country (new non-residential, new residential, existing residential, existing non-residential)?

10. Building energy codes cover (please tick where applicable):

- Single family houses
- Apartment blocks

11. Building codes cover (please tick where applicable):

- Commercial
- Public buildings

12. What is the policy requirement level of building energy codes (mandatory, voluntary, mixed)?

Please provide details below.

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region questionnaire continued...

Performance-based requirements in building energy codes

13. Are there performance-based requirements in building energy codes (please tick where applicable):

- New buildings
- Existing buildings

14. Please provide details/values of the performance-based requirements in building energy codes for new buildings

15. Elements which are required to be taken into account for the calculation of the energy performance of the building (please tick which applies):

- Thermal characteristics of the building (shell and internal partitions, etc)
- Air-tightness
- Heating installation and hot water supply
- Air-conditioning installations
- Mechanical and natural ventilation
- Built-in lighting installation (mainly the non-residential sector)
- Design position and orientation of buildings
- Passive solar systems and solar protection
- Indoor and outdoor climatic conditions
- Thermal bridging

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region questionnaire continued...

Prescriptive requirements in building energy codes

16. Prescriptive requirements cover:

- Thermal insulation
- Air-tightness
- Ventilation
- Lighting efficiency
- Boiler/AC efficiency
- Renewables
- Thermal bridges
- Other (please specify)

17. Please provide details on the prescriptive requirements that apply, i.e. U-values for walls, floor, roof, windows, etc.

18. Do building energy codes contain requirements for regular inspection of heating and A/C systems?

19. With regards to district heating and other external heating systems, are the buildings equipped with control units?

If yes, is this a mandatory requirement?

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region questionnaire continued...

Part Three – Energy Performance Certificates (EPC)/Energy Labelling/Energy Passportization

20. Please outline the main legislative documents relating to EPC.

21. What type of building(s) do EPC cover in your country (new non-residential, new residential, existing residential, existing non-residential)?

22. EPC cover (please tick where applicable):

- Single family houses
- Apartment blocks

23. EPC cover (please tick where applicable):

- Commercial
- Public buildings

24. Policy requirement level of EPC (mandatory, voluntary, mixed)? Please provide details below.

25. Is there a national registry database for EPC in your country?

Part Four – Building Materials

26. Are there requirements to have building materials certified/rated?

27. Are there requirements to test building materials by certified test labs?

28. Please provide details on the sales of thermal insulation materials in kg per 1000 capita in 2011-2016.

29. Please provide details on the annual percentage share of buildings with new multiple-walled insulating units of glass in 2011-2016.

Mapping of existing energy efficiency standards and technologies in buildings in the UNECE region questionnaire continued...

Part Five – Requirements for enforcement and compliance

Penalties, incentives and other mechanisms for improving compliance

30. Does the country have specific policy packages and incentives that complement or motivate compliance with building codes? Please provide details

31. Penalties for non-compliance with energy provisions in codes include (please tick what applies):

- Fines and fees for non-compliance
- Refusal for occupancy or construction permit

32. Is there is a process set by regulations to monitor the energy efficiency performance?

33. Is monitoring of the energy efficiency performance generally adhered to?

Part Six – Energy Efficiency Technologies

34. Please provide information where applicable below:

- Sales of condensing boilers per 1000 dwellings in 2011-2016
- Sales of biomass boilers per 1000 dwellings (Wood chip and pellet) in 2011-2016
- Sales of pellet stoves per 1000 dwellings in 2011-2016
- Sales of heat pumps per 1000 dwellings in 2011-2016
- Annual installation of solar thermal systems per capita (2011-2016)
- Annual installation of photovoltaic systems per capita (2011-2016)

- centralized

- distributed

Countries summary profiles

- Legislative framework

- Building Code summary

(coverage, policy requirement, type, energy uses and functions covered, enforcement, building envelop, HVAC, energy performance values)

- Energy Performance Certificates

(coverage, policy requirements, end-users covered, existence of a national registry database)

- Requirements for enforcement and compliance

- Requirements for building materials in building codes

- Trends in final energy consumption by residential and non-residential buildings

Comparative analysis of the building codes for new and existing properties

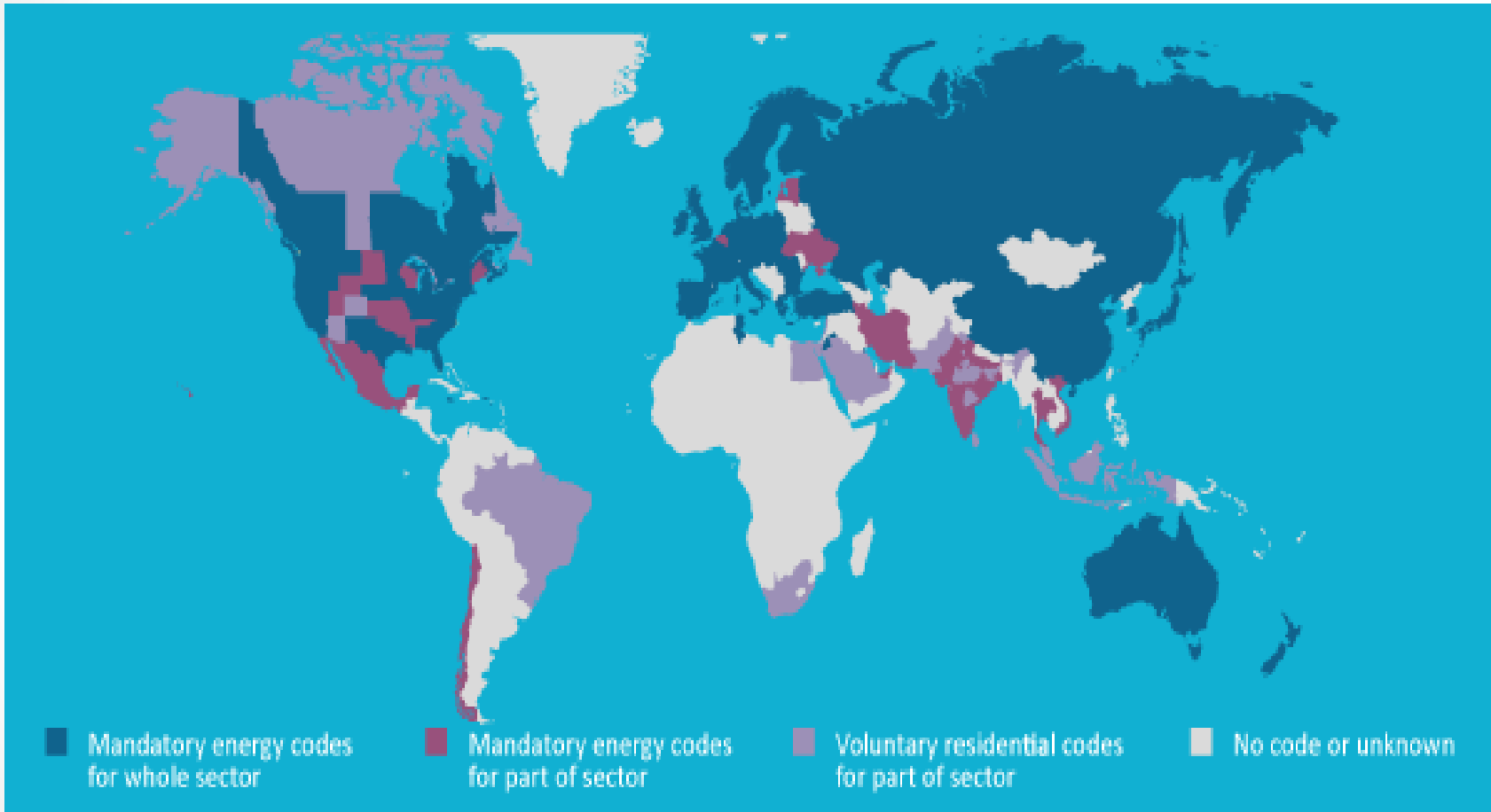
1. Structural comparison of building codes in the UNECE countries
2. Building code and EPC stringency and comprehensiveness
3. Technical requirements included in the building code by country
4. Performance-based requirements for new buildings
5. Building envelop insulation requirements
6. Requirements on Heating, Ventilation and Air-conditioning systems
7. Enforcement mechanisms, including incentive packages and penalties

Structural comparison of building codes in the UNECE countries example

Source: BPIE survey and MED-ENEC

Building code requirements		Performance Based Requirements		Prescriptive/element-based criteria in building codes						
	New Buildings	Renovations	New Buildings	Renovations	Thermal Insulation	Air permeability	Ventilation Requirements	Boiler /AC system efficiency	Lighting efficiency	Other requirements
Austria	Y	Y	Y	Y	Y	Y	Y	Y	N	Summer comfort requirements
Belgium-Walloon	Y	Y	Y	N	Y	N	Y	N	N	Overheating indicator
Belgium-Brussels	Y	Y	Y	N	Y	N	Y	N	N	Overheating indicator
Belgium-Flemish	Y	Y	Y	N	Y	N	Y	Y	N	Thermal bridges
Bulgaria	Y	Y	Y	Y	Y	Y	N	Y	N	
Switzerland	Y	Y	Y	Y	Y	N	N	Y	NRE	Thermal bridges, solar shading
Cyprus	Y	Y	Y	Y	Y	N	N	Y	N	Solar collector in new RE

Building Energy Code Stringency



Source: International Energy Agency, Tracking Clean Energy Progress 2016

Comparison of building energy codes coverage and stringency

	Residential		Commercial	
Country	Stringency	Coverage	Stringency	Coverage
Canada	Mixed	One Family; Multifamily	Mixed	Commercial and Public Buildings
France	Mandatory	One Family; Multifamily	Mandatory	Commercial and Public Buildings
Italy	Mandatory	One Family; Multifamily	Voluntary	Commercial and Public Buildings
Russia	Mandatory	One Family; Multifamily	Mandatory	Commercial Buildings

Analysis of the technical requirements included in the building code by country

Country	Thermal insulation	HVAC	Air tightness	Lighting efficiency	Design, Position and Orientation	RE	Technical installations
Canada	X	X	X	X	X	-	-
France	X	X	X	X	X	X	-
Spain	X	X	X	X	X	X	X
Russia	X	X	-	X	-	-	X
...							

Building envelop insulation requirements for selected countries

U-Values Table (W/m²K)

Source: Global Building Performance Network

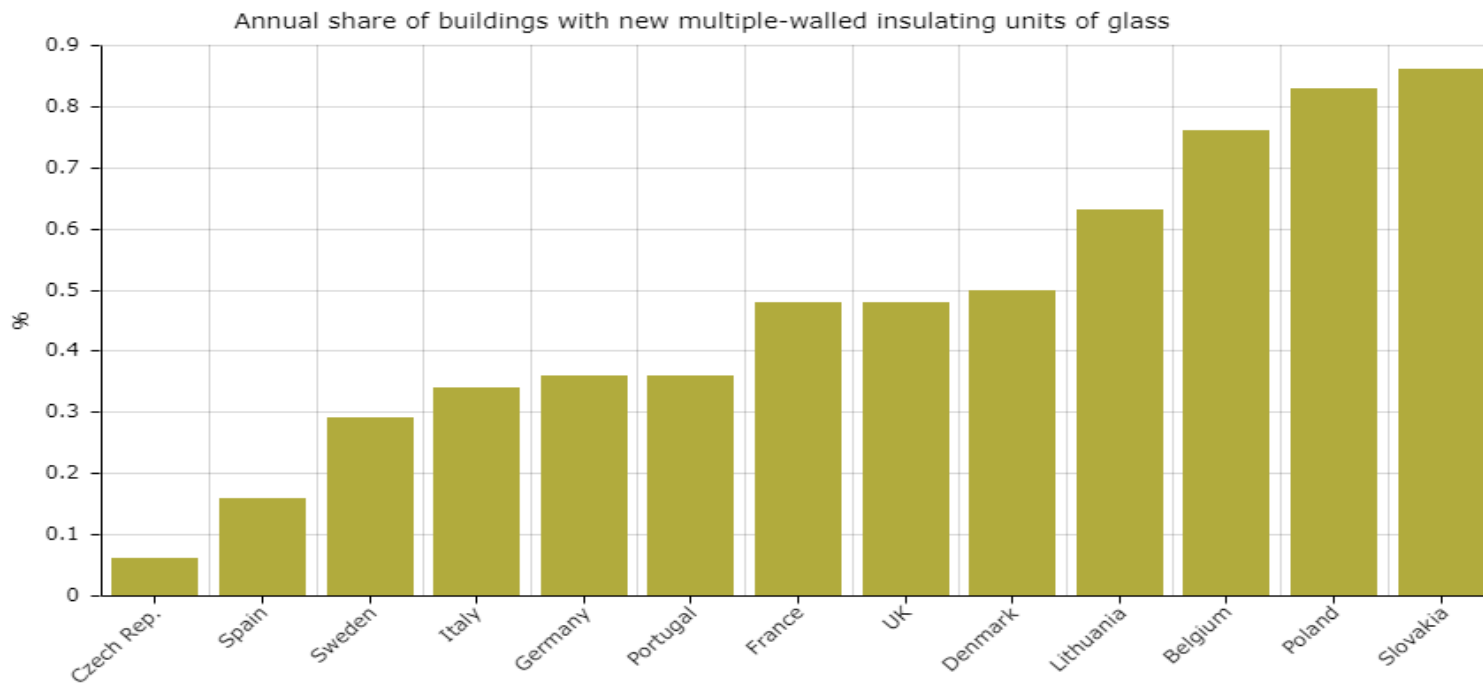
BEEC	U-value Floors	U-value Walls	U-value Roofs	U-value Windows
Austria	0.4	0.35	0.2	1.4
Denmark	0.2	0.3	0.2	1.4
England & Wales	0.25	0.3	0.2	2
Finland	0.09	0.17	0.09	1
Germany	0.28	0.28	0.2	1.3
Ireland	0.21	0.21	0.16	1.6
Lithuania	0.25	0.2	0.16	1.6
Spain	0.49	0.66	0.38	3.5
Sweden	0.15	0.18	0.13	1.3
The Netherlands	0.4	0.4	0.4	1.4

Final analysis template

Country	Building energy codes stringency and coverage	Technical requirements Energy uses and functions covered in the code	Stringency of technical requirements Building envelop, technical systems, RE systems	EPC Stringency and coverage, national register	Enforcement Mechanisms Incentives Fines Refusal of permission to construct	Building materials Certified/ Laboratory tested
Spain						
...						

Initial assessment of energy efficiency technologies

- Review of sales/installations of energy efficient technologies by country (building envelop components, heat pumps, solar thermal systems, condensing boilers, photovoltaic systems, etc.)
- Analysis of the status of the market deployment of high-priority, energy efficient building materials and technologies



Source: Zebra

Thank you for your attention!



Irina Davis
Sustainability Consultant
irinadvs1@yahoo.co.uk