



# **Current status of the elaboration of maps for climatic and seismic actions in the Balkan region – summary**

**Roberta Apostolska**

# Outline

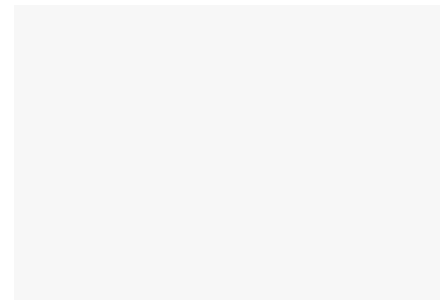
## ❑ Previous activities

- Workshop “Adoption of the Eurocodes in the Balkan region”
- Workshop “ Building capacities for elaboration of NDPs and NAs of the Eurocodes in the Balkan region”

## ❑ On-going activity

- Workshop “Elaboration of maps for climatic and seismic actions for structural design in the Balkan Region”

## ❑ State of the progress and views on the way ahead



2013



## ADOPTION OF THE **EUROCODES** IN THE **BALKAN** REGION

5-6 December 2013  
MILAN & JRC-ISPR, ITALY

Organized by  
**EUROPEAN COMMISSION**  
DG Joint Research Centre

Supported by  
EUROPEAN COMMISSION  
JRC **Enlargement and Integration Action**



2014



## BUILDING CAPACITIES FOR ELABORATION OF **NDPs** AND **NAs** OF THE **EUROCODES** IN THE **BALKAN** REGION

4-5 November 2014  
Skopje, the former Yugoslav Republic of Macedonia

Organized by  
**EUROPEAN COMMISSION** - DG Joint Research Centre

Hosted by  
Standardization Institute of the Republic of Macedonia

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JRC **Enlargement and Integration Action**



2015



## ELABORATION OF **MAPS** FOR **CLIMATIC** AND **SEISMIC** ACTIONS FOR STRUCTURAL DESIGN IN THE **BALKAN** REGION

27 - 28 October 2015  
Zagreb, Croatia

Organised by  
**EUROPEAN COMMISSION** - DG Joint Research Centre

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JRC **Enlargement and Integration Action**  
**CEN/TC250**  
**UNIVERSITY OF ZAGREB**, Croatia  
**CROATIAN STANDARDS INSTITUTE**



## ELABORATION OF **MAPS** FOR **CLIMATIC** AND **SEISMIC** ACTIONS FOR STRUCTURAL DESIGN IN THE **BALKAN** REGION

27-28 October 2015, Zagreb

# Outline

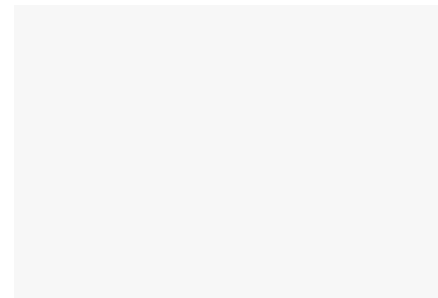
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## ❑ State of the progress and views on the way ahead





## About the First workshop .....

The workshop is focused on progress and specific needs for adoption and implementation of the Eurocodes and related EN standards in the Balkan region.

### OBJECTIVES:

- ❑ Assess the level of commitment and the progress of adopting the Eurocodes;
- ❑ Assess the level of harmonization of national policy/legislation with EU regulatory frameworks;
- ❑ Assess the progress of definition of Nationally Determined Parameters (NDPs)
- ❑ Define the strategies for training and elaboration of guidelines and training materials;
- ❑ Facilitate exchange of views, knowledge and information between EU experts and representatives of the non-EU countries in the Balkan region;
- ❑ Facilitate regional cooperation in preparing National Annexes and harmonization of NDPs

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27-28 October 2015, Zagreb

# NDPs, NATIONAL ANNEXES & HARMONIZATION – Translation of Eurocodes

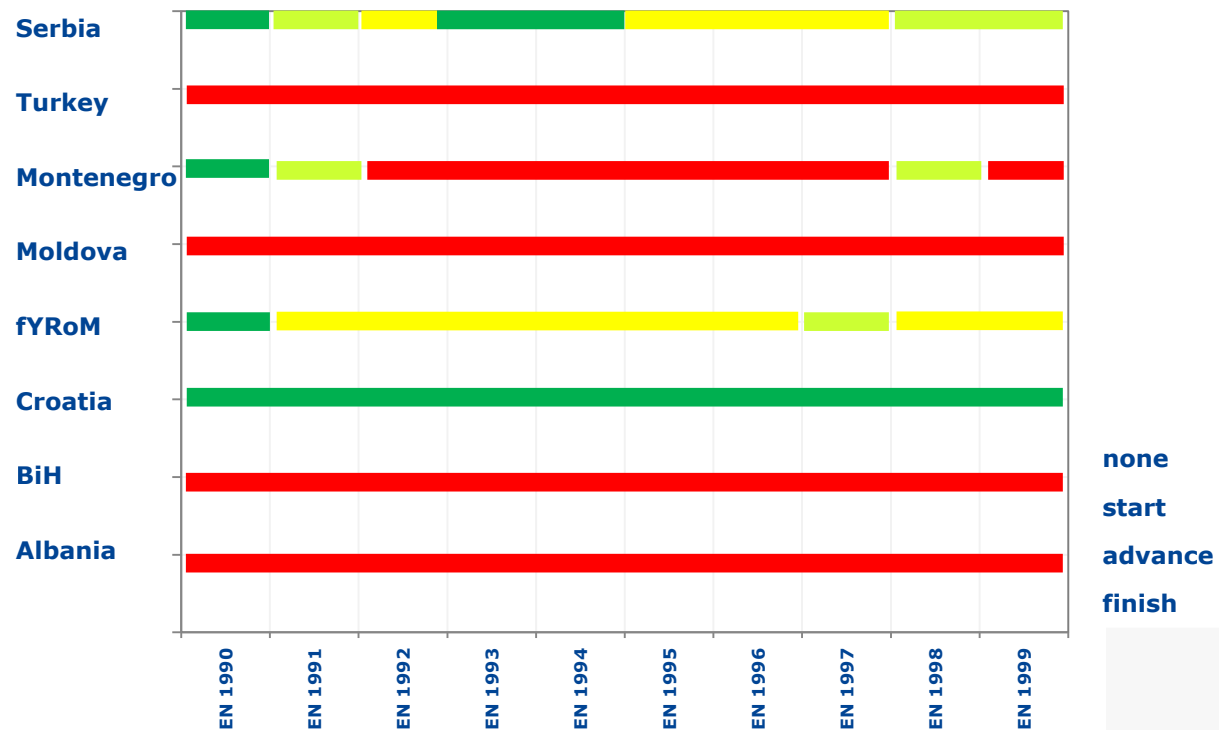
*(data refer to Dec. 2013)*

Progress of translation of the Eurocodes										
	EN1990	EN1991	EN1992	EN1993	EN1994	EN1995	EN1996	EN1997	EN1998	EN1999
AL	✓	✓	✓	✓	none	none	none	none	✓	none
BA	none	none	none	none	none	none	none	none	start	none
MK <sup>1</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ME	✓	advance	none	none	none	none	none	none	advance	none
RS	✓	✓	advance	✓	✓	✓	✓	advance	advance	✓
TR	advance	advance	advance	advance	advance	none	none	none	advance	none

Progress of definition of NDPs										
	EN1990	EN1991	EN1992	EN1993	EN1994	EN1995	EN1996	EN1997	EN1998	EN1999
AL	none	none	none	none	none	none	none	none	start	none
BA	none	none	none	none	none	none	none	none	none	none
MK <sup>1</sup>	✓	start	start	start	start	start	advance	start	start	start
MD	none	none	none	none	none	none	none	none	none	none
ME	✓	advance	none	none	none	none	none	none	advance	none
RS	✓	advance	start	✓	✓	start	start	start	advance	advance
TR	none	none	none	none	none	none	none	none	none	none

# NDPs, NATIONAL ANNEXES & HARMONIZATION – Progress of definition of NDPs

*(data refer to Dec. 2013)*



# Outline

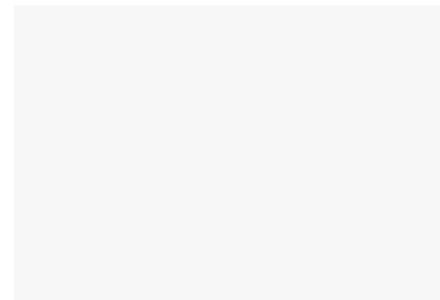
## □ Previous activities

- Workshop “Adoption of the Eurocodes in the Balkan region”
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## □ On-going activity

- Workshop “Elaboration of maps for climatic and seismic actions for structural design in the Balkan Region”

## □ State of the progress and views on the way ahead







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Centre

## About the Second workshop.....

The workshop is aimed to further adoption and implementation of the Eurocodes in the non-EU countries in the Balkan region.

### OBJECTIVES:

- ❑ Assess recent progress, difficulties and needs for the definition of the NDPs and NAs since the first workshop held in Milan & Ispra on 5-6 December 2013
- ❑ Boost regional collaboration for cross-border convergence of NDPs, in particular for the harmonization of seismic hazard maps
- ❑ Facilitate transfer of knowledge from EU MS experts to representatives of non-EU countries in the Balkan region
- ❑ Give an overview of JRC support to the implementation of the Eurocodes and raise awareness of the existing Eurocodes web site and benefits emanating from its use
- ❑ Improve information flow between National Standardization Bodies and European Commission
- ❑ Increase awareness of existing Enlargement funds and instruments which might support further progress in adoption and implementation of the Eurocodes

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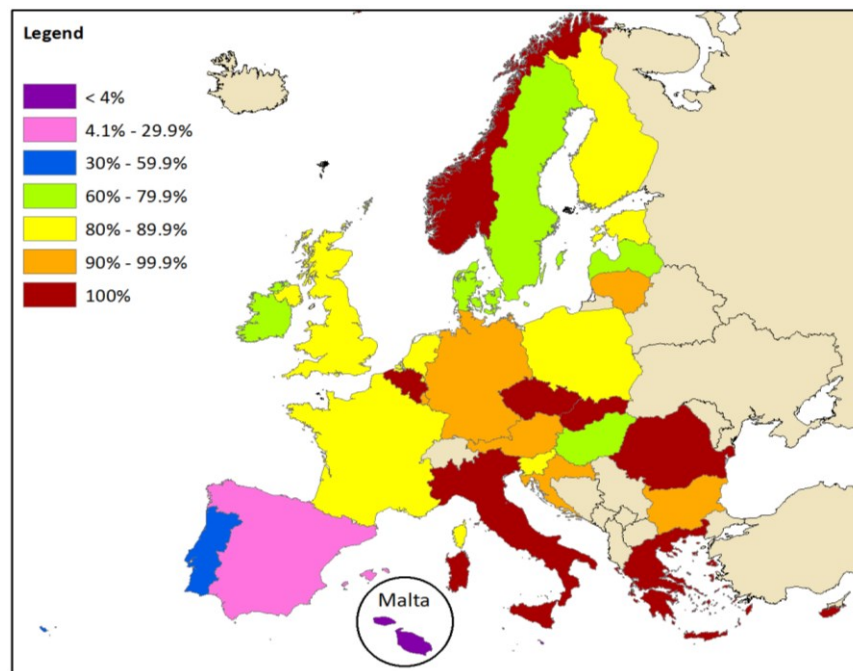
European  
Commission

# EN parts with defined NAs (data refer to Nov. 2014)

**Albania 37**  
**Serbia 34**

**The former Yugoslav Republic of  
Macedonia 28 on public enquiry,  
Aug-Sep 2015**

	EN parts	AL	BA	MK	MD	ME	RS	TR
EN 1990	EN 1990							
	EN 1990 / A1							
	EN 1991-1-1							
	EN 1991-1-2							
	EN 1991-1-3							
	EN 1991-1-4							
EN 1991	EN 1991-1-5							
	EN 1991-1-6							
	EN 1991-1-7							
	EN 1991-2							
	EN 1991-3							
	EN 1991-4							
	EN 1992-1-1							
	EN 1992-1-2							
EN 1992	EN 1992-2							
	EN 1992-3							
	EN 1993-1-1							
	EN 1993-1-2							
	EN 1993-1-3							
	EN 1993-1-4							
	EN 1993-1-5							
	EN 1993-1-6							
	EN 1993-1-7							
	EN 1993-1-8							
	EN 1993-1-9							
	EN 1993-1-10							
EN 1993	EN 1993-1-11							
	EN 1993-1-12							
	EN 1993-2							
	EN 1993-3-1							
	EN 1993-3-2							
	EN 1993-4-1							
	EN 1993-4-2							
	EN 1993-4-3							
	EN 1993-5							
	EN 1993-6							
EN 1994	EN 1994-1-1							
	EN 1994-1-2							
	EN 1994-2							
EN 1995	EN 1995-1-1							
	EN 1995-1-2							
	EN 1995-2							
EN 1996	EN 1996-1-1							
	EN 1996-1-2							
	EN 1996-2							
	EN 1996-3							
EN 1997	EN 1997-1							
	EN 1997-2							
	EN 1998-1							
EN 1998	EN 1998-2							
	EN 1998-3							
	EN 1998-4							
	EN 1998-5							
	EN 1998-6							
	EN 1999-1-1							
EN 1999	EN 1999-1-2							
	EN 1999-1-3							
	EN 1999-1-4							
	EN 1999-1-5							

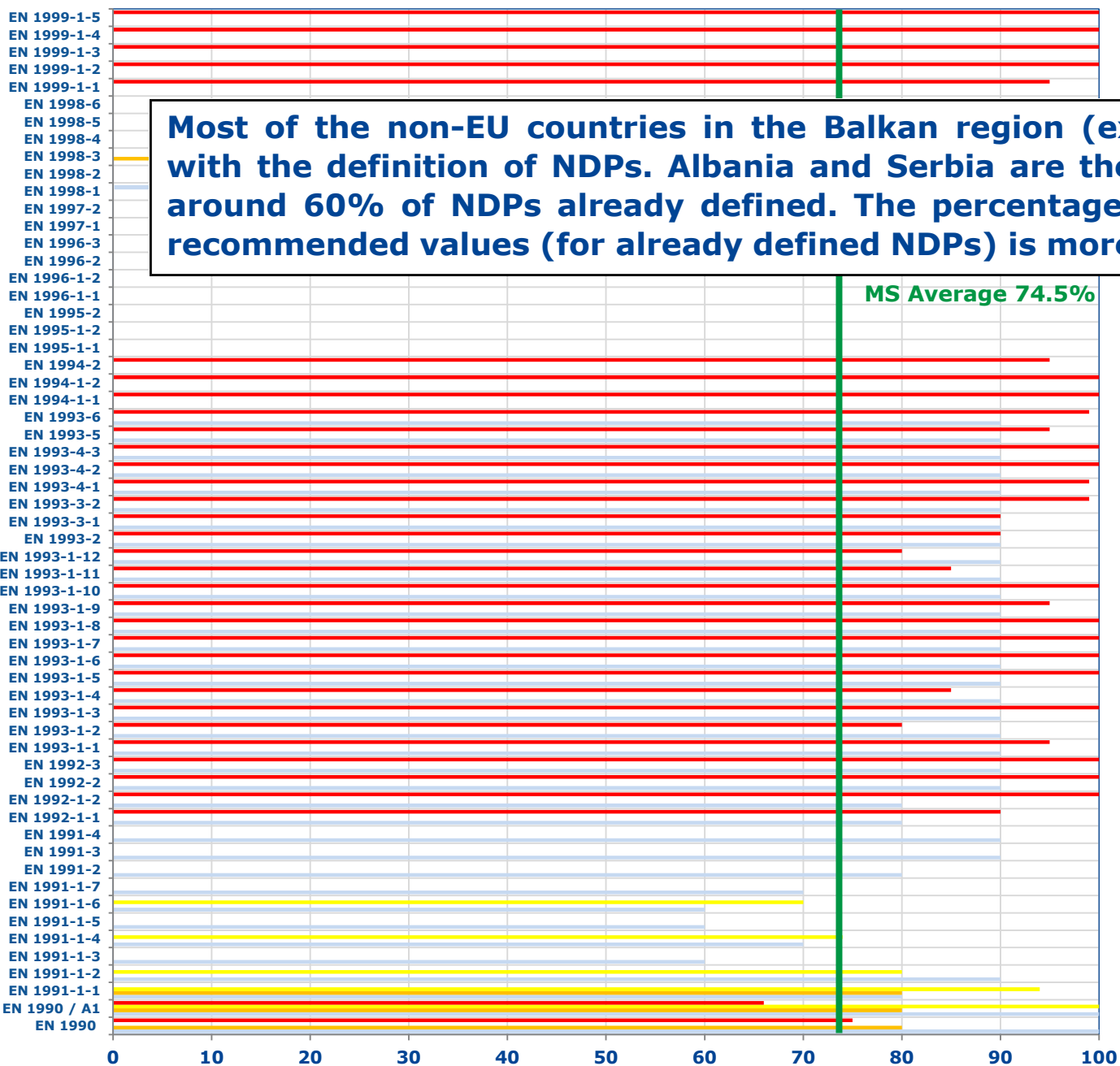


90% of the countries published NAs to more than 70% of all Eurocodes Parts  
(ref: preliminary results, report by DG JRC and DG GROW to be published in 2015)

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# Acceptance of recommended values [%] (data refer to Nov. 2014)



Most of the non-EU countries in the Balkan region (except Turkey) started with the definition of NDPs. Albania and Serbia are the most advanced with around 60% of NDPs already defined. The percentage of acceptance of the recommended values (for already defined NDPs) is more than 80%.

MS Average 74.5%

Average 85.8%

Average 80.0%

Average 83.6%

Average 94.5%

- AL
- MK
- ME
- SR

# Outline

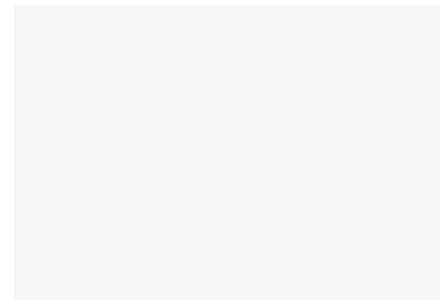
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## About the workshop

The workshop is aimed at further adoption and implementation of the Eurocodes in the non-EU countries in the Balkan region.

### OBJECTIVES:

- ❑ To strengthen the capacities of the stakeholders from non-EU countries in the Balkan region for the elaboration of maps for climatic and seismic actions for structural design with the Eurocodes
- ❑ To facilitate the regional cooperation and networking among non-EU countries in the Balkan region towards successful implementation of the Eurocodes

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## About the workshop

The workshop is aimed at further adoption and implementation of the Eurocodes in the non-EU countries in the Balkan region.

### PROGRAMME:

- Current status of the elaboration of maps for climatic and seismic actions in the Balkan region**
- Experience in the elaboration of maps for seismic actions**
- Experience in the elaboration of maps for climatic actions**
- New technical rules for assessment and retrofitting of existing structures**
- JRC support to implementation of the Eurocodes**

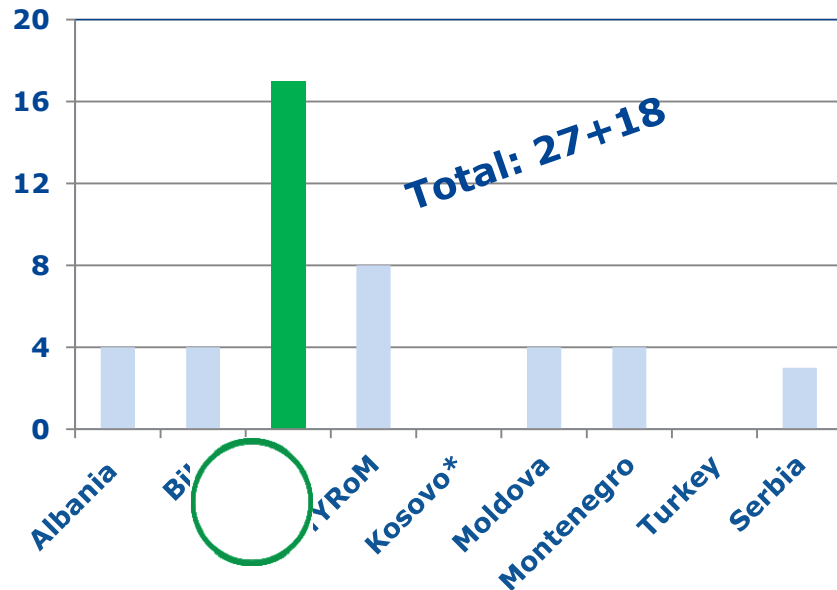
ELABORATION OF **MAPS** FOR **CLIMATIC** AND **SEISMIC** ACTIONS  
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# About the workshop

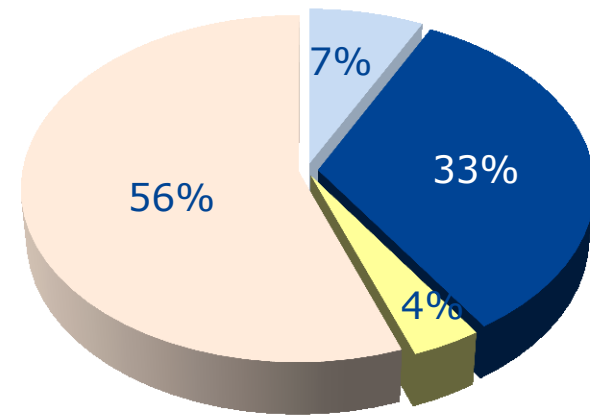
## Number and groups of participants from non-EU countries

Number of participants per country



\*This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

TG\_1 TG\_2 TG\_3 TG\_4



TG\_1: National Authorities and policy decision makers

TG\_2: National Standardization Bodies

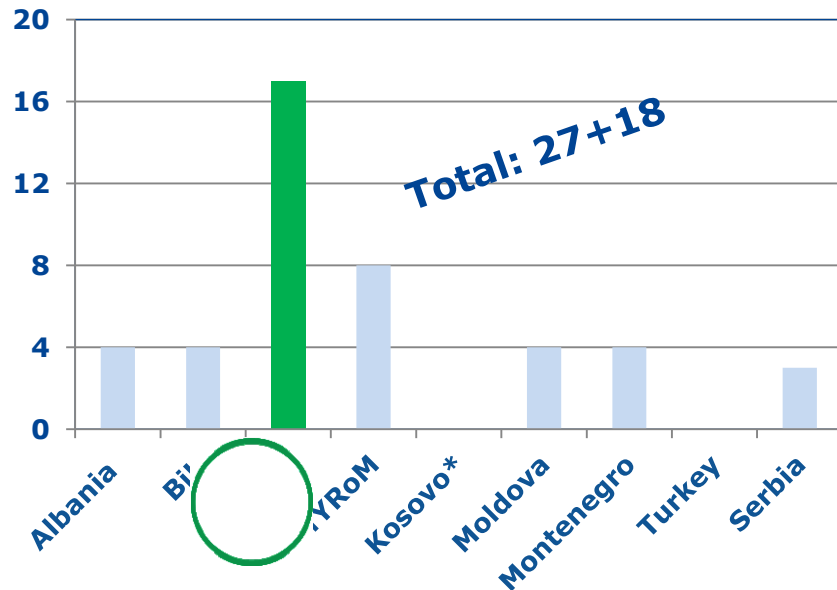
TG\_3: Professional users of standards

TG\_4: Institutions who will stream the determination of NDPs and the application and training on the Eurocodes

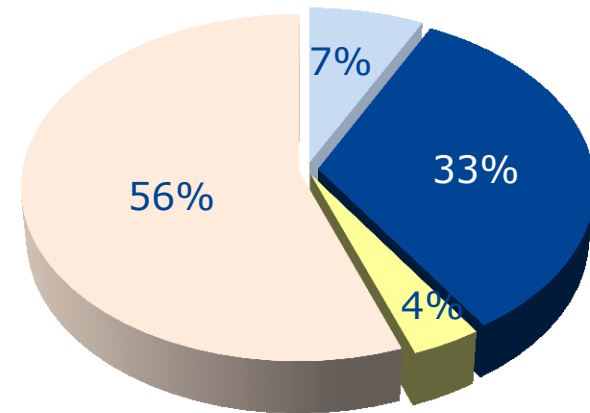
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TG\_1: National Authorities and policy decision makers

TG\_2: National Standardization Bodies

TG\_3: Professional users of standards

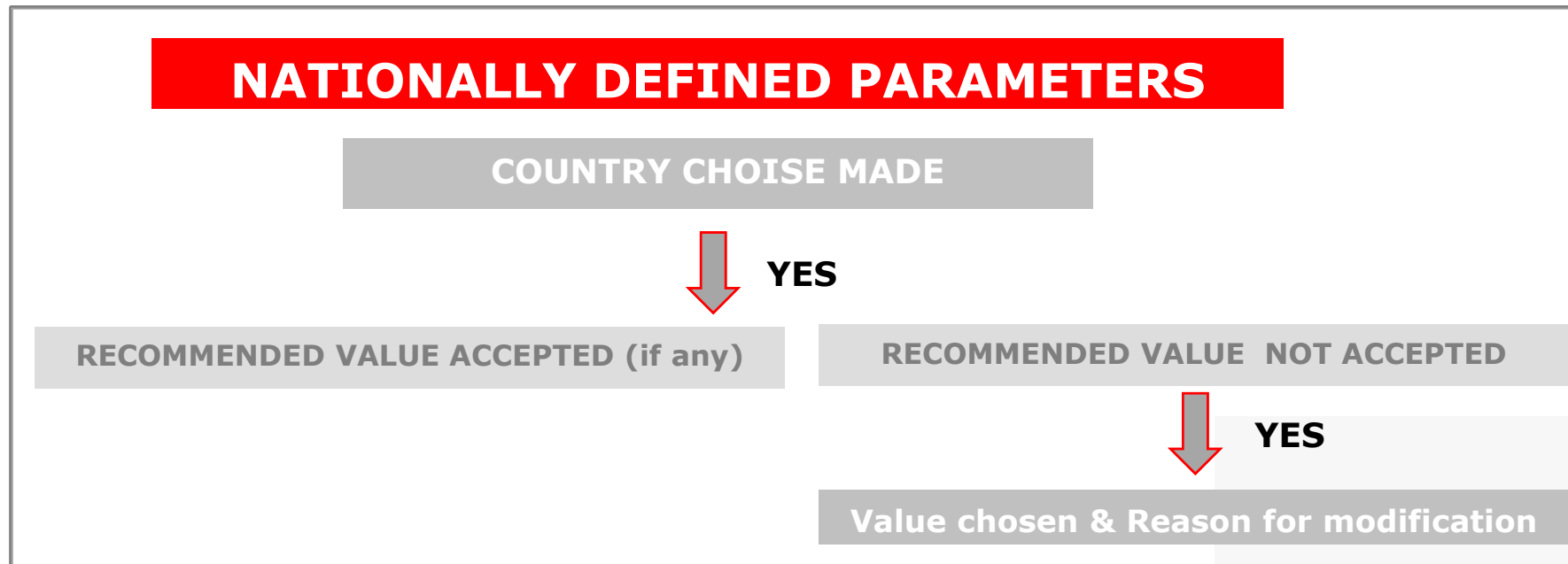
TG\_4: Institutions who will stream the determination of NDPs and the application and training on the Eurocodes



# Questionnaire

## OBJECTIVE:

To assess current status in the elaboration of maps for climatic and seismic actions for structural design in the Balkan region countries since last workshop (November, 2014)



## NDPs database: NDPs related to the climatic and seismic map (source: Dimova et al., October 2015, Zagreb)

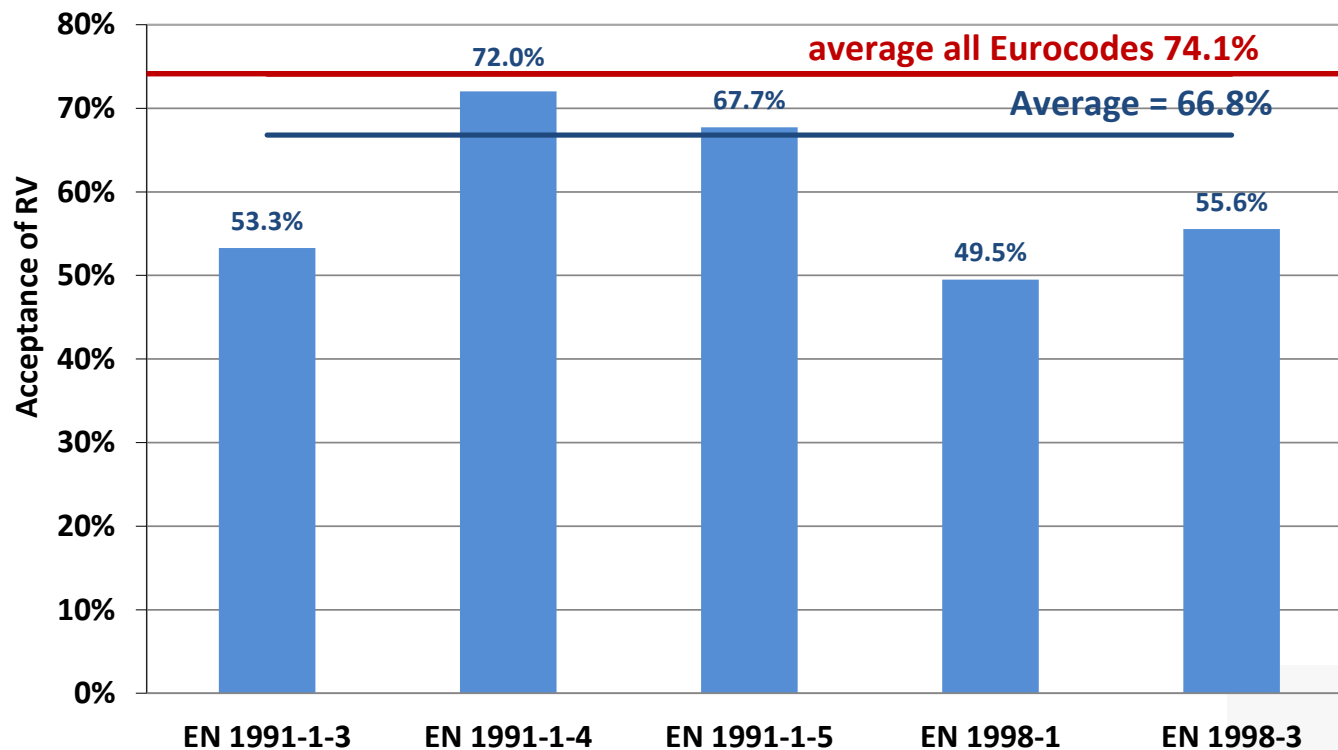
Eurocodes Part	Nb NDPs
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - Snow loads	33
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - Wind actions	68
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - Thermal actions	29
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, seismic actions and rules for buildings	11
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	1

**Total = 141**

# NDPs database: acceptance of recommended values (RV)

Analysis based on 65.2 % of data available by October, 14<sup>th</sup>, 2015

**NDPs with RV**



(source: Dimova et al., October 2015, Zagreb)

## Eurocodes Part

Accepted RV  
[%]

EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - **Snow loads**

80

EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - **Wind actions**

80

EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - **Thermal actions**

80

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, **seismic actions** and rules for buildings

80

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings

80

Eurocodes Part	Accepted RV [%]	Elaborated Maps
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	80	YES
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	80	YES
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	80	YES
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	80	YES
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	80	

**Progress since November 2015 - 55 of 58 EN parts already translated!**

Eurocodes Part	Accepted RV [%]	Elaborated Maps	NAs published
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	80	YES	NO
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	80	YES	NO
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	80	YES	NO
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	80	YES	NO
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	80		

BiH

# Progress of translation

## Status, December 2013

### 2.2 Please assess the progress of translation of each Eurocode/priorities



**Status, October 2015**  
**Translated 21 of 58 Eurocodes (36%)**

# Progress of elaboration of NAs

(relevant to the workshop objectives)

Status, December 2013

## 2.4 Please assess the progress of definition of the NDPs of each Eurocode





# Progress of elaboration of NAs

(relevant to the workshops' objectives)

Status, December 2013

2.4 Please assess the progress of definition of the NDPs of each Eurocode



Status, October 2015

PR/BAS EN 1991-1-3/NA:2015 (stage 10.99)

**BAS/TC 58/WG3**

PR/BAS EN 1991-1-4/NA:2015 (stage 10.99)

PR/BAS EN 1991-1-5/NA:2015 (stage 10.99)

**Insufficient number of stations with digital data!!!**

BiH

# Progress of elaboration of NAs (relevant to the workshops' objectives)

Status, December 2013

2.4 Please assess the progress of definition of the NDPs of each Eurocode



Status, October 2015

BAS/TC 58/WG4

PR/BAS EN 1998/NA:xxxx

# Progress of elaboration of NAs

(relevant to the workshops' objectives)

Eurocodes Part	Elaborated Maps	NAs published
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	NO*	YES
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	NO*	YES
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	NO*	YES
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	NO*	YES
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	N/A	YES (2012)

\* **The climatic and seismic hazard maps should be elaborate until end of 2015.**

# Elaboration of seismic hazard map

Source: Milutinovic & Salic, Country Report, Zagreb, 2015)

## Компаративни анализи и резултати

### MSK Representation

#	Град	Регионална студија			Модел			Официјални карти
		GSHAP	BSHAP	SHARE	M1	M2	M3	
1.	Битола	VIII	VIII	IX	IX	IX	VIII	VIII
2.	Велес	VIII	VIII	IX	VIII	VIII	VII-VIII	VIII
3.	Гевгелија	IX	VIII	IX	IX	IX	VIII	IX
4.	Дебар	IX	IX	IX	IX	IX	IX	IX
5.	Кавадарци	VIII	VIII	IX	VII	VIII	VII	VIII
6.	Кичево	VIII	VIII-IX	IX	IX	IX	VIII	VIII
7.	Крива Паланка	VIII	VIII	VIII	VII-VIII	VIII	VII	VIII
8.	Куманово	VIII	IX	IX	IX	VIII	VII-VIII	VIII
9.	Охрид	IX	IX	IX	IX	IX	VIII-IX	VIII
10.	Пехчево	IX	IX	IX	IX	IX	VIII	IX
11.	Прилеп	VIII	VII	IX	VII-VIII	VIII	VII	VII
12.	Скопје	VIII	IX	IX	IX	VIII-IX	VIII	IX
13.	Струмица	IX	IX	IX	IX	IX	VIII	VIII
14.	Тетово	VIII	VIII	IX	IX	VIII-IX	VIII	VIII
15.	Штип	VIII	VIII	IX	VIII	VIII	VII-VIII	VIII

Bitola  
Kicevo  
Kumanovo  
Ohrid  
Prilep  
Strumica  
Tetovo

■ Underestimated hazard  
■ Overestimated hazard

➔ **Potentially underestimated seismic hazard?**

MSK	PGA (g)
I	
II	
III	
IV	
V	0.012 - 0.025
VI	0.025 - 0.050
VII	0.050 - 0.100
VIII	0.100 - 0.200
IX	0.200 - 0.400
X	0.400 - 0.800
XI	0.800 - 1.600
XII	> 1.600

## Kosovo\*



- Overview
- Albania
- Bosnia and Herzegovina
- the former Yugoslav Republic of Macedonia
- Kosovo\***
- Montenegro
- Serbia
- Turkey
- Strategy and Reports

- + Conditions for membership
- Steps towards joining
- From 6 to 28 members
- + Policy Highlights
- + Instrument for Pre-accession assistance (IPA)
- + Funding and technical assistance
- Glossary

## Kosovo

### Membership status

Potential candidate

### Background

In 2008 the EU repeated its willingness to assist the economic and political development of Kosovo through a clear European perspective.

The EU helps contribute to stability in Kosovo through the EULEX rule of law mission in Kosovo and Special representative in Kosovo .

[More information on the country's relations with the EU](#)

### Interactive timeline

<p><b>25-07-2014</b></p> <p>The EU and Kosovo chief negotiators initialled the Stabilisation and Association Agreement between the EU and Kosovo in Brussels.</p>	<p><b>19-10-2012</b></p> <p>High-level dialogue between Kosovo and Serbia as facilitated by HRVP Ashton begins.</p>	<p><b>10-10-2012</b></p> <p>Commission issues its feasibility study for a Stabilisation and Association Agreement between the EU and Kosovo</p>	<p><b>10-0</b></p> <p>Kosovo d end of s indepe</p>
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### Key documents

- [2014 Progress report for Kosovo](#) 
- [2013 Progress report for Kosovo](#)
- [Joint Report on Kosovo\\*'s progress April 2013](#) 
- [Recommendation on a Stabilisation and Association Agreement between the EU and Kosovo\\*](#) 
- [Proposal on the general principles for the participation of Kosovo\\* in EU programmes - April 2013](#) 

[More...](#)

### Key links

- ["Building a common vision of its European future", article by Commissioner Füle](#)
- [EU Office in Kosovo\\*](#)

[More...](#)

### Latest photos

[http://ec.europa.eu/enlargement/countries/detailed-country-information/kosovo/index\\_en.htm](http://ec.europa.eu/enlargement/countries/detailed-country-information/kosovo/index_en.htm)

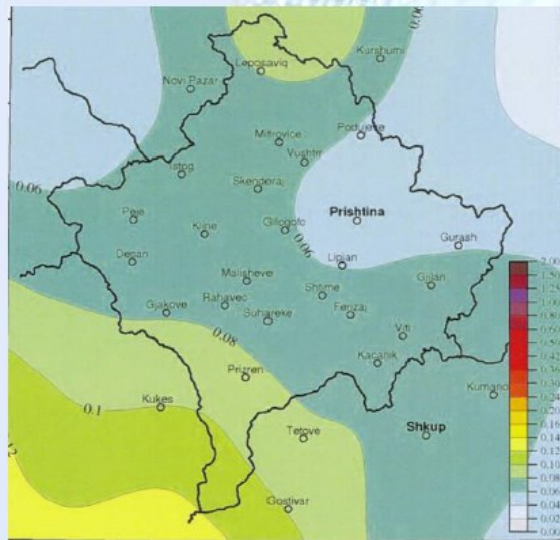
# Progress of maps for seismic action

(source: Kosovo Country Report, 2015 – Kosovo Geological Survey)



Figure 1 seismic risk map of Kosovo for the period PGS repeater rock kondida 95 years ( $V_{s30} = 800$  m / sec)

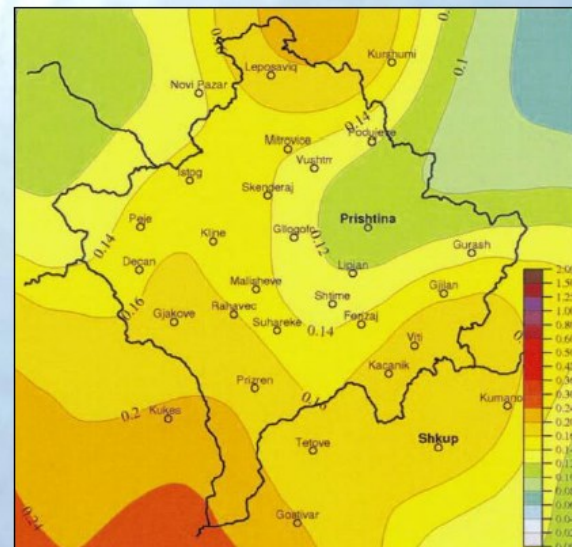
Fig 1.



22/10/2015

Figure 2 seismic risk map of Kosovo for the period PGS repeater rock kondida 475 years ( $V_{s30} = 800$  m / sec)

Fig 2.





Moldova



## DEVELOPING NATIONAL ANNEXES

(source: Moldova Country Report, 2015)



TECHNICAL UNIVERSITY OF  
CIVIL ENGINEERING BUCHAREST

National Annexes:  
Eurocode EN 1990;  
Eurocode EN 1991;  
Eurocode EN 1992.

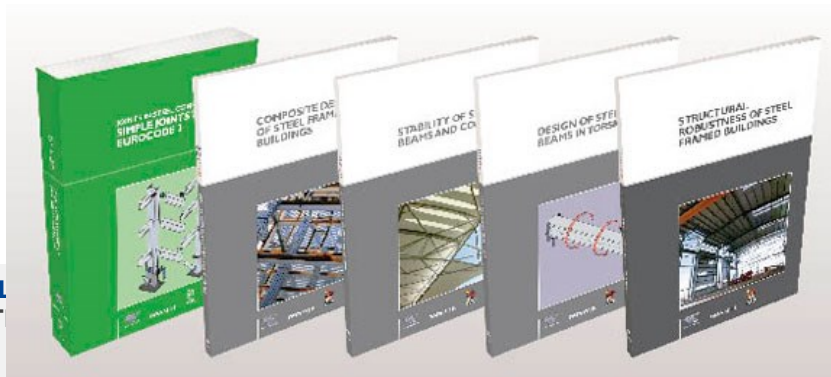


**CZECH REPUBLIC**  
DEVELOPMENT COOPERATION

National Annexes:  
Eurocode EN 1993;  
Eurocode EN 1994;  
Eurocode EN 1995;  
Eurocode EN 1996;  
Eurocode EN 1997;  
Eurocode EN 1998;  
Eurocode EN 1999.



CZECH OFFICE FOR STANDARDS, METROLOGY AND TESTING



ELABORATION OF MAPS FOR CI  
FOR STRUCTURAL DESIGN IN T

27-28 October 2015, Zagreb

Moldova



# DEVELOPING NATIONAL ANNEXES

(source: Moldova Country Report, 2015)



TECHNICAL UNIVERSITY OF  
CIVIL ENGINEERING BUCHAREST

National Annexes:  
Eurocode EN 1990;  
Eurocode EN 1991;  
Eurocode EN 1992.

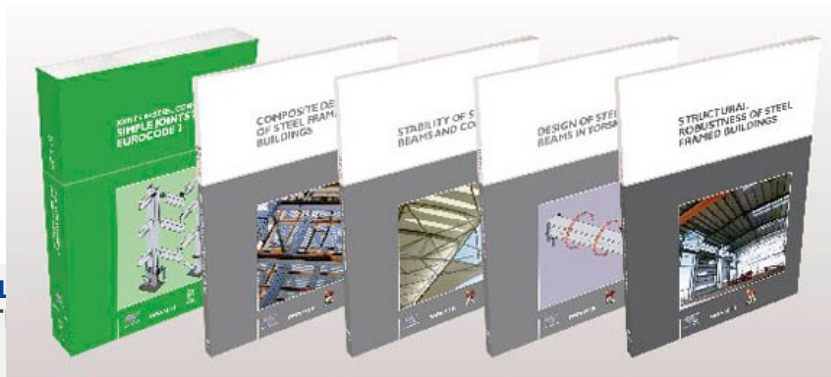


**CZECH REPUBLIC**  
DEVELOPMENT COOPERATION

National Annexes:  
Eurocode EN 1993;  
Eurocode EN 1994;  
Eurocode EN 1995;  
Eurocode EN 1996;  
Eurocode EN 1997;  
Eurocode EN 1998;  
Eurocode EN 1999.



CZECH OFFICE FOR STANDARDS, METROLOGY AND TESTING



ELABORATION OF MAPS FOR CI  
FOR STRUCTURAL DESIGN IN T

27-28 October 2015, Zagreb



## Eurocodes Part

Accepted RV  
[%]

EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - **Snow loads**

27

EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - **Wind actions**

71

EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - **Thermal actions**

93

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, **seismic actions** and rules for buildings

73

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings

## Eurocodes Part

Accepted RV  
[%]

Elaborated Maps

EN 1991: ACTIONS ON  
STRUCTURES; Part 1-3: General  
Actions - **Snow loads**

27

NO

EN 1991: ACTIONS ON  
STRUCTURES; Part 1-4: General  
Actions - **Wind actions**

71

NO

EN 1991: ACTIONS ON  
STRUCTURES; Part 1-5: General  
Actions - **Thermal actions**

93

NO

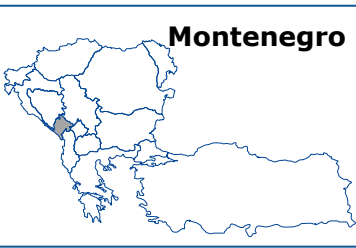
EN 1998: DESIGN OF STRUCTURES  
FOR EARTHQUAKE RESISTANCE, Part  
1: General rules, **seismic actions**  
and rules for buildings

73

YES

EN 1998: DESIGN OF STRUCTURES  
FOR EARTHQUAKE RESISTANCE, Part  
3: Assessment and retrofitting of  
buildings

Eurocodes Part	Accepted RV [%]	Elaborated Maps	NAs published
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	27	NO	NO
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	71	NO	NO
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	93	NO	NO
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	73	YES	NO
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings			



Eurocodes Part	Current status of elaboration of maps		
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	This Part is currently in working draft form and it is not yet approved by TC 002.		
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>			
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>			
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings			
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings			



Eurocodes Part	Current status of elaboration of maps		
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	This Part is currently in working draft form and it is not yet approved by TC 002.		
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	This Part is currently in working draft form and it is not yet approved by TC 002.		
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>			
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings			
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings			

**Eurocodes Part**

**Current status of elaboration of maps**

EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - **Snow loads**

This Part is currently in working draft form and it is not yet approved by TC 002.

EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - **Wind actions**

This Part is currently in working draft form and it is not yet approved by TC 002.

EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - **Thermal actions**

This Part is currently in working draft form and it is not yet approved by TC 002.

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, **seismic actions** and rules for buildings

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings

# EN 1998: Design of structures for earthquake resistance - Part 1 General rules, seismic actions and rules for buildings

Section & clause	Description
<a href="#">2.1 (1 NOTE 1)</a>	Reference return period $T_{NCR}$ of seismic action for no-collapse requirement (or, equivalently, reference probability of exceedance in 50 years, $P_{NCR}$ )
<a href="#">2.1 (1 NOTE 3)</a>	Reference return period $T_{DLR}$ of seismic action for the damage limitation requirement. (or, equivalently, reference probability of exceedance in 10 years, $P_{DLR}$ )
<a href="#">3.1.1 (4)</a>	Conditions under which ground investigations additional to those necessary for design for non-seismic actions may be omitted and default ground classification may be used
<a href="#">3.1.2 (1)</a>	Ground classification scheme accounting for deep geology, including values of parameters $S$ , $T_B$ , $T_C$ and $T_D$ defining horizontal and vertical elastic response spectra in accordance with 3.2.2.2 and 3.2.2.3.
<a href="#">3.2.1 (2)</a>	Seismic zone maps and reference ground accelerations therein
<a href="#">3.2.1 (4)</a>	Governing parameter (identification and value) for threshold of low seismicity
<a href="#">3.2.1 (5)</a>	Governing parameter (identification and value) for threshold of very low seismicity
<a href="#">3.2.2.1 (4 NOTE 1)</a>	The selection of the shapes of the elastic response spectra
<a href="#">3.2.2.2 (2)</a>	Parameters $S$ , $T_B$ , $T_C$ and $T_D$ defining shape of horizontal elastic response spectra
<a href="#">3.2.2.3 (1)</a>	Parameters $a_{vg}$ , $T_B$ , $T_C$ and $T_D$ defining shape of vertical elastic response spectra
<a href="#">3.2.2.5 (4)</a>	Lower bound factor $\beta$ on design spectral values

# EN 1998: Design of structures for earthquake resistance - Part 1 General rules, seismic actions and rules for buildings

Section & clause	Description	RV accepted
<a href="#">2.1 (1 NOTE 1)</a>	Reference return period $T_{NCR}$ of seismic action for no-collapse requirement (or, equivalently, reference probability of exceedance in 50 years, $P_{NCR}$ )	YES
<a href="#">2.1 (1 NOTE 3)</a>	Reference return period $T_{DLR}$ of seismic action for the damage limitation requirement. (or, equivalently, reference probability of exceedance in 10 years, $P_{DLR}$ )	YES
<a href="#">3.1.1 (4)</a>	Conditions under which ground investigations additional to those necessary for design for non-seismic actions may be omitted and default ground classification may be used	
<a href="#">3.1.2 (1)</a>	Ground classification scheme accounting for deep geology, including values of parameters $S$ , $T_B$ , $T_C$ and $T_D$ defining horizontal and vertical elastic response spectra in accordance with 3.2.2.2 and 3.2.2.3.	
<a href="#">3.2.1 (2)</a>	Seismic zone maps and reference ground accelerations therein	
<a href="#">3.2.1 (4)</a>	Governing parameter (identification and value) for threshold of low seismicity	
<a href="#">3.2.1 (5)</a>	Governing parameter (identification and value) for threshold of very low seismicity	
<a href="#">3.2.2.1 (4 NOTE 1)</a>	The selection of the shapes of the elastic response spectra	
<a href="#">3.2.2.2 (2)</a>	Parameters $S$ , $T_B$ , $T_C$ and $T_D$ defining shape of horizontal elastic response spectra	YES
<a href="#">3.2.2.3 (1)</a>	Parameters $a_{vg}$ , $T_B$ , $T_C$ and $T_D$ defining shape of vertical elastic response spectra	YES
<a href="#">3.2.2.5 (4)</a>	Lower bound factor $\beta$ on design spectral values	YES



## EN 1998: Design of structures for earthquake resistance - Part 1 General rules, seismic actions and rules for buildings

Section & clause	Description	Reason for modification
3.1.1 (4)	(4) Conditions under which ground investigations additional to those necessary for design for non-seismic actions may be omitted and default ground classification may be used	<p>Additional geotechnical investigations include the determination of the seismic amplification ground properties, i.e. application of modern technologies and methods for the determination of maximum horizontal ground acceleration at the level of building foundations.</p> <p>Additional geotechnical investigations are binding for structures of importance factor III and IV in seismic zones III - IV (Figure C.3 in Appendix C: Map of seismic zones) in all types of ground, then for importance factor II in seismic zone IV in ground types S1 and S2 (Section 3.1.2 (4)), as well as in the case when the owner / investor of the facility requires additional testing ground.</p> <p>The additional geotechnical research is not binding in the following cases:</p> <ul style="list-style-type: none"> <li>a) for the structures of importance class I in seismic zones I - IV for all types of ground,</li> <li>b) for the structures of importance class II in seismic zones I - III, for all types of ground, as well as in seismic zone IV for ground types A-D,</li> <li>c) for the structures of importance class III and IV in seismic zones I - II, for all types of ground.</li> </ul>
3.1.2 (1)	(1) Ground classification scheme accounting for deep geology, including values of parameters $S$ , $T_B$ , $T_C$ and $T_D$ defining horizontal and vertical elastic response spectra in accordance with 3.2.2.2 and 3.2.2.3.	The influence of deep geological on seismic actions is not taken into account.
3.2.1 (2)	(2) Seismic zone maps and reference ground accelerations therein	Seismic zone maps and reference ground accelerations are presented in National Annex
3.2.1 (4)	(4) Governing parameter (identification and value) for threshold of low seismicity	In Montenegro there is no area that can be characterized as a low seismic area
3.2.1 (5)	(5) Governing parameter (identification and value) for threshold of low seismicity	In Montenegro there is no area that can be characterized as a very low seismic area
3.2.2.1 (4 NOTE 1)	(4 NOTE 1) The selection of the shapes of the elastic response spectra	On the whole territory of Montenegro type 1 of elastic response spectrum is applied with the corresponding recommended values of parameters $S$ , $T_B$ , $T_C$ , $T_D$ .

Eurocodes Part	Accepted RV [%]	Elaborated Maps	NAs published
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	N/A	NO	NO (expected – end of 2015)
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	N/A	NO	NO (expected –end of 2015)
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	N/A	NO	NO (expected – end of 2015)
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	45	YES	YES (end of 2014)
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	N/A	N/A	N/A

## Progress in adoption of NAs

(source: Country Report Serbia, 2015, Zagreb)

Eurocodes Part	Publishing of NAs
naSRPS EN 1991-1-1/NA:2015	end of November 2015
naSRPS EN 1991-1-7/NA:2015	end of November 2015
naSRPS EN 1991-3/NA:2015	end of November 2015
naSRPS EN 1991-4/NA:2015	end of November 2015
SRPS EN 1992-1-1:2015	end of November 2015
SRPS EN 1994-2:2015	end of November 2015

## Eurocodes Part

Accepted RV  
[%]

EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - **Snow loads**

79

EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - **Wind actions**

85

EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - **Thermal actions**

0  
(mainly RV  
shell be adopted)

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, **seismic actions** and rules for buildings

9

EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings

No country choice  
is made

Eurocodes Part	Accepted RV [%]	Elaborated Maps
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	79	YES (should be modified)
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	85	YES
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	0 (mainly RV shell be adopted)	YES (finished but not confirm)
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	9	YES
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	No country choice is made	N/A

Eurocodes Part	Accepted RV [%]	Elaborated Maps	NAs published
EN 1991: ACTIONS ON STRUCTURES; Part 1-3: General Actions - <b>Snow loads</b>	79	YES (should be modified)	NO
EN 1991: ACTIONS ON STRUCTURES; Part 1-4: General Actions - <b>Wind actions</b>	85	YES	NO
EN 1991: ACTIONS ON STRUCTURES; Part 1-5: General Actions - <b>Thermal actions</b>	0 (mainly RV shell be adopted)	YES (finished but not confirm)	NO
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 1: General rules, <b>seismic actions</b> and rules for buildings	9	YES	NO
EN 1998: DESIGN OF STRUCTURES FOR EARTHQUAKE RESISTANCE, Part 3: Assessment and retrofitting of buildings	No country choice is made	N/A	

# Progress of translation

(relevant to the workshops' objectives-  
Source: Country Report, Turkey, 2015, Zagreb)

		The EN part was translated in National language?	NDP	The EN part was published as National standard?	Turkish structural codes cite
<b>EN 1990: Basis of structural design</b>					
EN 1990	BASE + buildings	Yes	No	Yes	NA
EN 1990 / A1		Yes	No	Yes	NA
<b>EN 1991: ACTION TO STRUCTURES</b>					
EN 1991-1-1	ACTIONS loads	Yes	No	Yes	NA
EN 1991-1-2	fire	Yes	No	Yes	NA
EN 1991-1-3	snow	Yes	No	Yes	Yes
EN 1991-1-4	wind	Yes	No	Yes	Yes
EN 1991-1-5	temp	No	No	Yes	No
EN 1991-1-6	exec	No	No	Yes	No
EN 1991-1-7	accid	No	No	Yes	No
EN 1991-2	traffic	No	No	Yes	No
EN 1991-3	crane	No	No	Yes	No
EN 1991-4	silo	No	No	Yes	No
<b>EN 1992: DESIGN OF CONCRETE STRUCTURES</b>					
EN 1992-1-1	CONCRETE gen.	Yes	No	Yes	Partial
EN 1992-1-2	fire	Yes	No	Yes	No
EN 1992-2	bridge	No	No	Yes	No
EN 1992-3	tanks	No	No	Yes	No
<b>EN 1998: EARTHQUAKE RESISTANT DESIGN OF STRUCTURES</b>					
EN 1998-1	EARTHQUAKE	Yes	No	Yes	Partial
EN 1998-2	bridge	No	No	Yes	No
EN 1998-3	repair	Yes	No	Yes	No
EN 1998-4	silo etc	No	No	Yes	No
EN 1998-5	foundations	Yes	No	Yes	No
EN 1998-6	tower etc	No	No	Yes	No

# Elaboration of snow map

(relevant to the workshops' objectives-  
Source: Country Report, Turkey, 2015, Zagreb)

TS EN 1991-1-3 can be used in TR with the accompanying National Annex.

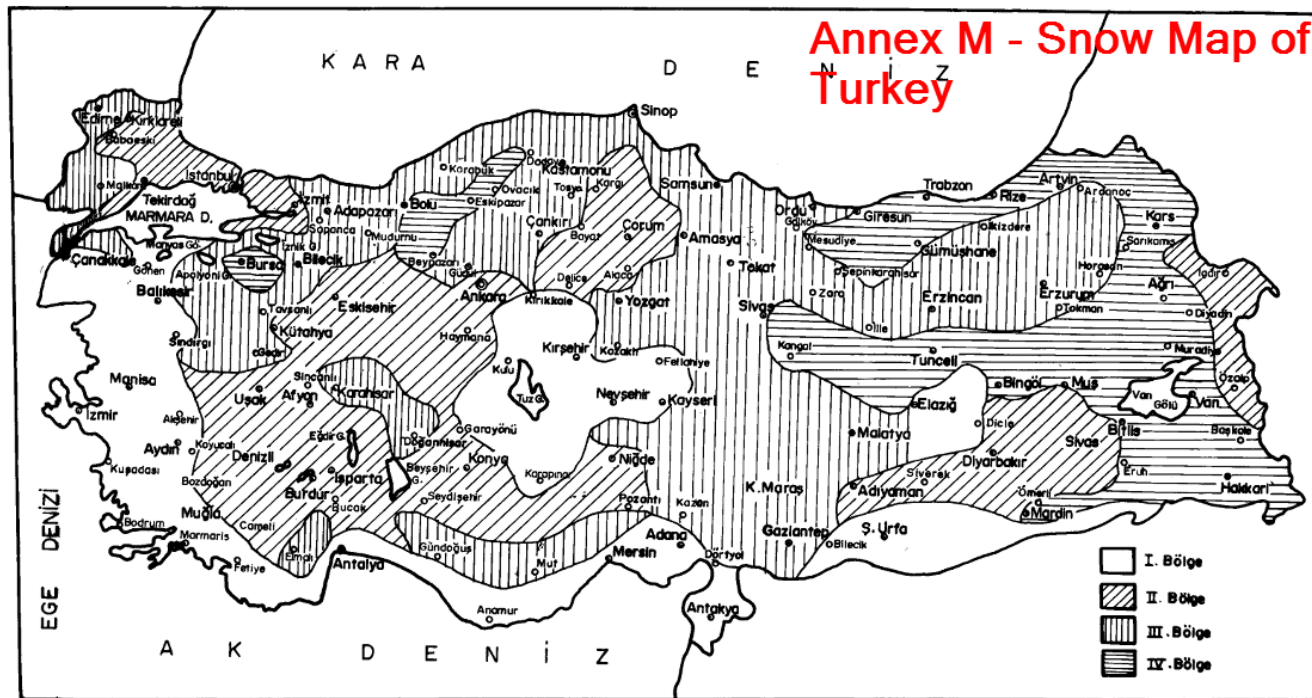
ICS 91.010.30

TÜRK STANDARDI

TS EN 1991-1-3/Nisan 2007

## Ek MA

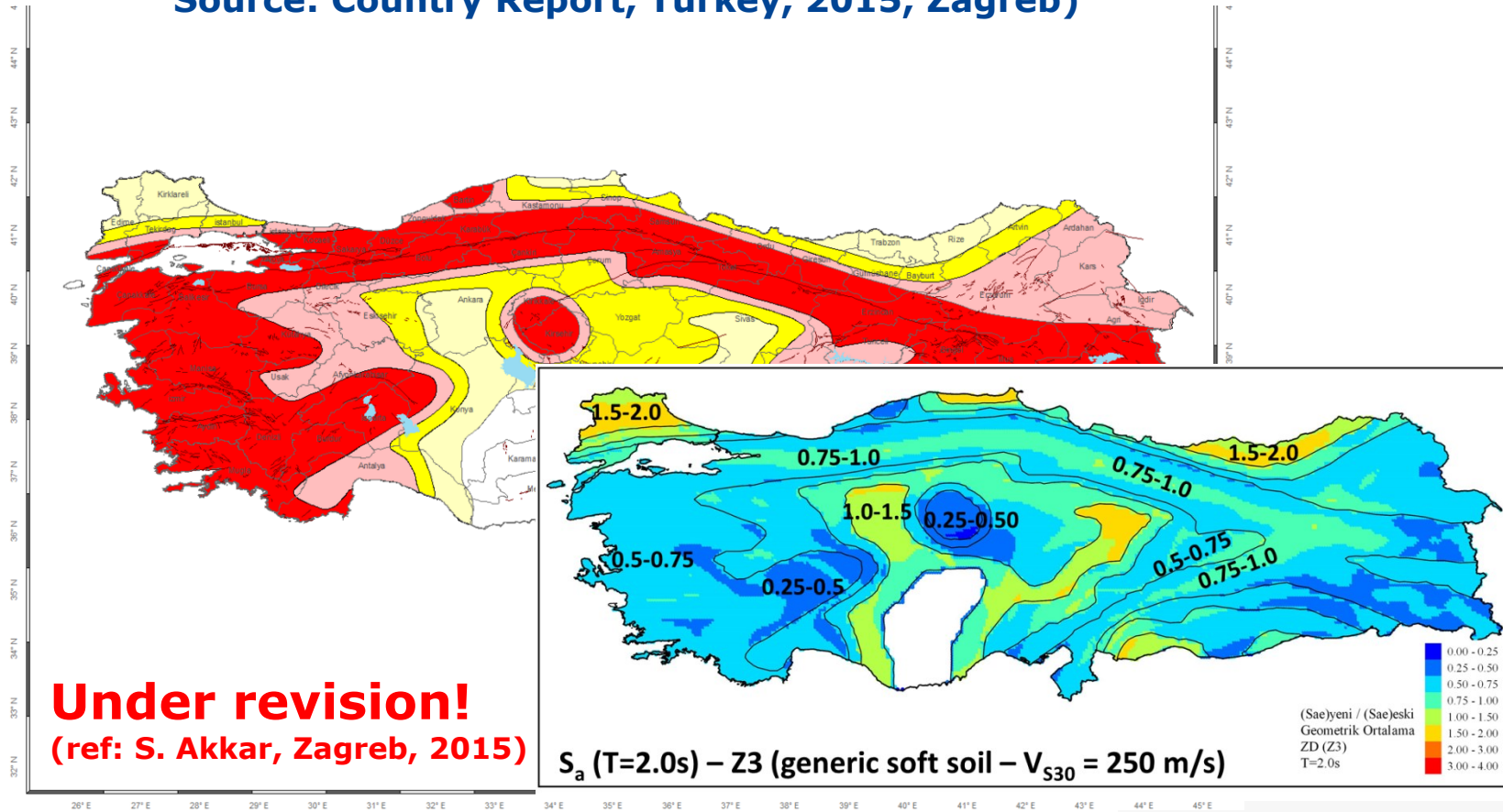
Türkiye'de kullanılacak kar haritası, bölgelere ve yüksekliğe bağlı olarak alınması gereken kar yükleri ve il ve ilçelere göre kar yükü bölgeleri.





# Elaboration of seismic hazard map – EQ zones

(relevant to the workshops' objectives-  
Source: Country Report, Turkey, 2015, Zagreb)





# Summary – elaboration of maps for climatic and seismic actions



European Commission

Country	Snow map	Wind map	Thermal map	Seismic hazard map
<b>Albania</b>	YES	YES	YES	YES
<b>BiH</b>	NO	NO	NO	NO
<b>FYROM</b>	NO (end of 2015)	NO (end of 2015)	NO (end of 2015)	NO (end of 2015)
<b>Kosovo</b>	NO	NO	NO	YES
<b>Moldova</b>	NO (ongoing)	NO (ongoing)	NO (ongoing)	YES
<b>Montenegro</b>	NO	NO	NO	YES
<b>Serbia</b>	YES (should be modified)	YES	YES (finished but not confirmed)	YES
<b>Turkey</b>	YES	NO	NO	YES (revision done-to be approved)



# Summary – elaboration of maps for climatic and seismic actions



European Commission

Country	Snow map	Wind map	Thermal map	Seismic hazard map
<b>Albania</b>	YES	YES	YES	YES
<b>BiH</b>	NO	NO	NO	NO
<b>FYROM</b>	NO (end of 2015)	NO (end of 2015)	NO (end of 2015)	NO (end of 2015)
<b>Kosovo</b>	NO	NO	NO	YES
<b>Moldova</b>	NO (ongoing)	NO (ongoing)	NO (ongoing)	YES
<b>Montenegro</b>	NO	NO	NO	YES
<b>Serbia</b>	YES (should be modified)	YES	YES (finished but not confirmed)	YES
<b>Turkey</b>	YES	NO	NO	YES (revision done-to be approved)



## Summary – elaboration of NAs relevant to the objectives of the workshop

Country	EN1991-1-3	EN1991-1-4	EN1991-1-5	EN1998-1	EN1998-3
<b>Albania</b>	NO (end of 2016)	NO (end of 2016)	NO (end of 2016)	NO (end of 2016)	NO (end of 2016)
<b>BiH</b>	NO (stage 10.99)	NO (stage 10.99)	NO (stage 10.99)	no info	no info
<b>FYROM</b>	YES	YES	YES	YES	YES
<b>Kosovo</b>	NO	NO	NO	NO	NO
<b>Moldova</b>	NO	NO	NO	no info	no info
<b>Montenegro</b>	NO (end of 2015)	NO (end of 2015)	NO (end of 2015)	YES	no info
<b>Serbia</b>	NO (end of 2015)	NO (end of 2015)	NO	no info	no info
<b>Turkey</b>	NO	NO	NO	NO	NO



## Summary – elaboration of NAs relevant to the objectives of the workshop

Country	EN1991-1-3	EN1991-1-4	EN1991-1-5	EN1998-1	EN1998-3
<b>Albania</b>	NO (end of 2016)	NO (end of 2016)	NO (end of 2016)	NO (end of 2016)	NO (end of 2016)
<b>BiH</b>	NO (stage 10.99)	NO (stage 10.99)	NO (stage 10.99)	no info	no info
<b>FYROM</b>	YES	YES	YES	YES	YES
<b>Kosovo</b>	NO	NO	NO	NO	NO
<b>Moldova</b>	NO	NO	NO	no info	no info
<b>Montenegro</b>	NO (end of 2015)	NO (end of 2015)	NO (end of 2015)	YES	no info
<b>Serbia</b>	NO (end of 2015)	NO (end of 2015)	NO	no info	no info
<b>Turkey</b>	NO	NO	NO	NO	NO

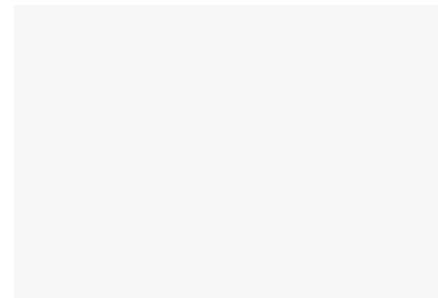


# State of the progress and views on the way ahead



## State of the progress and views on the way ahead

- ❑ Concerning elaboration of maps for climatic and seismic actions, Albania and Serbia are the most advanced with all maps elaborated. It is also observed that in most of the countries, (except BiH and FYROM-end of 2015), the seismic hazard maps are already elaborated. Comparing with this, elaboration of maps for climatic actions is behind seismic hazard ones mainly due to the insufficient data.
- ❑ Process of publication of NAs of the EN parts which are relevant to the objectives of the workshop is in its initial phase in all countries, except in FYROM where all NAs are already published (the maps will be included not later than end of 2015). Montenegro is in advance stage also with already elaborated EN1998-1 (NA) and foreseen EN1991-1-3, EN1991-1-4 and EN1991-1-5 (NAs) for the end of 2015.





## State of the progress and **views on the way ahead**

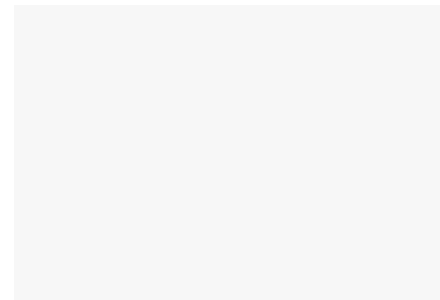
- ❑ Concerning elaboration of maps for climatic and seismic actions, Albania and Serbia are the most advanced with all maps elaborated. It is also observed that in most of the countries, (except BiH and fYROM-end of 2015), the seismic hazard maps are already elaborated. Comparing with this, elaboration of maps for climatic actions is behind seismic hazard ones mainly due to the insufficient data.
- ❑ Process of publication of NAs of the EN parts which are relevant to the objectives of the workshop is in its initial phase in all countries, except in fYROM where all NAs are already published (the maps will be included not later than end of 2015). Montenegro is in advance stage also with already elaborated EN1998-1 (NA) and foreseen EN1991-1-3, EN1991-1-4 and EN1991-1-5 (NAs) for the end of 2015.
- ❑ There is a need for creating a regional platform to boost regional collaboration for cross-border convergence of NDPs, in particular for harmonization of seismic hazards, snow, wind and thermal maps.
- ❑ It is proposed to launch bilateral (twinning) projects for building national capacities and for transfer of knowledge for the elaboration on maps for climatic and seismic actions (positive example – BiH and Chezh Standardization Institute).





## State of the progress and **views on the way ahead**

- ❑ It is recommended to bring experience from different projects (as GSHAP, BSHAP, SHARE in the field of seismic hazard) and to use methodologies and tools developed within them in synergy with national expertise in order to facilitate the process of elaboration of climatic and seismic hazard maps.
- ❑ It is recommended to intensify communication between experts for elaboration of maps for climatic and seismic actions and NA & engineering community responsible for enforcement of standards and regulations in order to have clear implication of elaborated actions on the design issues.



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- Glossary
- Publications
- Events
- JRC support to implementation and development

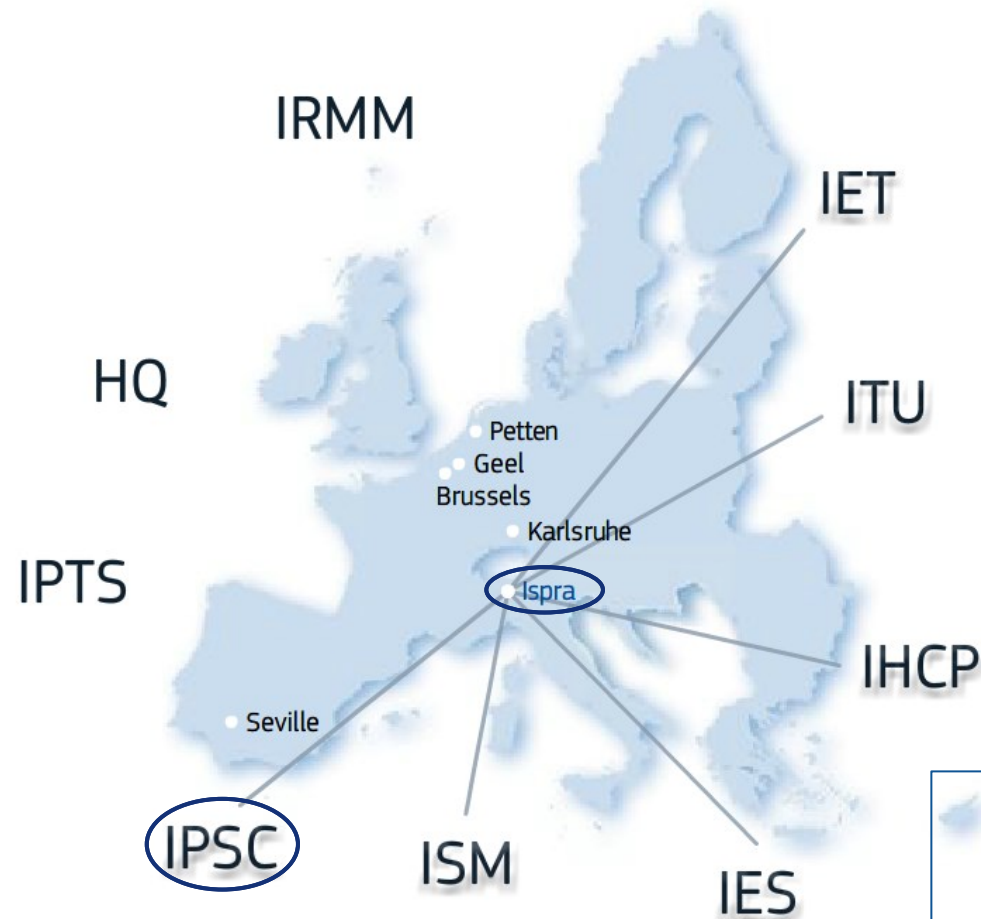
## Elaboration of maps for climatic and seismic actions for structural design in the Balkan region

27-28 October 2015, Zagreb, Croatia



- Objectives**
- Programme**
- Participants**
- Workshop Presentations**
- Contacts**

**ELABORATION OF MAPS FOR CLIMATIC AND SEISMIC ACTIONS FOR STRUCTURAL DESIGN IN THE BALKAN REGION**  
**27-28 October 2015, Zagreb**



*Thank you for your attention!*

**Prof. Dr. Roberta APOSTOLSKA**  
**Institute of Earthquake Engineering  
and Engineering Seismology (IZIIS)**  
**"Ss. Cyril and Methodius" University,**  
**Skopje, Republic of Macedonia**

