



## ADOPTION OF THE EUROCODES IN THE BALKAN REGION

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### ABSTRACT

The considerable interest in the implementation and adoption of the Eurocodes in EU Member states, as well as in non-EU countries in the Balkan region is based on the opportunity to have an advanced common standardization environment, which is adaptable to the particular requirements of each country with regard to geographical, geological and climatic conditions, allowing to select specific levels of safety.

Selected activities which are focused on the progress and specific needs for adoption and implementation of the Eurocodes and related EN standards in the Balkan region (Apostolska et al., 2013) are presented in the paper. These activities are carried out within the framework of the JRC Enlargement and Integration Action and intend to foster the implementation of the Eurocodes in the Balkan region. They encompass: (1) mapping of the current situation in the adoption and implementation of the Eurocodes in the Balkan region which was carried out by means of a questionnaire sent to the relevant national stakeholders and (2) a Workshop which brought together national experts and nominated experts from the European Commission, EU Member States and CEN/TC250.

Generally, it may be concluded that most of the countries in the Balkan region are going to use the Eurocodes as primary standards. These countries are aware about needs for harmonization of national legislation and standardization framework for construction with EU legislation. However, in most of the countries there is a lack of relevant institutional support for adoption and implementation of the Eurocodes. One of the main recommendations streaming from the activities carried out is to increase exchange of experience and strengthen regional cooperation for elaboration of National Annexes and cross-border harmonization of the NDPs, especially in the elaboration of seismic hazard maps.

### INTRODUCTION

Standardization will play an important part in supporting the European Union's strategy for smart, sustainable and inclusive growth (Communication from the Commission, 2010). The EN Eurocodes are a set of European standards which provide common rules for the design of construction works, to check their mechanical resistance and stability against live and extreme loads such as earthquakes and fire. Out of ten Eurocodes, Eurocode 8, denoted in general by EN 1998: "Design of structures for earthquake resistance", applies to the design and construction of buildings and civil engineering works in seismic regions. Hence, in these regions, structural design should conform to the provisions of Eurocode 8 together with the provisions of the other relevant Eurocodes.

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The experience of the European Commission, Member States and individual experts shows that there is a considerable interest for adoption and implementation of the Eurocodes worldwide (Fig. 1). The interest is based on the awareness that the Eurocodes are:

- A complete set of design standards that cover in a comprehensive manner all principle construction materials, all major fields of structural engineering and a wide range of types of structures and products
- Flexible codes, offering the possibility for each country to adapt to local conditions and practices through the so-called Nationally Determined Parameters (NDPs)
- The most advanced and coherent codes of practice
- A comprehensive design tool, which over a mid - to long-term period intends to cover additional fields of design, such as structural design of glass components, and assessment and retrofitting of existing structures.

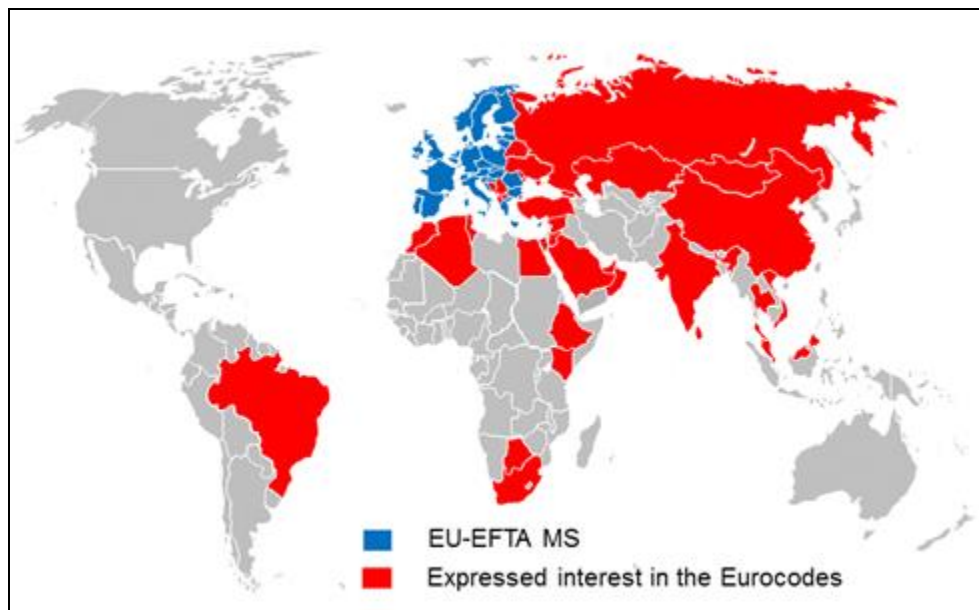


Fig.1 The Eurocodes on the world map (European Commission, 2014)

The non-EU countries in the Balkan region also expressed their interests for adoption and implementation of the Eurocodes. In the paper are presented selected activities which are focused on the progress and specific needs for adoption and implementation of the Eurocodes and related EN standards in this region (Apostolska et al., 2013). These activities are carried out within the framework of the JRC Enlargement and Integration Action and intend to foster the implementation of the Eurocodes in the Balkan region.

Having in mind that, on the one hand, the countries in the Balkan region are situated in seismically active zones characterized by high seismic risk and on the other hand, that most of them apply the seismic design codes of former Yugoslavia, specific needs and findings concerning Eurocode 8 are also addressed in the paper.

## **ACTIVITIES CARRIED OUT TO FOSTER ADOPTION OF THE EUROCODES IN THE BALKAN REGION**

In line with the EU enlargement and neighbourhood policy the following non-EU countries in the Balkan region were identified: Albania, Bosnia and Herzegovina, Croatia<sup>5</sup>, former Yugoslav Republic of Macedonia, Montenegro, Serbia and Turkey, as well as Moldova that belongs to the European neighbouring countries of the European Union.

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<sup>5</sup> Croatia became a Member State since July 1, 2013.

Gross value added (GVA) by the construction sector (%), as well as presence of the Eurocodes as standards for structural design in the last annual progress report of DG Enlargement, for each of the above listed countries is presented in the Table 1.

Table 1. Construction sector in the targeted countries

Country	GVA (%)	Eurocodes in the progress report
Albania (AL)	8.6	No
Bosnia and Herzegovina (BA)	4.7	No
Croatia (HR)	-	<i>Member State as of 1st of July 2013</i>
former Yugoslav Republic of Macedonia (MK)	7.4	Only three national annexes to Eurocodes have been developed and adopted
Moldova (MD)	-	<i>Not part of Enlargement</i>
Montenegro (ME)	5.8	No
Serbia (RS)	4.3	No
Turkey (TR)	6.9	No

In each of the non-EU countries in the Balkan region four different groups of national stakeholders were identified:

- National authorities and policy decision makers (Ministries of Construction, Ministries of infrastructure, etc.)
- National Standardization Bodies (NSBs)
- Professional users of standards (Design and construction companies, Industry (trade) organizations, National Economic Chambers, Chambers of professionals involved in design and engineering, etc.
- Institutions that will stream the determination of NDPs and the application and training on the Eurocodes (Universities, research institutions, Academies of Sciences, etc.)

A Workshop on the Adoption of the Eurocodes in the Balkan region was held on 5-6 December 2013 in Milan and at the JRC, Ispra, Italy (<http://eurocodes.jrc.ec.europa.eu/>). It was organized by DG Joint Research Centre of the European Commission and supported by the JRC Enlargement and Integration Action. The workshop was focused on the progress and specific needs for adoption and implementation of the Eurocodes and related EN standards in the Balkan region. Thirty seven representatives of the National Authorities, National Standardization Bodies, Academia and Chambers of Engineers from non-EU countries in the Balkan region participated as well as seven invited experts from CEN/TC250, CEN&CENELEC Management Centre, DG ELARG and EU Member States and seven staff of the JRC (ELSA Unit). The total number of participants was 51. The activities carried out within the workshop served the following objectives: (1) to assess the level of commitment and the progress of adopting the Eurocodes; (2) to assess the level of harmonization of national policy/legislation with EU regulatory frameworks; (3) to assess the progress of definition of Nationally Determined Parameters (NDPs); (4) to define the strategies for training and elaboration of guidelines and training materials; (5) to facilitate exchange of views, knowledge and information between EU experts and representatives of non-EU countries in the Balkan region; (6) to facilitate regional cooperation in preparing National Annexes (NA) and harmonization of NDPs.

Mapping of the current situation in the adoption and implementation of the Eurocodes in the Balkan region was carried out by means of a questionnaire, which was sent to the relevant national stakeholders. Generalized data requirements of the questionnaire were organized in four groups: (1) National regulatory framework; (2) National Determined parameters, National Annexes and harmonization; (3) Education and training and (4) Additional comments. Selected outcomes gathered from the questionnaires are presented in the paper.

## ASSESSMENT OF THE PROGRESS OF ADOPTION AND IMPLEMENTATION OF THE EUROCODES

The mapping of the current situation in the adoption and implementation of the Eurocodes in non-EU countries in the Balkan region was carried out by means of a questionnaire, which was compiled and sent to the members of each country delegation. Generalized data requirements of the questionnaire are organized in four groups (Table 2).

Table 2. Organizational scheme of the questionnaire

<b>Questionnaire – generalized data requirements</b>	
<b>National regulatory framework</b>	<p>1.1. Is there a National Action Plan (NAP) for adoption and implementation of the Eurocodes? If yes, please give reference and time table.</p> <p>1.2. In the case the Eurocodes are adopted as national standards, are they going to be used as primary standards or in parallel with no contradictory existing national standards?</p> <p>1.3. Does any relevant national institution supports/participates in projects for adoption and/or implementation of Eurocodes? If yes, please give information and reference to any project financed by the European Union.</p> <p>1.4. Are there needs for harmonization of national legislation and standardisation framework for construction with EU legislation, related to the adoption of the Eurocodes?</p>
<b>Nationally Determined Parameters, National Annexes and harmonization</b>	<p>2.1. Is there a Technical Committee for adoption of the Eurocodes already established? If yes, please give its title, date of creation, and Chairman.</p> <p>2.2. Please assess the progress of translation of each Eurocode (by placing an 'x' in one of the first four columns, and a grading between 1 and 5 in the last column for priorities ranging from the lowest to the highest).</p> <p>2.3. Please give reference to any existing regional cooperation in the process of translation of the Eurocodes.</p> <p>2.4. Please assess the progress of definition of the Nationally Determined Parameters of each Eurocode.</p> <p>2.5. Please assess the proportion of the recommended values of Nationally Determined Parameters of each Eurocode that have been/will be accepted.</p> <p>2.6. Please give reference to any regional cooperation and/or on-going projects for the definition of the Nationally Determined Parameters.</p> <p>2.7. Please suggest any national and/or regional institutions in neighbouring countries that might be interested to collaborate in the definition of Nationally Determined Parameters and their regional harmonization.</p> <p>2.8. Please identify barriers for the elaboration of the National Annexes, if any.</p> <p>2.9. Please assess the progress of adoption of Eurocodes related harmonized EN standards (optional).</p>
<b>Education and training</b>	<p>3.1. Are the Eurocodes included in the first cycle (Bachelor) study curriculum at the Universities?</p> <p>3.2. Are the Eurocodes included in the second cycle (Master) study curriculum at the Universities?</p> <p>3.3. Are the Eurocodes included in the training courses offered by professional associations?</p> <p>3.4. Is there any training material, (booklets, leaflets, guidelines etc.) available on your national language? If yes, please give the references.</p>
<b>Additional comments</b>	4.1 If applicable

Upon receiving filled questionnaires, analysis of data and drawing of conclusions were done for the four groups of questions, respectively.



Analysis of collected data for the proportion of the recommended values of NDPs of each Eurocode that have been/will be accepted shows that Croatia, Montenegro and Serbia (for EN 1990, EN 1991, EN 1993 and EN 1998) have high percentages of acceptance of the recommended values – over 75% (see Fig. 3). In Croatia, who delivered detailed data for each Eurocode, the average percentage of acceptance is 80% (Table 4). For the rest of the countries this assessment couldn't be done since they are at the beginning of the process of definition of NDPs.

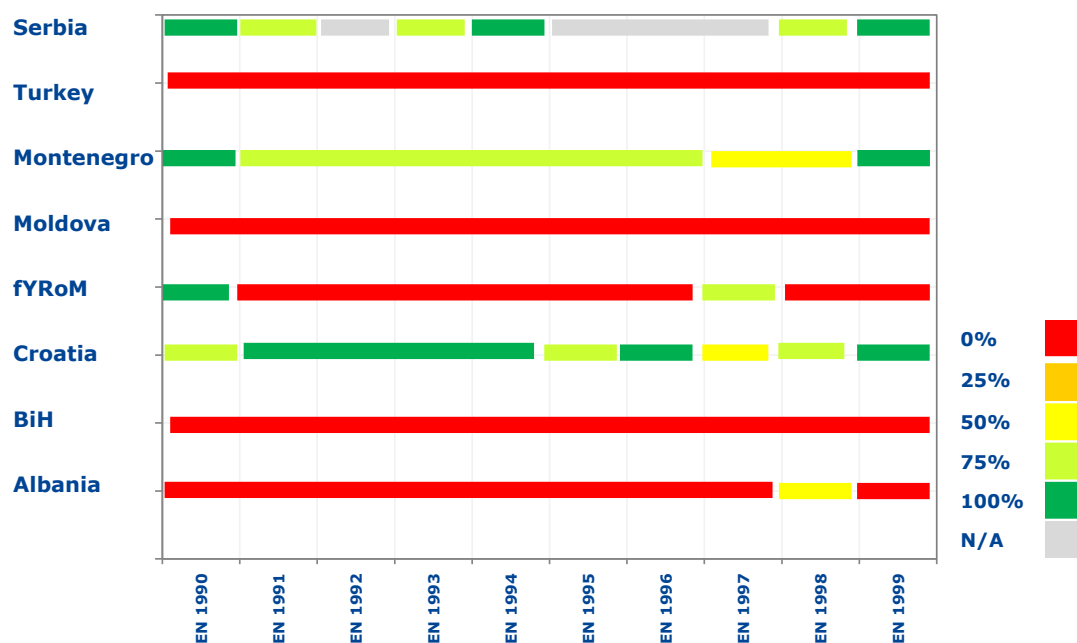


Fig. 3 Proportion of acceptance of recommended values of NDPs

Table 4. Proportion of acceptance of recommended values of NDPs for Croatia

Code	EN1990	EN1991	EN1992	EN1993	EN1994	EN1995	EN1996	EN1997	EN1998	EN1999
[%]	74	94	98	95	78	63	82	48	70	100

There is a lack of existing regional cooperation for the definition of NDPs. The only cooperation reported has been by the Institute for Standardization of Serbia that delivered NDPs adopted in their NA to the Institute for standardization of Republic of Macedonia. Nevertheless, all countries expressed their willingness for establishing regional cooperation among NSBs, Academia and Research institutes and professional organizations. The barriers for elaboration of NAs were identified and in general they are: lack of resources (e.g. for elaboration of maps), legal framework, insufficient experience and specialists.

Since most of the targeted countries are in seismic prone areas it is very important to map their progress related to translation, definition of NDPs and proportion of acceptance of the recommended values of NDPs related to EN 1998 (Table 5).

Table 5. Progress related to EN 1998 NDPs

Country	Translation	Definition	Acceptance of recommended values
Albania	✓	start	50%
Bosnia and Herzegovina	none	none	n/a
Croatia	✓	✓	70%
former Yugoslav Republic of Macedonia	✓	start	n/a
Moldova	✓	none	n/a
Montenegro	advanced	advanced	50%
Serbia	advanced	advanced	75%
Turkey	advanced	none	n/a



It can be observed that there is good a progress on EN 1998 translation (except in Bosnia and Herzegovina). The process of elaboration of EN 1998 NDPs has started in the majority of non-EU countries in the Balkan region; in Montenegro and Serbia it is already in the advanced phase. It was pointed out that elaboration of the seismic hazard maps is the most time consuming task and requires cross-border collaboration.

The progress of adoption of the Eurocodes related harmonized standards has been completed in Bosnia and Herzegovina, Croatia, Montenegro and Serbia (see Fig. 4). The process is in an advanced phase in Albania and Moldova, and at the beginning in fYRoM. No data was provided for Turkey.

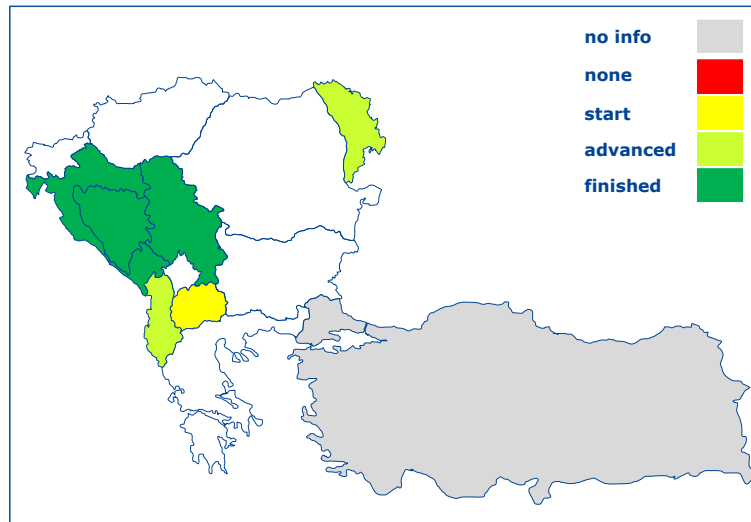


Fig. 4 Progress of adoption of the Eurocodes related harmonized EN standards

### Education and training

Based on the data provided in the questionnaires, the Eurocodes are comprehensively included in the first study cycle (Bachelor level) of Universities in Bosnia and Herzegovina (BiH), and in Croatia. In Albania and Moldova the Eurocodes are not included at all. Montenegro, Serbia and Turkey show some progress (in average four of ten Eurocodes are included) and fYRoM included only EN1990. At the second cycle studies (Master level) the situation is more promising. BiH, Croatia, fYRoM and Montenegro (except EN 1990) include all Eurocodes in the educational process. Inclusion of EN 1998 in the education of young engineers in non-EU countries in the Balkan region is presented in Fig. 5.

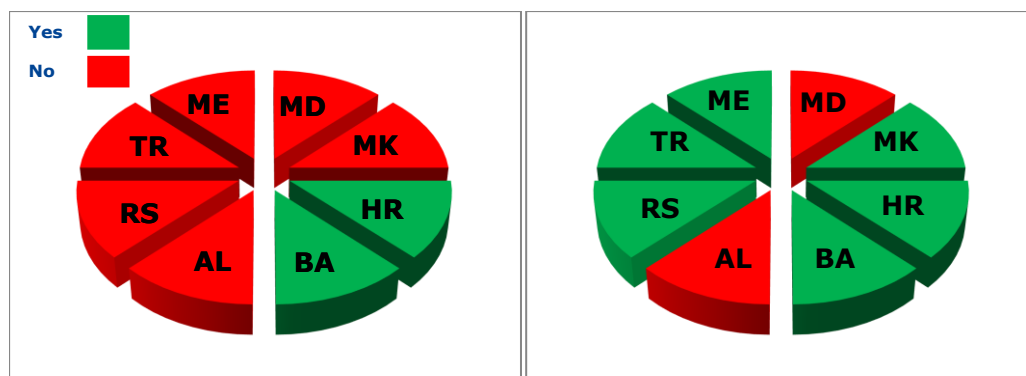


Fig. 5 Presence of the EN 1998 in the education (left –first level and right – second level)

Training courses are offered in Croatia, Montenegro (except EN 1999) and partially in Albania (only EN 1990 and EN 1998). Training material (booklets, leaflets, guidelines, etc.) in national languages is available in Croatia, fYRoM, Montenegro (except EN 1994 and EN 1999) and Serbia. Implementation of the EN Eurocodes meets difficulties due to the lack of material available in each national language. It is also important to emphasise the lack of a common strategic approach at national level.

## CONCLUSIONS

As a result of mapping the current situation concerning the adoption and implementation of the Eurocodes in non-EU countries in the Balkan region the following conclusions were delivered:

- Most countries are planning to use the Eurocodes as primary standards. They are aware about the need for harmonization of their national legislation and standardization framework for construction with EU legislation. However, in most of the countries there is a lack of relevant institutional support for adoption and implementation of the Eurocodes.
- There is good progress on Eurocodes translations, especially on EN 1990, EN 1991 and EN 1992 (except in Bosnia and Herzegovina). This process is completed in the former Yugoslav Republic of Macedonia (fYRoM) and Moldova (the latter accepted the Romanian translation) and in a very advanced phase in Serbia. The process of elaboration of Nationally Determined Parameters (NDPs) and National Annexes (NA) has started in the majority of non-EU countries in the Balkan region.
- Eurocodes are included in higher education; more extensively in the second cycle (Master courses). In general, training courses are not offered by professional associations (except in Montenegro) and there is a lack of comprehensive training material. Croatia could serve as a regional example of “good practice” concerning the organization of training programs and involvement of all relevant stakeholders in the process. The financing at National level for the elaboration of guidelines for application of EN Eurocodes and design aids is insufficient.
- There is a need for creating a regional platform for collaboration concerning adoption of the Eurocodes, for example by setting up itinerant regional conferences / meetings / seminars /workshops / training hosted by each of the countries in the Balkan region.

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