The European Commission’s science and knowledge service
Joint Research Centre

Building Regulation and Standards for Long-term Resilience

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Outline

• Prevention and preparedness for DRR
• Eurocodes and the resilience of built environment
• Partnerships in development of policies and standards for resilient construction
Revised EU civil protection mechanism

The Commission proposal to strengthen EU disaster management of 23 November 2017

1. Increasing disaster response capacities: rescEU
   - creation of an EU civil protection response reserve of assets
   - assisting Member States to boost their national capacities by offering higher financial incentives

2. Better preventing and preparing for disasters
   - engaging Member States in better assessing risk and planning for effective preparedness and prevention
   - the best available European expertise trained together, sharing of knowledge and lessons from previous disasters
Session: “Recovery Opportunity: Building Regulations and Standards for long-term resilience”
co-organised by the JRC and the World Bank

Key messages and outcomes:

✓ post-disaster recovery is a unique opportunity to achieve a wide range of health, safety and civil rights objectives and help to reduce cost and losses in future disaster events;

✓ regulatory capacity is of strategic importance for prevention and for efficient post-disaster recovery: the countries should keep preparing for reconstruction in advance, so that they can react in a proper way when a disaster hits;

✓ the regulatory preparedness for post-disaster recovery and building long-term resilience shall be considered at the same level of importance as the emergency preparedness.

It was decided to create community of practice on post-disaster recovery for exchange of experience and knowledge in building long-term resilience.
Regulatory capacity for preventing and preparing for disasters

Regulatory framework - components:

1. **legal and administrative framework** at the national level that mandates the construction of safe buildings and enables the construction process to proceed efficiently;

2. **building codes/standards**: development and maintenance process that has the capacity to expand, adapt and update construction standards **based on local needs and rapidly-evolving risks**; and

3. set of implementation mechanisms at **local level**

Kobe earthquake, Japan (1995)

- **97%** of collapsed buildings **built under old building codes**, while those complying with the **most updated codes** accounted for **only 3%** of the total number of collapsed buildings*

*The World Bank: BUILDING REGULATION FOR RESILIENCE
The Eurocodes

• are state-of-the-art standards of practice based on best available knowledge

• aim to reduce existing risks related to natural and man-made disasters, and to anticipate and mitigate new risks.

• the Nationally Determined Parameters offer each country the possibility to adapt the standards to local conditions and needs
The Eurocodes can be used in different regulatory systems and contribute to harmonization of levels of safety, construction practices and markets.

Obligatory use of Eurocodes Parts (EU28 + Norway)

In 55% of the countries none of the Eurocodes Parts is obligatory
Use of Eurocodes for design of important infrastructure

EXAMPLE: *India’s first mega cable-stayed railway bridge* at Anji Khad in Kashmir will be 196 metres high, with a span of 290 metres. The Eurocodes were used in the design areas not covered by the Indian Standards.

Anji Khad bridge project, Kashmir, India (© Italferr)
Policies and standards for resilient construction

*JRC – DG GROW Partnership*

- **Implementation and use of the Eurocodes** – Administrative arrangements between JRC and DG GROW (2005 – 2018), new programme 2018 - 2021

- **Bridging the gap between Research and Standardization** – institutional & competitive projects

- **JRC support to EU initiatives**: Construction 2020, REFIT, FIEP, ...
Fire Information Exchange Platform

Led by DG GROW in partnership with Commission DGs, Member States, European Associations,

Main work streams identified by the Commission:

1. **common terminology and fire statistics**
2. **application of fire prevention principles**
3. **regulatory approach for new products and high-rise buildings**
4. **exchange of experience from fire accidents**
5. **use of fire engineering approach in building regulations**
# JRC support to policies and standards for construction

Work programme for Administrative Arrangements between DG JRC and DG GROW (2015 – 2021)

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<td>Implementation and harmonized use</td>
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<td>Promotion of policies and standards for construction outside EU</td>
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Development of 2\textsuperscript{nd} generation of the Eurocodes

*Partnership of JRC with DG GROW, CEN/TC250, experts*

- Definition of standardization needs
- **Pre-normative research**: projects under the EU Framework Programmes (FP6, FP7, H2020,...)
- Definition of **Mandate to CEN** for the 2\textdegree{} generation of the Eurocodes (cost 11M €, the biggest grant to CEN)
- **Pilot studies** on expected impacts of climate change on the loading on structures
- **Further standardization needs**: design of tunnels, robustness of design,....
Harmonised use of the Eurocodes in the EU

Partnership of JRC with EU MS on the NDPs Database

Reliability of structural members achieved with the NDPs chosen by the Member States

Markoč, J. et al.

2018

State of harmonized use of the Eurocodes

Dresler, C. et al.

Late 2018
Implications of climate change on structural design

Partnership of JRC with DG CLIMA, CEN/TC250, University of Pisa, FP7 projects, CEN Project Teams, Italian Aerospace Research Centre

Experts Group:

- pilot studies on the **trends of evolution** of different climatic actions
- **interface between the research, work of CEN** on Mandates M/515 (Eurocodes) and M/526 (important infrastructures), and **relevant policy DGs**.

- produced a pilot study on the **evolution of the snow load on structures** (example of Italy) and justified the **need of new European snow load design map**.
- in 2018-2019 - **evolution of thermal actions** on structures; **carbonation and corrosion** of structures in Europe due to climate change
Standardisation needs for design of underground structures
Partnership of JRC with DG MOVE, International Associations, CEN/TC250, Industry, Research Institutions, National Authorities

First conclusions of the experts group:

• The **Eurocodes are already used** in tunnel design, in particular EN 1990, EN 1992 and EN 1997.

• The **concept of new standards** for design of tunnels shall be **in consistence with the Eurocodes**, delineating how to complete and/or restrict their use for tunnels.

• A possible way ahead are **guidelines** specifying which approaches of the Eurocodes shall not be used, and alternatively – which are suitable for the design of tunnels.
Eurocodes training and promotion (EU, globally)

JRC Partnership with DG GROW, CEN, MS, community of practice

Organised by
European Commission
DG Enterprise and Industry, Joint Research Centre

with the support of
CEN/TC250, CEN Management Centre and Member States
Eurocodes promotion co-ordination

Partnership between Commission DGs, EEAS, CEN, EU MS

Working Group on the co-ordination of the international promotion of European policies and standards for construction:

- JRC and DG GROW co-leading the activities,
- JRC compiles and assess related information,
- Dissemination of the information through the CIRCABC interest group,
- SCC members and interested staff from the EU Delegations to join the group and receive information/contribute with new material.
Holistic approach to safety and sustainability

Partnership across policies

Hybrid **seismic-plus-energy retrofitting** JRC solution with textile-based mortar (TRM) and thermal insulation

Keeping the overall intervention cost low by **dramatically reducing the labour cost**

*Emilia Region earthquake, 2012*
Open access to JRC Research Infrastructure

Give European research and business organisations access to equipment that they would not normally have

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ELSA Reaction Wall Facility
ELSA Hopkinson Bar Facility
In conclusion…….

Building Regulations and Standards are the key instrument for long term resilience. Regulatory capacity is of strategic importance for prevention, preparedness and for efficient post-disaster recovery.

The Eurocodes aim to reduce existing risks related to natural and man-made disasters, and to anticipate and mitigate new risks. They are adaptable to local conditions and needs, and can be used in different regulatory systems.

The JRC provides interface for successful partnerships between Commission policy DGs, CEN, MS, Industry, Research and communities of practice:

• to further develop standards and guidelines matching global and local needs,
• to anticipate and mitigate new risks,
• to build capacities in the communities of practice
Thank you for your attention
http://eurocodes.jrc.ec.europa.eu

The European construction sector
A global partner