The need for a Circular Economy in the construction sector in Romania

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Co-funded by the
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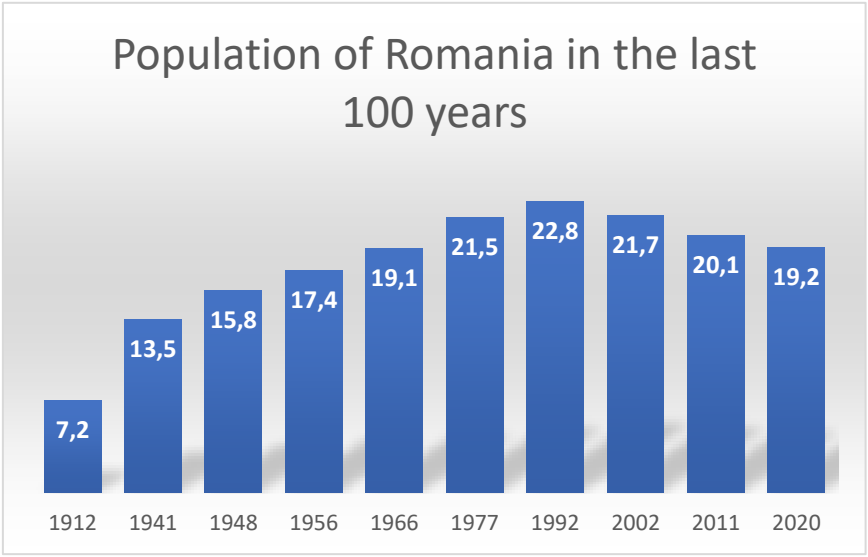
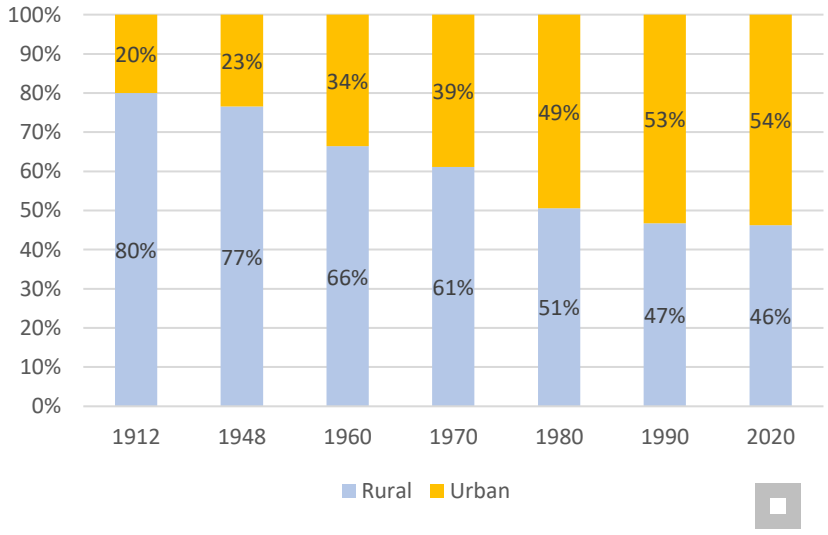
ROMANIA

- part of the European Union since 01.01.2007;
- 9th state in EU by surface area: 238.400 square kilometers;
- 7th state in EU by number of inhabitants: 19.8 million;

- divided into 7 development regions;
- divided into 41 counties + Bucharest (the capital city and the largest)

- at the beginning of the 20th century, Romania's population was 8 million, **80%** of whom lived in **rural** areas, and only **20% in urban** areas.
- at that time, **Bucharest** had a population of 0.6 million people… (now is aprox. 2.5);
- by 2030 -> **68%** will live in cities,
- by 2050, the percentage will reach **77%**.





- the significant increase in the number of inhabitants in the urban environment led to a huge demand for **housing**, and not only…
- more than **100,000** homes could be built annually, the period of maximum intensity being 1971 - 1980, when only in cities, **1.4 million** homes were put into use;
- in the last 20 years, less than **400,000** homes have been put into use in urban areas…

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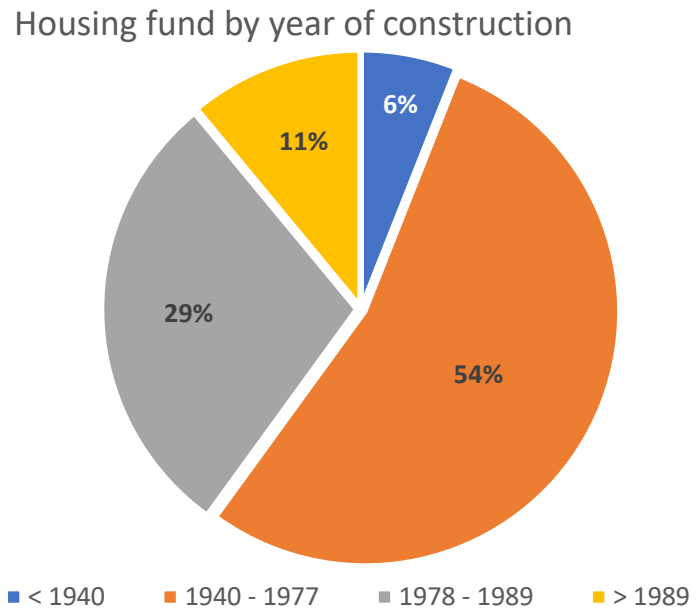
❑ **Housing**:

- like many other Eastern European countries, Romania has a significant legacy of collective housing built during the communist period (“communist" blocks);

- the forced industrialization policy of that time and the massive migration of the population from rural to urban areas have led to the construction of **collective housing** to accommodate mostly workers in industrial areas, generically called “bedroom neighborhoods”, having as their only function “sleeping”…

- **70%** of homes are collective housing with GF + 4…10 height regime;
- **90%** of them were built before 1989 and it is estimated that **80%** of them will be in use in 2050…

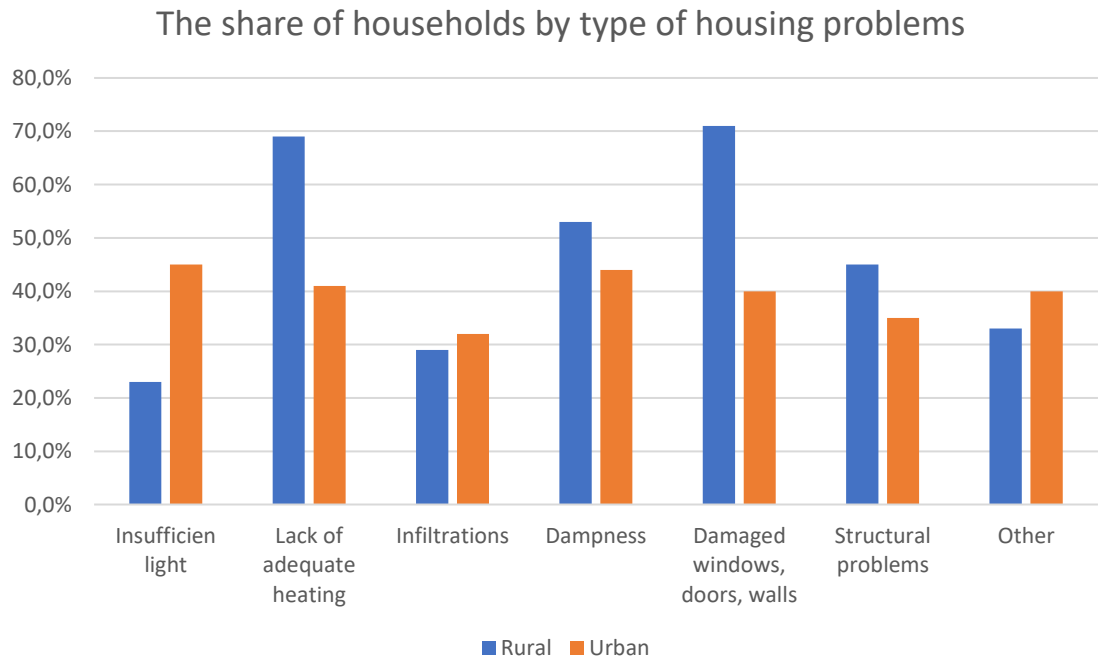


- these types of blocks had certain advantages related to the social and economic requirements:
  - speed of production and execution: **prefabricated panels** in factories are transported to the construction site where they only had to be put in place and connected to each other;
  - **repeatability**: standardized projects, built on a large scale with a few small adjustments;
  - **economic efficiency**: industrialized process, short construction times, limiting the loss of materials, reducing labor costs by improving the system;

→ **linear economy**

- they have not been built to provide a certain level of **comfort** or degree of **energy efficiency** and the functions they offer are not in line with the current requirements of the tenants;
- among the main problems encountered are:
  - the small surface of the apartments,
  - lack of common areas,
  - high energy consumption for heating,
  - lack of ventilation and the appearance of mold,
  - poor sound insulation,
  - infiltrations on the upper floors,
  - etc.

- according to their projects, they should be repaired every 30 years;
- because most buildings were erected in the 1970s, the first repairs should have been completed after 2000…
- more than **35%** need **urgent repairs** and more than **50%** need **improvements**:



❑ **Other constructions**:

- more urban inhabitants meant more jobs, so there were built many **industrial plants**, infrastructure (**roads, railways, bridges**), **power plants**, social and administrative buildings (**schools, hospitals, hotels**), **sport facilities**, etc.

- more industrialization meant more inhabitants…




❑ **Other constructions**:

- similar to buildings for living, these kind of constructions are old enough and need major revisions…
- some of them are out of service…
- some are used in other scopes that those they were meant to be used…

- some have been replaced with new developments…

❑ Sustainable development (example of good practice)

Coresi neighbourhood was built both by **rejuvenating old industrial buildings** and by creating **new landmarks**,

- the first multifunctional project of such magnitude,
- commercial, residential, office, entertainment, space community and public spaces

former “Tractorul Brasov” factory
(> 130 hectares)

new “Coresi” urban development

❑ **Circular economy**:

- the built environment has a significant impact on many sectors of the economy, on local jobs and on the quality of life….

- civil / administrative / social / industrial buildings are intensive energy consumers (heating and cooling, ventilation, lighting, production support systems, etc) and use large quantities of building materials, labor and transportation;

  - ➢ for their execution or for their rehabilitation / current service

❑ **Circular economy**:

- construction industry / buildings sector is responsible for more than **36%** of global energy consumption and for nearly **40%** of total direct and indirect CO_2 emissions;
- **1.3 billion tons** of construction and demolition waste (CDW) are generated every year;

- **Circular economy**:
  - → to reduce their environmental impact;
  - → a need for new **circular solutions**, new types of design and execution making use of technologies like LCA / BIM, etc;
  - → it is necessary to start implementing these aspects even from the beginning: **educational sector**
    - → HE institutions
    - → VET institutions
      - → future professionals: engineers, architects, constructors, researchers, teachers, etc
      - → future administrative staff.

❑ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV:

- **General courses (1st and 2nd year of study):**
  - Math
  - Mechanics
  - Strength of materials
  - Technical drawing and infographics
  - Geological and Geotechnical engineering.

- **Specific and domain related courses (2nd, 3rd and 4th year of study):**
  - Building materials
  - Concrete structures
  - Timber structures
  - Steel structures
  - Safety of buildings

❑ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV:

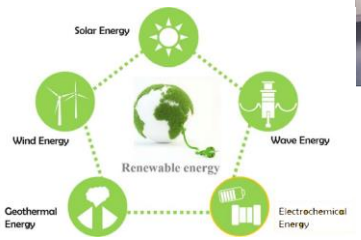
◘ Environmental related courses:

- Law and regulations concerning buildings and buildings services

- Environmental engineering

- Special concrete and composite materials

- Renewable energy sources
- Sustainability of buildings



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❑ PRESENT CURRICULA IN CIVIL ENGINEERING IN BRASOV:

◘ NEW Environmental related courses:

- **Circular economy**
  - 2 hours / week for course;
  - 2 hours / week for laboratory / practical works;
  - 4 ECTS credits

  - Proposed topics:
    - Principles of construction design to ensure a maximum degree of circular economy
    - Types of products and materials and reduce waste - through reuse and recycling
    - Ways to calculate the circular economy in construction
    - Monitoring the circular economy in construction

THANK YOU!