BUILDING TYPOLOGY IN ALBANIA BASED ON IT’S THERMAL CHARACTERISTICS

Overview

Each country should develop its own building typology for residential sector. For this purpose we should have a system of classification defined by year of construction, building function and size of the existing buildings. It should then find examples that represent that category. The relevant data of these objects (external walls, windows, exterior doors, roof and slab above the ground); along with their respective photographs of buildings create the country typology. Its importance lies in the fact that when the object is being renovated regarding energy savings, rising the comfort or simply to maintain the structure of the building must know in advance some of the features of the building that are typical for its type. A typical classification of building stock will give professionals preliminary data for quick calculations on the potential energy savings, sustainability of the building structure, historical values etc. This paper will present the first steps in Albania for creating building typology and its application by analyzing existing projects in this field. The paper will also give best solutions for improving thermal characteristics by implementing Energy efficiency (EE) measures. It will also show what are these measures and how will they affect heat transmission and energy consumption in general.

Characteristics of the buildings structures, the old and new buildings stock

Albania lack building typology catalogue which in most countries is a useful tool in determining energy saving potential by using specific categories in catalogue like year of construction, construction materials, types of windows installed, building size etc. In order to gain required information when working with countries building stock, some small projects have developed through surveys a classification of building stock being focused in energy performance on buildings.

Buildings in Albania as a basic element of life are one of the social and economic problems, which have emerged especially after the 1990s. There are many reasons, but foremost are relatively poor quality of the existing stock of buildings and the small living area per capita, which caused a non-comfort of life related with living conditions in them.

In countries with a communist background like Albania, multi-unit constructions were heavily favored because they allowed the most efficient provision of housing that supported the 'collective' aspect of their ideology. After their beginnings with loadbearing brick construction, the authorities began to experiment with the new solutions of the modernist era. Of particular importance was the use of reinforced concrete that enabled the construction of higher rise buildings. Prefabricated construction methods were also employed as a means to further lower costs and provide rapid urbanization to meet demand. Up to 60% of these prefabricated panel construction were built after the 1960s.

After the 1945, Albania, as a poor country met the demands, for a rational, simple and functional building based on the modern technology of that time, and the industrialization of construction. The method of socialist realism style was always a political dogma, because it had no executive value, it did not help as a design instrument. The socialist Content and the national forms remain only slogans.
“Let’s build quickly good, and cheap.” This slogan should have been followed, and under this motto were built most of the buildings in Albania before 1990, especially prefabricated buildings.

Based on the statistical data of INSTAT (Institute of Statistics in Albania), inherited housing stock up to 1990 was 674,633 apartments, of which 35% were state-owned and 65% privately owned. About 57% of housing was in rural areas while 43% in urban areas.

The state-owned buildings are in the form of multi – apartments block. So their stock at the end of 1990 was 238,700 apartments (dwellings), or 33,881 apartments’ buildings, where a building had average seven apartments (usually in 7-8 major cities of the country this average ranged from 20 to 25 apartments per building).

Dwellings are inherited from the private sector are in the form of 1-2 storey buildings for one to two families. The stock of private sector housing at the end of 1990 was 435,933 dwellings or 351,888 apartments buildings, then averaged 1.2 apartments per building.

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<tr>
<td>Before 1945</td>
<td>14</td>
<td>20</td>
<td>18.9</td>
<td>24.2</td>
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**Typical classification**

The most common classification criteria of a building stock are year of construction or period of construction. Each period is characterized by building system, building materials, heating system as main characteristics while there are also other not so important diversities.

The draft building type matrix is setting up on the basis of the building stock model which is definition to take into account the statistical data, which means that the number and the total floor area of the buildings classified into a building type category is supported by relevant statistical data. This data is taken from the Albanian CENSUS 2011.

Albanian Residential Building Typology includes a set of buildings that are selected for their building characteristics. The adopted basic common principles of the typology are as follows:

- Period of construction, and
- Classification into four basic types as below:
  1. Detached house;
  2. Semi-detached house;
  3. Row (or terraced) house, and
  4. Multi-Apartment blocks (buildings of large area).

The number of residential buildings in Albania is 598,267. More than 80 per cent are mainly one storey detached houses, with only one dwelling. Only 3.7 per cent of them are apartment buildings, of which 31.3 per cent were located in the prefecture of Tirana.

Only 1.0 per cent of them have 6 floors and more, while 2.1 per cent of the total has 9 dwellings or more. Buildings with 2 floors and buildings with 2 dwellings are about 10.0 per cent of the buildings used for residential purposes.
There are a total of 1,012,400 dwellings enumerated in Albania, from which, according to the classification by type, 99.6 per cent are conventional dwellings and 0.4 per cent of them are non-conventional ones.

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<tr>
<td>Detached house</td>
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<td>Semi-detached house</td>
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<td>8,140</td>
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<tr>
<td>Row (or terraced) house</td>
<td>18,773</td>
<td>3,618</td>
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<tr>
<td>Apartment building</td>
<td>22,171</td>
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</table>

Classification as to the period of construction

The following six periods of construction year were defined:

- Period 1: buildings built before 1960;
- Period 2: buildings built between 1960 and 1980; emergency socialism period
- Period 3: buildings built between 1981 and 1990; end of emergency socialism period
- Period 4: buildings built between 1991-2000; emergency post socialism period
- Period 5: buildings built between 2001 and 2005; end of emergency period
- Period 6: buildings built between 2006-2011; recent times.

In addition another classification is the classification as to the construction system:

- Massive
- Skeleton
- Combined

These construction systems are also linked to the building materials classification.

First building period

This period covers stock of buildings constructed prior to year 1960. These buildings are characterized with thick bearing walls constructed with solid bricks, double pane windows, wooden board floorings without thermal insulation and ceilings consisting of plastered cane and wooden boards.
Because of wall thickness, these buildings consist of mostly 2-3 floors; these buildings could only go up to 4-5 floors. Wall thickness is different in each floor, with thicker in lower floors. Openings (windows) are small in size hence lack of lighting comfort.

This construction system is used to construct buildings from the ottoman period (considered building heritage) and early Communist period.

Most of these buildings have gone through a refurbishment, but, those that aren't refurbished should take under consideration following:

- Wall thickness usually not fulfills the heat transmission values. This means that no additional insulation is needed.
- If building is considered a cultural heritage, EE measures should be carried out only in close cooperation with official experts.
- Before any intervention, municipal or ministerial officials should evaluate the bearing capacity of the structure in order not to have refurbishment process if building is not considered stable.

**Second and third building period**

In the second and third period buildings are built between 1960 and 1990,

Regarding EE, these buildings are big energy consumers due to glass/wall ratio, thermal bridges, un-insulated envelope etc. In other hand there is also a big potential for saving energy and whenever possible during EE implementation the glass mass should be reduced and substituted with insulated walls.

**Fourth building period**

The emergency period or post socializm period had sheltering as priority. The emergency period renovations were conducted in a non professional manner and with bad quality materials. Walls were left un-insulated while thermal insulation was only installed in new ceiling because it was less expensive then constructing new concrete slab. However there are cases that not even ceiling was insulated. **Windows during** emergency period were produced from wet wood which during first year of being mounted cracked due to contraction. At present, those windows do not close properly and air penetrates throughout their frame. Also, in this period the windows produced from duralumin frame, which present the big problem regarding the heat transmission. **Floors** during this period were only covered with ceramic tiles.

**Fifth and sixth building period**

This period covers the new buildings constructed from 2001-2006 and after 2006. The residential sector had somebuildings that are constructed in accordance with state standards while individual houses in majority do not implement energy conservation measures. Thermal measures are implemented in building envelope and the roof.

Skeleton building system has a reinforced concrete frame which consists from elements such as columns, beams and slabs. Its importance lies on releasing walls from bearing function. Hence, perimeter walls are usually 25-30cm thick and openings or glass mass are unlimited in size. With no bearing walls, buildings rise to significant height.
This system has been widely adopted in Albania starting 1990. As to the wide span in time buildings constructed with this system represent various thermal characteristics.

Combined system is mostly used for individual houses. It combines both bearing walls and reinforced concrete frame. Thickness of bearing walls is reduced by the significant concrete mass used to fill clay hollow blocks. The combination of these systems comes more as a result of traditional craftsmanship than a real need for extra strength in structure. Thermal measures are not considered during construction and there is a significant EE potential.

**Classification as to the building materials**

As to the construction materials, buildings can be classified regarding four specific materials:

- Stone
- Brick (hollow, full)
- Concrete

These are only few of the materials used in construction, but there can be also other materials and subdivisions.

If built before 90-ies, the most common building material was full brick and perforated (hollow) brick after 1990 without outside insulation whatsoever. New building code enforced in 2003. It serves only for new buildings that build after entry in force. Even then no thermal insulation was required and no attention was paid to thermal bridges. Most of the buildings built during '90-ies have composite walls while perimeter concrete slabs and columns are left un-insulated and uncover with bricks creating this way a so called "Thermal bridge".

Until 90-ies roofs were constructed as flat roofs with a thin layer of thermal insulation covered with water insulation and gravel. However, later on these roofs were reconstructed as pitch roofs due to leakage problems. Whatever the thermal insulation was provided in original roof, it was damaged from leakage and from construction works carried out while reconstructing roof.

Windows installed during '60-ties and '90-ties are windows with single glass, while after '90-ies double glassed windows with aluminum frame were introduced. Such windows were produced in country are not so good regarding thermal conductivity. However, during the last decade residential buildings have gone through a refurbishment process with mostly windows being changed with new PVC double glazed or wooden frame double glazed.
## Albanian Residential Building Typology – the Matrix

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