Energy Efficiency in the buildings of Kosovo

Maljetë Hoxha

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Energy Efficiency in the buildings of Kosovo

Bachelor Degree

Maljetë HOXHA

October, 2010

Prishtinë
Energy Efficiency in the buildings of Kosovo

Maljetë HOXHA

Energy Efficiency in the buildings of Kosovo

Dr. Cand. Binak BEQAJ

October, 2010

This thesis is submitted in partial fulfillment of the requirement for a Bachelor Degree
I would like to dedicate this thesis to my dearest Mother

Ganimete Hoxha
Acknowledgments

I would like to thank everyone who has given their contribution in helping me to write this thesis. I would like to thank you Dr. Cand Binak Beqaj, Dr. Edmond Hajrizi, Dr. Thomas Hrabal, Prof. Ernst Heiduk, Dr. Caroline Jager-Klein, Prof. Marena Marquet, for spreading your knowledge, for your support and help to develop myself and become more mature human being during the three years journey and for gaining the bachelor degree in Architecture and Spatial Planning.

I would also like to thank other people who are dealing with the same topic in Kosovo and helped me without any hesitation in my last project for the bachelor degree; Dr. Xhelal Llonçari, Msc. arch Petrit Ahmeti, Avni Sfishta, Besiana Berisha, Luan Morina, my best friends, without them I could not make it.

Last but not least, I would like to thank my family, my father Selman, my mother Ganimete, my sister Donjete and my brothers Majmal and Ismail for supporting me every time I needed help.

Maljetë HOXHA
Abstract

The thesis is basically interview based thesis. The aim of the project is to explore the actual situation of energy efficient buildings of Kosovo.

The thesis by exploring the current situation, tries to identify which are the next steps that should be taken in to account in order to have a better performance of energy efficiency in the buildings.

Although, there are mentioned some public buildings, the thesis are mainly focused on the residential sector which is considered the most energy consumption sector.
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Abbreviations

AKM Association of Kosovo Municipalities
EU European Union
EC European Commission
CHF Cooperative Housing Foundation
GTZ The Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
KEEA Kosovo Energy Efficiency Agency
KfW Kreditanstalt für Wiederaufbau
MS Member States
MEM Ministry of Energy and Mining
MESP Ministry of Environment and Spatial Planning
MLGA Ministry of Local Government Administration
RES Renewable Energy Resources
Almost everywhere in the world nowadays architects are strongly occupied in building sustainable architecture and a better quality of life for human beings regarding also global challenges like it is the climate change. Community of architecture, mainly in European countries, is doing its best in developing the concept of low energy buildings-energy efficient buildings. Some European countries have even started to deal with this issue in the late of 80ies, are they 20 years ahead from Kosovo? Probably, unfortunately yes. Should the people of Kosovo turn on their ‘engines’ in the last moment and think seriously about their quality of life?

Although Kosovo had a tradition in the quality of buildings, however, because of the political situation which collapsed during the end of the twentieth century, in 1999, the situation has changed dramatically. Unfortunately destroying and burning the residential and historical buildings became part of the plan for ethnic cleaning of the population who lives in Kosovo.

Therefore, in my bachelor thesis I will try to explore the current situation of energy efficiency and sustainable architecture in Kosovo, try to extract few of good examples and show some bad examples too, what it is happening at the moment, almost twelve years after the war?

The other reason why I have chosen this topic is that I want to make my contribution through this paper, to remind people and let them be aware of global challenges, how much they can contribute for a healthy environment end to the economical situation of the country by building quality envelopes for their homes. And reminding them that the opposite of not doing so, it is the

“Modern technology has become a total phenomenon for civilization, the defining force of a new social order in which efficiency is no longer an option but a necessity imposed on all human activity.”
Jacques Ellul
factor which weakness the economy of the country, of climate change, pollution etc.

In the first chapter is given the definition of energy efficient buildings, history, basic principles of energy efficient buildings and some information’s about the costs. There are also given types of energy efficient buildings throughout Europe and how much citizens of Europe are spending to build those houses.

In the second chapter is shown the situation of the quality of buildings at the moment in Kosovo. The chapter is basically concentrated in the current situation and shows the level of how much people are informed about the concept. Some facts are given about the standard of buildings at the moment, mostly in Pristina, the capital city of Kosovo.

To conclude this introduction, my bachelor thesis is interview-based project and during this experience I wanted to explore how familiar are the people of Kosovo with the concept of energy efficiency in their buildings.
2. UNDERSTANDING ENERGY EFFICIENT BUILDINGS

2.1 Definition and standards of energy efficient building

There is no global definition for energy efficient buildings, but it generally indicates a building that has a better energy performance than the standard alternative/energy efficiency requirements in building codes. Energy efficient buildings typically use high levels of insulation, energy efficient windows, low levels of air infiltration and heat recovery ventilation to lower heating and cooling energy. They may also use passive solar building design techniques or active solar technologies. These homes may also use hot water heat recycling technologies to recover heat from showers and dishwashers.

In fact, energy efficient buildings are known under different names across Europe. A survey carried out in 2008 by the Concerted Action supporting EPBD identified 17 different terms in use to describe such buildings used across Europe, among which the terms low energy house, high-performance house, passive house/Passivhaus, zero carbon house, zero energy house, energy savings house, energy positive house, 3-litre house etc. In the relevant literature additional terms such as ultra-low energy house can be found. Finally, concepts that take into account more parameters than energy demand again use special terms such as eco-building or green building.

Variations exist not only as regards the terms chosen, but also what energy use is included in the definition. Ideally, the minimum performance requirements should take into account all types of energy use that is demand for space heating (cooling), water heating, air conditioning as well as consumption of electricity. This is often not the case. On the contrary, the definition may cover only space heating ignoring all electricity demand that may cover most heating needs for instance in office buildings. The following illustration on selected low energy performance standards shows the different scopes and calculation methods: [1]
At present, seven EU MS have defined for themselves when a building is a low energy building (AT, CZ, DK, UK, FI, FR and DE, BE (Flanders), a few more (LUX, RO, SK, SE) plan to do so. Definitions typically target new buildings, but in some cases (AT, CZ, DK, DE, and LUX) also cover existing buildings and apply in almost all cases to both residential and nonresidential buildings [3]. Typically the required decrease in energy consumption will range from 30 to 50 % of what is defined for standard technology for new buildings. That would generally correspond to an annual energy demand of • 40- 60 kWh/m² in Central European countries. In some countries such as France or Switzerland, labels have been introduced (MINERGIE in Switzerland, Effinergie in France) that help consumers identifying nationally standardized low energy buildings. The table below gives an overview of the definitions for low energy buildings used across Europe:
Table 1: Examples of definitions for low energy building standards

<table>
<thead>
<tr>
<th>Country</th>
<th>Official definition</th>
</tr>
</thead>
</table>
| Austria      | • Low energy building = annual heating energy consumption below 60-40 kWh/m² (gross area 30% above standard performance)  
• Passive building = Feist passive house standard (15 kWh/m² per useful area (Styria) and per heated area (Tyrol)) |
| Belgium (Flanders) | • Low Energy Class 1 for houses: 40% lower than standard levels, 30% lower for office and school buildings  
• Very low Energy class: 60% reduction for houses, 45% for schools and office buildings |
| Czech Republic | • Low energy class: 51 – 97 kWh/m² p.a.  
• Very low energy class: below 51 kWh/m² p.a., also passive house standard of 15 kWh/m² is used |
| Denmark      | • Low Energy Class 1 = calculated energy performance is 50% lower than the minimum requirement for new buildings  
• Low Energy Class 2 = calculated energy performance is 25% lower than the minimum requirement for new buildings (i.e. for residential buildings = 70 + 2200/A kWh/m² per year where A is the heated gross floor area, and for other buildings = 95 + 2200/A kWh/m² per year (includes electricity for building-integrated lighting)) |
| Finland      | • Low energy standard: 40% better than standard buildings |
| France       | • New dwellings: the average annual requirement for heating, cooling, ventilation, hot water and lighting must be lower than 50 kWh/m² (in primary energy). This ranges from 40 kWh/m² to 65 kWh/m² depending on the climatic area and altitude.  
• Other buildings: the average annual requirement for heating, cooling, ventilation, hot water and lighting must be 50% lower than current Building Regulation requirements for new buildings  
• For renovation: 80 kWh/m² as of 2009 |
| Germany      | • Residential Low Energy Building requirements = kfw60 (60 kWh/(m²·a)) or Kfw40 (40 kWh/(m²·a)) maximum energy consumption  
• Passive House = Kfw40 buildings with an annual heat demand lower than 15 kWh/m² and total consumption lower than 120 kWh/m² |
| England & Wales | Graduated minimum requirements over time:  
• 2010 level 3 (25% better than current regulations),  
• 2013 level 4 (44% better than current regulations and almost similar to PassivHaus)  
• 2016 level 5 (zero carbon for heating and lighting),  
• 2016 level 6 (zero carbon for all uses and appliances |

Source: SBI (Danish Building Institute), European Strategies to move towards very low energy buildings, 2008
2.1 History of energy efficient buildings

In Germany, research had developed since the early 80ies, more and more efficient buildings which were used to develop, test and demonstrate new solutions. At the same time, Passive houses and other low energy buildings have been used and subsidized to move the most efficient buildings towards ever lower energy uses. This has created a small market for the most efficient buildings and helped the new standards to mature. It can be seen in the illustration below that the minimum standards of the building code have gradually followed the R&D frontier. [²]

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Fig.2 History of development of energy efficient buildings through the years

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1Info note, Brussels, Low Energy Buildings in Europe, 2009, page 2
2.2 Basic principles how to build an energy efficient building

ISOVER is one of the leading companies which provides sustainable design and construction of buildings. Their experience of 70 years has made this company one of the most innovative company in the industry of designing and construction of buildings. Below is presented their principle how to build an energy efficient building.

Energy efficiency is a fundamental element in our global fight against climate change. It plays a critical role in minimizing the societal and environmental impacts of economic growth in developing and developed nations. Energy efficiency also has a crucial role improving every nation's security of energy supply. In addition, these benefits can come without a price tag as is the case for insulation where it is easily possible to get five times your investment back in money saved. This can be achieved through the following elements:

1. **bioclimatic architecture**: shape and orientation of the building, solar protections, passive solar systems
2. **high performing building envelope**: thorough insulation, high performing glazing and windows, air-sealed construction, avoidance of thermal bridges
3. **high performance controlled ventilation**: mechanical insulation, heat recovery

Only when the building has been designed to minimize the energy loss, it makes sense to start looking at the energy source (including renewable energy) and at the heating and cooling equipments. We designate this approach as the Trias Energetica concept.

Fig3. The trias Energetica Concept
Following the principles of the Trias Energetica concept they have developed the following 5-step approach:

**Bioclimatic architecture** takes into account climate and environmental conditions to help achieve thermal and visual comfort inside. Bioclimatic design takes into account the local climate to make the best possible use of solar energy and other environmental sources, rather than working against them. Bioclimatic design includes the following principles:

- The shape of the building has to be compact to reduce the surfaces in contact with the exterior; the building and especially its openings are given an appropriate orientation (preferably towards the south); interior spaces are laid out according to their heating requirements;
- Appropriate techniques are applied to the external envelope and its openings to protect the building from solar heat in winter as well as in summer; passive solar systems collect solar radiation, acting as “free” heating and lighting systems; the building is protected from the summer
sun, primarily by shading but also by the appropriate treatment of the building envelope (i.e. use of reflective colors and surfaces).

**Thermal insulation** is a low-cost, widely available, proven technology that begins saving energy and money, and reducing emissions the moment it is installed. Well installed insulation ensures energy efficiency in every part of the building envelope including ground decks, roofs, lofts, walls and facades. It is also well suited for pipes and boilers to reduce the energy loss of a building’s technical installations. Insulation is as relevant in cold regions as in hot ones. In cold/cool regions, insulation keeps a building warm and limits the need for energy for heating whereas in hot/warm regions the same insulation systems keep the heat out and reduce the need for air conditioning.

- An exterior wall is well insulated when its thermal resistance (R value) is high, meaning the heat losses through it are small (reduced U value). Insulation is a key component of the wall to achieve a high R value (or a low U value) for the complete wall. The thermal resistance R of the installed insulation products has to be as high as possible.
- To limit the thickness of the insulation within acceptable dimensions, Saint-Gobain Isover constantly improves the thermal conductivity of its materials (lower lambda value) thus allowing increased thermal resistance within the same space.

**Air tightness** reduces air leakage – the uncontrolled flow of air through gaps and cracks in the construction (sometimes referred to as infiltration, exfiltration or draughts). Air leakages need to be reduced as much as possible in order to create efficient, controllable, comfortable, healthy and durable buildings. With more stringent building regulations requiring better energy efficiency, air tightness is an increasingly important issue.

- Details that are vital to achieving good air tightness need to be identified at early design stage. The next and equally important step is to ensure these details are carried over into the construction phase. Careful attention must be paid to sealing gaps and ensuring the continuity of the air barrier. It is far simpler to design and build an airtight construction than to carry out remedial measures in a draughty home.
- Saint-Gobain Isover has developed systems with innovative accessories that allow appropriate installation of the insulation while guaranteeing excellent air tightness and allowing proper moisture management (see the Vario system presentation).
Consequences of air leakages: cold outside air may be drawn into the home through gaps in the walls, ground floor and ceiling (infiltration), resulting in cold draughts. In some cases, infiltration can cool the surfaces of elements in the structure, leading to condensation. Warm air leaking out through gaps in the dwelling’s envelope (exfiltration) is a major cause of heat loss and, consequently, wasted energy. Most existing buildings, even those built recently, are far from being airtight and because of unwanted air infiltration generate huge costs to owners and occupants, in environmental, financial and health terms. A leaky dwelling will result in higher CO2 emissions. The additional heat loss will mean that a correctly sized heating system may not be able to meet the demand temperature. Draughts and localised cold spots can cause discomfort. In extreme cases, excessive infiltration may make rooms uncomfortably cold during cooler periods. Excessive air leakage can allow damp air to penetrate the building fabric, degrading the structure and reducing the effectiveness of the insulation. Air leakage paths often lead to dust marks on carpets and wall coverings that look unsightly.

Ventilation is the intended and controlled ingress and egress of air through buildings, delivering fresh air, and exhausting stale air through purpose-built ventilators in combination with the designed heating system and humidity control, and the fabric of the building itself.

- If you do not insulate properly and ventilate too little, you can risk warm humid air condensing on cold, poorly insulated surfaces which will create moisture that allows for moulds and fungi to grow.

- A controlled ventilation strategy will satisfy the fresh air requirements of an airtight building. Air infiltration or opening of the window cannot be considered an acceptable alternative to designed ventilation.

- As the saying goes: ‘build tight, ventilate right.’

2.2.1 Cost of Energy Efficient Buildings

Based on the experience of local professionals and producers in Kosovo, in most of the cases, the costs for building an energy efficient building go beyond what it is experienced in other countries of Europe especially in western countries of Europe. This is happening due to the fact that most of the materials need to be imported from abroad. With less developed low energy markets the costs are always higher.

According to sources and information from MEM officials, currently, is being worked in the relevant law, which will make the reduction of customs tariffs for
products of energy efficiency. It also envisions the establishment of customs tariffs for products that have lower performance in energy efficiency. This law will make potential investors and manufacturers from developed countries of Europe to invest in Kosovo. However, below is given an explanation about the experienced costs in general to all countries in Europe.

Additional costs for energy efficient buildings cannot be predicted with precision, in all cases they depend on specific conditions. Up to 10% extra upfront investment costs are reported, but with clearly declining trend. The cost of building energy efficient is generally higher due to the extra costs associated with improved insulation of all building components such as windows. Another reason is that most entrepreneurs are not used to the new technologies and much time and resources are invested in planning, education and quality assurance – which bring up costs. This has also contributed to the idea that energy-efficient buildings are expensive. Exact information on these additional costs are difficult to find, in particular for countries with less developed low energy markets, but below is given an overview of studies and the situation in several countries.

Indeed it can be shown that in Germany, Austria or Sweden it is now possible to construct Passivhaus buildings for costs that are no longer significantly higher than for normal standards because of increasing competition in the supply of the specifically designed and standardized Passivhaus building products. For these countries (one could add Switzerland), the extra cost of construction is generally indicated to be in the range of 4-6 % more than for the standard alternative. For Switzerland, a range of 2-6 % of additional upfront cost is given for the Minergie® low energy standard and, depending on the design chosen, a range of 4-5 % but maximum 10 % for the Minergie® P passive house standard. The Interessensgemeinschaft Passivhaus in Germany gives a similar estimation of a range of 0-14 % of extra upfront costs and with current energy prices a time span of up to ten years before energy savings neutralize the extra cost. The Passive-On project estimates the range of additional upfront costs across five involved countries (UK, FR, PT, ES, IT) to be in the range of 3-10 % for newly constructed buildings respecting passive house standards. The cost difference between a low

Energy and the more ambitious passive house standard is indicated with 8 % (around 15,000 Euro) for Germany.

Interestingly, the standardized labels as they are used in Switzerland and France can help to limit the surplus costs (10% for Minergie® S, 15% for Minergie® P) due to the special construction techniques employed and hence
act as a safety net. The French study ‘Construction durable’ has also demonstrated that the earlier the energy parameter is included in the project, the smaller this cost will be. The HQE association in France, reports an additional cost of only 5% if the ‘High Environmental Quality’ parameters are taken into account early enough. In other projects additional costs and payback time were still considerably higher. For example, the first low energy house in Ireland needed a reported price of 1.130 Euro/m².

For the specific case of Passive house buildings, it should be noted that buildings bring a substantial reduction of total costs at around 15kWh/m² p.a., point at which a traditional heating system is no longer needed. If a house is built as a passive house, one can actually save money for not having to install a radiator system at all. At this level of energy efficiency, the gains from energy savings will also be significant. However marginal costs then rise steeply to achieve even higher savings as is shown below.

Fig 5. Source: Laustsen, Jens: Energy Efficiency requirements in building codes and energy efficiency policies for new buildings. IEA, 2008.

One should be cautious in trying to transfer cost estimations from one country to another, as energy prices, labour cost, available experience and expertise differ significantly, as does the way in which each construction project is executed. In particular, it seems misleading to try to transfer the price estimations from countries which are already in their phase of rapid spread
(Germany, Austria) to other countries where low energy buildings are not yet common (East and some southern European countries).

### 2.2.2 EU MS aspirations for energy efficient buildings?

Several Member States have already set up short and long-term strategies and targets for achieving low energy standards for new houses. For example, in the Netherlands there is a voluntary agreement with industry to reduce energy consumption compared to the present building codes by 25% in 2011 and 50% in 2015 (which is close to passive house) and to have energy neutral buildings in 2020. In the UK the ambition is to have zero carbon homes by 2016. In France by 2012 all new buildings should comply with "low-consumption" standard, and by 2020 be energy positive, i.e. produce energy. Also several regions and municipalities (e.g. in Italy) are moving ahead. Outside Europe, similar developments can be observed with e.g. Japan currently discussing plans to adopt a goal for zero energy buildings by 2030 and some US states such as California.

![Image of EU timeline for legislation](http://www.bsria.co.uk/news/eu-energy/)
3. ENERGY EFFICIENCY IN THE BUILDINGS OF KOSOVO

Generally the term energy efficient in Kosovo is quiet new. Kosovo has signed the Energies Efficient Treaty, in 2005 after a negotiation part of two years. The law on construction in power unfortunately yet does not treat the energy efficiency in buildings. Based on the informations given by the official working personnel, at the moment the law is under reevaluation with the proposals for energy efficient performance in buildings.

3.1 Government support for energy efficiency

There is a wide range of activities done by relevant authorities under government of Kosovo so far. Particularly the ministry of energy and mines has done and continues to do many activities, including capacity building for managing energy consumption. This ministry also helps reduce energy consumption in the public sector, which is trying to be an example, for owners of other construction units. Law for Energy of year 2004 treats with a special accent on the energy efficiency and determines the responsibilities. Kosovo legislation; Energy Law, The law on electricity, Heating Law, Draft law on energy efficiency, Administrative guidance for energy audit. Below is listed the hierarchy of powers;

Ministry of Energy and Mining is responsible for the Energy Efficiency.

As part of MEM, the Division for Energy Efficiency performs since 2005. First Kosovo Action Plan for the Energy Efficiency was compiled on 2006 from MEM with the EAR support appointed as KOSOVO PROGRAM FOR ENERGY EFFICIENCY, AND REVENUABLE RESOURCES (PKEEBRE) 2007-2009

With all the defects concerning the implementation of the all projects of PKEEBRE target had served as good base for some activities and as output could be mentioned:

Composition of the secondary legislation for energy efficiency,
Trainings for energy auditor (overall elementary knowledge),
Municipalities official’s trainings of 26 Municipalities of Kosovo for efficiency, Audit, managing the projects etc.,
Direct support on the public sector for building the solar system of heating the water on the public sector buildings,
Contracted international auditors from EAR for auditing some buildings of public sector,
Campaigns of the energy efficiency etc.[3]

Sustainable development is about improving the quality of life, while reducing the use of natural resources and pressures on the environment. Our quality of life is greatly enhanced by energy and the services it provides. The main source of energy production in Kosovo is lignite. The main question is how to make use of available energy resources sustainable and how to replace it with renewable ones.

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Reducing the environmental pressure of the energy sector by implementing energy efficiency projects and gradually introducing renewable energy sources (RES) and newer technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures</td>
<td>- Finalization and implementation of the Energy Strategy with Action Plan and adoption of necessary sub-legal acts</td>
</tr>
<tr>
<td></td>
<td>- Institutional strengthening</td>
</tr>
<tr>
<td></td>
<td>- Introduction of economic instruments</td>
</tr>
<tr>
<td></td>
<td>- GHG inventory and National ceilings</td>
</tr>
<tr>
<td>Aktivities</td>
<td>Ensuring legal and technical conditions for implementation of pilot programs on EE and RES</td>
</tr>
<tr>
<td></td>
<td>Implementation of pilot projects on energy potential of waste</td>
</tr>
<tr>
<td></td>
<td>Developing a plan for management of waste from energy sector</td>
</tr>
<tr>
<td></td>
<td>Ensuring legal and technical conditions for transfer of knowledge and new technologies</td>
</tr>
<tr>
<td></td>
<td>Law enforcement for fuel quality control</td>
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<tr>
<td></td>
<td>Establishing of a monitoring and information system</td>
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<tr>
<td></td>
<td>Setting emission limits for emissions from power plants and central heating systems</td>
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<tr>
<td></td>
<td>Development of Regulation for energy performance of buildings</td>
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<tr>
<td></td>
<td>Encouraging of use of combined heating systems</td>
</tr>
<tr>
<td></td>
<td>Capacity building for personnel in the energy sector</td>
</tr>
<tr>
<td></td>
<td>Support voluntary agreements between the government and the industry</td>
</tr>
<tr>
<td></td>
<td>Assessment of possibilities to introduce CO2 taxes</td>
</tr>
<tr>
<td></td>
<td>Development of use of RES</td>
</tr>
</tbody>
</table>

Fig. 7 Scheme of objectives and activities planned for 2006-2010
LIST OF PRIORITY PROJECTS:

<table>
<thead>
<tr>
<th>No.</th>
<th>Project</th>
<th>Budget (EUR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.</td>
<td>Developing Capacities for Implementation of ISO 14001 in Kosovo</td>
<td>203,833</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>1,218,966</td>
</tr>
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</table>

Fig. 8 Scheme of projects and budget planned for 2006-2010

As seen in these tables is not made sufficient investment to date in the field of energy saving by the government, especially in the construction of buildings using energy efficiently. The housing sector is calculated as the largest spenders of energy and the current state of houses in terms of energy saving is disturbing.

Currently in many conferences and debates organized in the local level by AKM, it is being discussed the need to establish an office with the manager of energy efficiency in every municipality. The office and manager for each municipality, it is a new proposal within the law of energy efficiency proposed by MEM. This manager should be responsible and report to MEM for all the data’s from the municipality regarding energy efficiency. But yet, there is another problem that should be solved, the current law of energy efficiency does not address where the financial support for these offices should come.

As for the managers who will be working in the quality of expert, AKM considers that at the moment, there are enough human resources to perform this job after the training of 60 energy auditors. They will monitor and read, energy meter each month and will make a simple analysis. Energy managers will be able to apply for funding to undertake some cases far less costly of energy efficiency in buildings under their management. Project results will be monitored and will be used as typical examples for less costly measures of success, in order to repeat them in other buildings.

3.2.1 MEM Campaign

Since September 2009 a campaign from MEM called "The campaign to raise public awareness for promoting Energy Efficiency and Renewable Energy Resources" has started its activities. Until now they have provide some brochures and posters which describes how to use energy efficiently and some examples how people can improve performance of energy efficiency in their homes. Below is presented the description of the campaign, the aim of the campaign and how are they planning to achieve the goals of the campaign.

Republic of Kosovo produces electricity from power plants, but not sufficient enough to cover habitants’ needs. Kosovo does not have natural gas reserves or oil, no gas or oil pipeline access, and the country does not have objects for processing by oil. Except burning wood, uses few renewable resources. For the above reasons a part of Kosovo’s energy needs should be covered under the import provision. And Kosovo’s energy needs will continue to grow significantly in the next decade. By 2007, residential sector is calculated as the sector that consumes the most electricity in Kosovo, and today spends 50% of all energy consumed. Kosovo in particular relies heavily on electricity for heating. Other important customers are the service sector and public sector.

Kosovo is committed to reducing energy demand by encouraging more efficient in energy use and greater use of resources to energy. As renewable member of the Energy Community Treaty for Southeast Europe, which is devoted to this issue, Kosovo has drafted and submitted a national plan for efficiency in energy usage. The National Plan for Energy Efficiency 2009-2016 has set targets annual savings of at least 1% (one percent), the use of energy by the year 2016.

An important part of achieving this goal, it will be public awareness to encourage households, owners and managers of buildings to use energy more efficiently, and where possible to utilize more RES. In accordance with the above information the EU has decided to support with € 300,000 of public awareness project to support the efforts of the Government to encourage the public to use more sustainable energy practices. This is the first national campaign for public awareness to promote energy efficiency.

The aim of the campaign; this campaign aims to increase public awareness for promoting Energy Efficiency and Renewable Energy Resources, energy saving measures and other related benefits to the environment and priorities for the use of renewable energy. This will be achieved through the following means of communication.

- TV and Radio ads
- Notices in newspapers
- Billboard advertisements in
Energy Efficiency in the Buildings of Kosovo

3.2 Energy in Kosovo

Energy in Kosovo relays mainly in electricity production and it represents one of the most important sectors of Kosovo economy. Resource for obtaining the primary energy is very high, but in aspect of impact on environment is very unfavorable, because it mainly consists on huge lignite reserves. Actually, out of total annual electric energy produced in Kosovo, about 97% is provide through burning of coal in power plants, while hydropower provides only about 3% of annually produced electric energy. Main sources of electricity production are still the existing lignite resources and better use of hydropower. Solar, thermal, wind and biomass energy is used very few cases.

Installed power of power plants is about 1.478 MW, while coal supply is done from the open pit mines in Mirash and Bardh, with projected capacities of 16 million tons/year. Actual level of power plant production capacities is very low – it is only about 30% of installed capacity. Kosovo doesn't have its source of liquid and gas carburant; therefore, supply with those carburant is mainly done through import. In general, efficiency of energy use is very low. Energy sector in Kosovo is an enormous polluter, especially in a wide region of Prishtina. Gas emissions from power plants do have a high level of dioxide, sulphur, nitrogen oxides and dust. Due to the lack of treatment of industrial waters, power plants cause water pollution. Additional problems are ash hills that have more than 40 million tons of ash and are taking about 150 ha of agricultural land, as well as craters created during the coal exploitation in lignite open pit mines.\(^4\)

3.3 Analyzing some of the buildings

3.3.1 Private housing

Currently, there are few cases where citizens are using solar panels for water heating in their homes. However, it is becoming a major application of economic bulbs as well, that save 80% of energy. Based on personal experience as a permanent inhabitant of Kosovo as well as from the opinions of interviewed people, there are two categories of private residential buildings in Kosovo in terms of energy efficiency. Buildings that remain without any thermal isolation are more than 70%. The rest of the buildings have an average of up to 8cm thermo isolation.

Fig.9 a), b), c) and d) Houses in Kosovo without thermal insulation
The facts above shows that habitants are spending huge amount of energy to heat those buildings.

b) http://www.eu-ad.com/?view=ads&catid=4&subcatid=&cityid=0&page=7 (13th of August, 20:36)
Another category of buildings are the buildings which have an envelope up to 10 cm, but still they also spend huge amount of energy to heat those types of buildings because of thermal bridges as a mistake during the constructions. Considering the fact that the law on construction in power does not treat the issue of training the workers, they continuously make mistakes during the constructions, thus, they do not reduce thermal bridges, but they keep leaving many thermal bridges.

Fig. 10 e) Houses in Kosovo with a small thermal insulation $t = 3$ up to 8 cm

### 3.3.2 Collective housing

Still another element to worry is the quality of collective residential buildings currently being built in Kosovo. Given the overcrowding that is being undertaken in Kosovo, especially cities in Pristina, the construction of collective housing has become one of most profitable postwar business. As the desire of some businessmen to go quickly to the money, but ignored the standards of design and construction of buildings collectively. In most collective buildings recently built is not mechanical tests were made on the quality and strength of the soil. Some experts of the country have stated that 70-80% of collective buildings do not meet quality standards and rules of construction. They even say that if there will be terms, will have great human losses and material due to poor construction of residential buildings collectively.

Fig. 11 The picture shows the external wall of a collective building in Pristina which has only two layers, brick $t = 20$ and brick $t = 10$ cm and as a result, the energy loss is huge.

Source:

Source: [http://www.google.com/imghr](http://i8.photobucket.com/albums/a28/skitzoph/DSC01863.jpg)
3.3.3 Public buildings

MEM projects to promote solar energy is financing the deployment of solar panels through several public buildings including, hospital facilities, dormitories, etc. and will continue to be implemented also in other public buildings. Also, the ministry of labor and social welfare for two years has made the deployment of solar panels on buildings.

![Fig. 12 System of solar panels in clinic in Pristina](http://www.google.com/imgres?imgurl=http://www.ks-gov.net/MEM/repository/images/Inaugurimi_i_paneleve_ne_QKUK.jpg&imgrefurl=http://www.ks-gov.net/mem/?page=1,42,131&usg=__9NS0b7G5o0dvhKVo5ti6I69FLOo=&h=424&w=600&sz=69&hl=en&start=0&zoom=1&tbm=isch&tbnid=uWxFckahe6fAGM:&tbnh=146&tbnw=195&prev=/images?q=QKUK+panelet+solare&hl=en&biw=1280&bih=909&gbv=2&tbs=isch:1&itbs=1&iact=hc&vpx=547&vpy=86&dur=230&hovh=189&hovw=267&tx=130&ty=101&ei=_9PHTIfZFZDKjAfu56XjDw&oei=_9PHTIfZFZDKjAfu56XjDw&esq=1&page=1&n dsp=5&ved=0CBojuke4AQE)

Another important project which is happening for the first time in one of the municipalities of Kosovo in terms energy efficiency it is called "Renovation of public lighting in the Municipality of Shtime, using photo-Voltiake panels." The idea for this project has come from the International Conference "Environmental Protection and Energy Efficiency which was organized by MESP respectively Kosovo Agency for Environment Protection which was held in Pristina on 20-21 October 2008. The project will be implemented in two phases, while the cost of the project will be 150.000.00 (one hundred and fifty thousand Euro)

c) [http://www.tregukosVAR.com/dtl/?id=11511](http://www.tregukosVAR.com/dtl/?id=11511) (22nd of August, 19:30h)


e) [http://www.tregukosVAR.com/dtl/?id=11511](http://www.tregukosVAR.com/dtl/?id=11511) (22nd of August, 19:42h)
3.4 Who else is supporting energy efficient initiatives besides government?

3.4.1 EC supports energy efficiency in Kosovo

The European Commission it is engaged in helping the development of energy efficiency and clean environment in Kosovo. Regarding this EC has supported the rehabilitation of five public buildings, the Emin Duraku and Selman Riza primary schools in Gjakovë, two schools in Pristina and the Regional Hospital in Gjilan. The EC Liaison Office to Kosovo is funding two more projects in favor of energy efficiency. One is support to the Ministry of Energy and Mining in its efforts on establishing an energy auditing process in compliance with legal requirements and the National Plan for Energy Efficiency, which recently trained and certified national energy auditors. The second project focuses on a public awareness campaign in order to promote the efficient use of energy and the use of renewable energy sources. All in all this makes over EUR 2 million of EU investments for a cleaner and greener Kosovo.

Fig.13 Inauguration of the Emin Duraku and Selman Riza primary schools in Gjakovë.

The rehabilitation works have concentrated exclusively on energy efficiency measures such as thermal insulation of the external walls and the roof, installation of new PVC windows and doors, overhaul of the existing boiler system and in one of the schools also the installation of a new lightning system.

The energy consumption in the rehabilitated buildings is expected to drop for at least 40% and the temperature and thermal comfort inside the schools will improve considerably. For instance in winter the temperature should go from frosty 14-15°C to comfortable 19-20°C. In addition, the pollution caused by the heating, such as CO2 emissions, will decrease considerably.
3.4.2 CHF supporting green technology

Currently there are some organizations and individuals who have already started to do something towards this concept. CHF is an international development organization which has developed the idea to build a new school using modern green technology. Since they wanted to raise the awareness about the green technology, CHF asked local designers to design the concept. Local designer surprised CHF because they went beyond the expectations with concepts and models using technologies such as solar, wind, geothermal, efficient building materials and special lighting systems. Construction began almost immediately after signing the contract in October 2009. The Green School is expected to be ready for the 2011 school year.

Fig. 14. The picture is a 3D view, which shows the final view of Green School

3.4.3 GTZ invested in 52 projects in Energy Efficiency

Another project which is called Modernizing municipal services is being implemented by GTZ in Kosovo, a federally owned organization by German Government which works worldwide in the field of international cooperation for sustainable development, in association with Kosovo Municipalities. The duration of this project is planned to be January 2006 to December 2013. Until September 2010 within this project have been realized 52 projects or 2.2 million euro in the field of energy efficiency. These projects mainly are public buildings; 29 schools, 8 municipality buildings, 5 hospitals and 10 public lighting streets. The project is concentrated in improving in a very high level the energy efficiency in four sections: public lightning, thermal insulation, changing of doors and windows and heating system renovation.
The preparation procedure starts by analyzing the existing situation of buildings in energy consumption, electricity, fuel, gas etc. The experts calculate the actual costs of the building. After this, the proposal for renovation from architects comes into account with energy efficient concept regarding thermo isolation, minimizing thermal bridges, changing windows and doors etc. The final section of preparations ends with comparing the costs of the building at the current situation with the costs after a potential renovation. If the project indicates that the building will reduce the energy consumption in a large size, than they decide to invest in the renovation.

3.4.4 KfW, the loans for energy efficient buildings

KfW is a German government-owned development bank active in Kosovo with many projects, which has recently started a project which is providing small interest loans for residents of Kosovo who are interested to build their homes using energy efficiently.

3.4.5 Kosova Centre for Energy Efficiency

The Kosovo center for Energy Efficiency has been established during 2008 with an initiative of more than 20 Kosovar and international experts, who aspire to contribute to the sustainable development of Kosovo thought energy efficiency. The goals of this centre are to contribute to policy development efficiency in all managerial levels reached in Kosovo to economic benefits environmental state of Kosovo, to support institutional development process building human capacities in Kosovo as a prerequisite for development and implementation of projects and programs for energy efficiency, to assist in technology transfer and exchange experiences and information, to support the environmental education focusing on the energy efficiency. The KCEE until now has made many activities including debates, conferences, trainings and workshops.[5]

3.4.6 Products and Services

Currently some companies in Kosovo are offering products and services in supporting the energy efficiency into buildings. MADEN GROUP except other activities in the field of construction and design, provides \textbf{ecological building houses} where access, design, construction of houses and supply of geothermal heating, solar panels, the system for double use of gray water, the thermal insulation of the house according to the latest standards, the system for collecting atmospheric water etc.

![Fig. 15 Schemes for renewable resources made by MADE GROUP](http://www.madengroup.com/publikimet/detalet-ekologjike.html) (25\textsuperscript{th} of August)

Some other companies are selling products including Green Energy Technologies which is selling solar panels and other products which save the energy and are eco friendly.

Source: \url{http://www.madengroup.com/publikimet/detalet-ekologjike.html} (25\textsuperscript{th} of August)
3.5 Survey - opinion research of the citizens of Kosovo and their knowledge about energy efficient buildings

In order to dig deeper in the real situation, discussing with society directly was the best solution. Trying to know the level of information of the people a survey was necessary. This survey was conducted with people of different professions and the important element is that, the target group for this survey were adult people from 25-45 years old, who already have finished studies and have jobs which gives them a good financial status. This makes the survey qualitative and not quantitative. Therefore below are the charts that explore better the knowledge of people in Kosovo about energy efficient concept;

Fig.16 Response of the interviewers in; what is an energy efficient building?

1. Usually people in the beginning felt confused, but after trying to explain them, than they were written those descriptions e.g.;
   • The building which has thickness of thermo isolation up to 40 cm.
   • Those buildings which use natural resources.
   • The buildings which use alternative energy.
   • Buildings which has thermo isolation with today’s standards.
   • I have heard about energy efficient buildings.
Fig. 17 Response of the interviewers in; how much you are informed about the global challenge of climate change-CO$_2$ emission?

The purpose of this question was made to remind them that each individual gives a ‘contribution’ to the global challenges. And therefore, having knowledge and being responsible what products we bye is very important, starting by planning to build a house and also using different mechanisms within the house. In Kosovo yet, not in every product it is written how much energy they spend and also how much CO$_2$ they emit.
Fig.18 Response of the interviewers in; Are you aware of high costs living in a low standard building?

Many examples are given nowadays that almost 80% of the costs of a buildings happen after the building is built. This comes as a fact of bad shelter of the building in terms of technical realization which indicates in thermal bridges – huge amount of energy loss, quality of materials and also thickness of thermo insolation in Kosovo which is usually rom 3 cm to 10cm.

Fig.17 Response of the interviewers in; Do you know that energy efficient buildings (Passivhaus) save 90% of the costs during their lives?
Have you ever thought of building your home with the principles of energy efficient building?

![Pie chart showing responses to the question.](image)

**Fig. 19** Response of the interviewers in: Have you ever thought of building your home with the principles of energy efficient building?

The answers in this chart show that the inhabitants of Kosovo are full of willingness to cooperate for a better quality of life, but they only need proper instructions which are missing at the moment. Although there is a campaign which was mentioned above supported by EU, still the majority needs to be informed.

Would you renovate your house and make it an energy efficient building?

![Bar chart showing responses to the question.](image)

**Fig. 20** Visual overview of the response; would you renovate your house and make it an energy efficient building?
This chart is another element which helps us to understand that inhabitants are open to cooperate towards the standard of energy efficient buildings.

**Are you aware of the fact that sustainable buildings which use the energy efficiently is an important issue to meet EU energy and environmental directives and regulations and to enter EU?**

Although, citizens are willing to fulfill the conditions to enter the EU, nonetheless, this diagram shows that in terms of meeting the EU directives and regulations in this area, citizens are still not informed enough. This diagram also mirrors the real situation of buildings in Kosovo.

Reducing energy consumption and eliminating energy wastage are among the main goals of the European Union (EU). EU support for improving energy efficiency will prove decisive for competitiveness, security of supply and for meeting the commitments on climate change made under the Kyoto Protocol. There is significant potential for reducing consumption, especially in energy-intensive sectors such as construction, manufacturing, energy conversion and transport. At the end of 2006, the EU pledged to cut its annual consumption of primary energy by 20% by 2020. To achieve this goal, it is working to mobilize public opinion, decision-makers and market operators and to set minimum energy efficiency standards and rules on labeling for products, services and infrastructure.[6]

3.7 The quality of buildings before the war of 1999 regarding energy efficiency

Although, it is obvious for everyone who is living in Kosovo to see it, the statement of Professor Xhelal Llonçari indicates that whatever period—in the last twenty years—of time we refer the quality of buildings was better than in the current time. Professor Xhelal Llonçari is one of the most experienced architects in Kosovo at the moment. Except many activities and participation to the contribution for a Sustainable Architecture, he was also engaged in the project of GTZ called Modernizing municipal services last year, who helped in renovation of buildings of some municipalities in Kosovo. Furthermore, to know better about his point of view regarding energy efficiency in the buildings below are some question answered by professor.

Interview with Xhelal Llönçari,

- **What insulation materials are mainly used in Kosovo in the earlier periods and have they been effective?**

  - Local materials: Mainly have been from mud brick and stones from one region of Kosovo called Gllareva. Although, the construction of residential buildings was based on local materials, the isolation of the buildings was not weak.

- **Does the area profits by using local-domestic materials?**

  There are benefits of course, but also often reflect shortcomings such as the case of stone which requires for a great treatment, people have known that clay is isolation material, but they have had near the stone. The combination of materials, further at that time, had to possess more knowledge. So, they have been challenged and aware of the fact which materials are more isolating materials.

- **Have architects, builders and workmanships taken into account the orientation of the building earlier and are they taking into account this principle now?**

  Of course they have taken it into account, even more, they have taken into consideration in two aspects: on one side was the orientation, to the other side was the compact provisions. Certainly we know that, if the house contains compact we waste far less energy. And orientation has been
exclusively on the south side, it has even have gone to the extreme, that often I have encountered cases where the north had no openings. There were very small window that was supposed to serve for the ventilation of any secondary alcove.

With the exception of this that we are talking, there were times that the main orientation has been from the north. This was happening only in cases where building owners have given priority to the visualizations which have been extremely dominant at that time but now. I.e. if a home has access from the street, the main orientation has north had even tried to use south. - That have dedicated important orientation but also isolation, this is taking place in Prizren castle, in the cities, but also in some villages of Kosovo, which I call intelligent villages: the priority of proof have saved the terrain, right in the visualization right at the orientation. - That the literature I have called the smart villages, i.e. Kosovo’s everywhere I have I usually travel to spend Peje and not sending Magure seen house near the hill, who have not ever built on agricultural land. - And now for the moment in Kosovo is not taken into account at all.

What are the factors of the present state of buildings in Kosovo?

- Non-compliance with regulations
- Pressure enormous immigration from rural to urban sites
- Pressure-capital-both when these are combined we have this result Arrival in Pristine uncontrollably.

The overpopulation of cities has happen in normal circumstances-Pristine has previously been very low rate of residents who have lived in cities. Normally, in the whole world is happening, but to us is going on at the wrong time, nor can offer you work, or better accommodation, nor has the capacity to accept. But, as a social phenomenon must happen because there is time no matter which city has no capacity.

- After the war
- Need for better living in the village,
- The habitants from village are not primitive society, they require conditions.
- No streets
- No electricity
- No water
- No infrastructure,
- Underdevelopment of villages
The economy is almost zero and the majority of the citizens of Pristina does not work.

Can you make a categorization of the buildings situation in Kosovo in terms of efficient energy use?
They are quite the same category, but here we should make a difference: I cannot complain for the last decade. There are many buildings with thermal insulation. This has come due to the fact of:
- Raising awareness
- Is the trend that, when the façade is done, it should also be placed thermal insulation.
- Consciousness of individuals.

Although, there is poor quality of isolation being applied at the moment, it is good that at least they are doing it. And yes, they leave thermal bridges because they are not informed, but it is also difficult to explain to the majority of people, because they are not able to understand it at the moment. Then, thermal bridges - eliminate them - requires professionalism and is financially cost able for which our nation is not prepared. That is largely absent of mass awareness, and also training of workmanship for the elimination of these thermal bridges is needed.

In your opinion which is the first and urgent step to be taken to improve the quality of buildings in Kosovo?
First of all, the adoption and observance of laws as soon as possible should be the first step. Then, we should push the education of generations as much as possible in this regard.

Are you optimistic for the application and use energy efficiently through buildings in Kosovo, or the application of European directives in this field in Kosovo?
As individual we do not have major impact, but we should never give up. Now in our market we can already find many materials ranging from economic electric shelves stock, but this is not satisfactory. A long and short term campaign is needed to inform the population, in different ways including media.
3.7.1 Domestic building materials

The building tradition regarding comfort and also architectural design was very sophisticated during the history, especially during the last twenty years. As domestic materials mainly were used clay bricks combined with straw fiber, which served as binding material. The walls constructed by this material were high heat isolation components within the building.

That has been a mixture of clay with straw or sheep's wool. That goat wool is used as binding material. Animal manure are more hygienic, rather than has some factors contained therein. Animal manure has been temporary material for each season's have changed. Even the cover of concrete have freezing's because in the chemical process they release heat. This indicates that it has had an insulating character, because there was no ornamental view or something else where this material was applied.

![Clay bricks](image)

Fig.22 Clay bricks
3.8 Building quality situation in the last twelve years after the war

Considering the fact that people came back to their burned homes, there was a quick home improvisation by every family.

Interview with Petrit Ahmeti,

Petrit Ahmeti is young architect who has finished recently his master degree in translating “Passive House Planning Package” into Albanian language. In the question how does he sees the development of construction of the buildings in the last decade in Kosovo in terms of thermal quality? He answered; “Unfortunately, the development in construction of the buildings in terms of quality, I see it as a slow process and low standard, not taking into account adherence to construction standards in force, much less the most advanced standards of the European Union. Construction has also undergone changes in terms of new materials and new construction techniques. But in my opinion, yet all these changes have not had any positive impact in the field of energy saving”.

• What are the factors of the present state of buildings in Kosovo?

The factors of this condition have been initially associated directly with low economic level of the country, as a consequence of war. This economic situation for 10 years has changed for the better, but not the quality of life. However, another factor is the disregard of the standards and laws of the building in force.

• How can you categorize the state of buildings in Kosovo in terms of efficient energy use?

Unfortunately, the use of energy efficiency in buildings, residential as well as public ones, is the last thing that it is taken into account. In general, this problem has its roots in general education in Kosovo, especially in the education of professionals in this field. As a result, buildings constructed after 1999 have very large losses of energy, this, as a
result of non-compliance of design methods and application of materials with poor quality or their application in the wrong way.

For existing buildings, I have no accurate records, what amount of energy they lose, but e.g. Difference between Passivhaus and buildings in Kosovo is about 95%, which means 95% are less efficient in energy consumption for heating and cooling. And the difference between the buildings in Kosovo could be 20-30%.

- **What are the products currently used as a source of alternative energy in buildings in Kosovo?**

In Kosovo they have already begun to promote every day products and accessories, which help energy use or production of the energy in alternative methods. These include solar panels for water heating, the panels 'photovoltaic' for the production and accumulation of energy, as well as thermal insulating materials which directly affect the energy savings. But their use is not at satisfactory level, due to no adequate information to citizens.

- **In your opinion, what is the first and urgent step to be taken to improve the quality of buildings in Kosovo?**

The first step would be the commitment of the Ministry of Environment and Spatial Planning in coordination with the Minister of Energy and Mining, having vetted the implementation of current laws, which are not served by today’s construction and at the same time, considered the possibility of harmonization of our laws those of the European Union. This however must be accompanied in parallel by the respective faculty by developing education in the field of energy saving and quality construction through collaboration with numerous institutions in European Union countries. Another important step is the professional preparation of professionals in new methods of design and calculation facilities, for reasons of achieving the best possible results in more efficient use of energy, which today is lacking.

- **Are you optimistic for the application and use energy efficiently through buildings in Kosovo-or the application of European directives in this field in Kosovo?**

Application of quality materials and efficient heating systems, we encounter in some cases in Kosovo, but in very small numbers. This number is negligible compared to the energy problem in general and to save it. And application of European Union directives, which have to do with the efficiency of energy
use, I see this as a very difficult step. This I base on the situation, not good economic situation in Kosovo, but also low awareness about the efficiency of energy use.

- **How is it possible that in Kosovo to build a building with high efficiency in energy use?**

Technical possibilities are available now and I'm sure that will be able to achieve the realization of objects based on the standard of construction quality "PassivHaus". This standard is one of the standards with the fastest development in the EU, in terms of standards with minimal consumption of energy. This standard is expected to be the standard of construction quality is mandatory for all EU countries, within a few years. In the near future this should be mandatory for Kosovo.

- **What are the advantages of the standard "PassivHaus"?**

The name "PassivHaus", reveals that these items benefit the energy in passive way, ie without electrical energy expended to produce thermal energy. In addition, this standard limits the maximum power consumption, lowering until 15kWh/m2 per year for heating and cooling. As an illustration, standard homes in Kosovo in a year spend 250-350KWh/m2 for heating and cooling. Therefore "Passivhaus" shows a very high efficiency in use of energy. At the same time living conditions in these homes are much higher, both in terms of comfort as well as hygienic.
2. CONCLUSION

Generally, the term energy efficiency it is not new in Kosovo, but regarding the buildings stills much work needs to be done, in order to raise the awareness of people.

Experience shows that in Kosovo, there is a need to offer training on energy efficient buildings to all operators in the building construction chain, architects, engineers, builders and workmanships in both public and private sector to increase knowledge about this concepts.

As the expectations were, people are not aware of the fact. Probably because of the economic situation, 70% are unemployed. Furthermore, the rest of the population which is employed have an average of incomes per month of about 150 euro.

The survey shows that people of Kosovo are full of willingness to cooperate, but there is a lack of information about the energy efficient buildings and sustainable construction.

Putting it into this context, sustainable architecture-design creates solutions that solve the economical, social and environmental challenges. People must be aware that, in parallel to their uncomfortable and unhealthy life, bad quality of buildings weakness the economy of the country.

Kosovo has almost every invention ready regarding building techniques and a wide range of materials which have been invented and still are developing by other countries within the European Union. Therefore, the application of these techniques needs to be updated by law constantly from the authorities with the clime where is located Kosovo, than just to be applied.

As seen in the second chapters of this project, government has invested a very small amount of money until now, which should be raised and be considered very important step in the planning of the budget in the next years.
Last but not least personally I had great experience having the chance in discussing and interviewing many professionals as well as interviewing people in the streets. This should be the goal of authorities, finding the best way to reach directly the society, in order to inform them regarding the energy efficiency.

An important fact is that, currently the topic of energy efficiency it is being discussed often in local and national level. However, does this mean that Kosovo will have a huge development regarding this field? This should be discussion topic in the next few years.
Internet resources:

1. http://sherbesa.com/chi/?path=1.0.1.2.8 (CHF, August 19, 2010)

Basic principles of low energy building


Basic principles of passive house

Energy Efficiency in the Buildings of Kosovo

Bachelor Thesis

Low cost building materials


Low maintenance building materials

Low cost building plans

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