ENERGY EFFICIENCY IN THE CONSTRUCTION

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“Buildings are the worst thing that a man makes to the environment “(Rob Wattson)

- Buildings are responsible for 40% of energy consumption and 36% of EU CO₂ emissions.
- Most of energy is a product of fossil fuels and the burning of fuels like coal and oil release pollutants that contribute to global warming.
- Energy performance of buildings is key to achieve the EU Climate & Energy objectives, namely the reduction of a 20% of the Greenhouse gases emissions by 2020 and a 20% energy savings by 2020.
IMPORTANCE OF BUILDING ENERGY EFFICIENCY

- Incorporating energy efficiency, renewable energy, and sustainable green design features into buildings has become a top priority in recent years for facilities managers, designers, contracting officers, and others in government buildings procurement.

- Architects and engineers who incorporate energy design concepts and methods into their design projects can play a significant role in reducing energy consumption and achieving sustainable energy structure for our society.
Directive on the energy performance of buildings (2010/31/EU) is the main legislative instrument at EU level to achieve energy performance in buildings.

Under this Directive, the Member States must apply minimum requirements as regards the energy performance of new and existing buildings, ensure the certification of their energy performance and require the regular inspection of boilers and air conditioning systems in buildings.
ENERGY SAVING THROUGH ARCHITECTURAL PLANNING

- The six important aspects of architectural planning which will affect thermal and energy performance of buildings are:
  1. Site selection
  2. Layout
  3. Shape
  4. Spacing
  5. Orientation
  6. Mutual relationship
ENERGY SAVING THROUGH BUILDING DESIGN

An integrated approach to building design involves judicious use and application of:

- Bio climatic & solar passive architectural principles.
- Use Energy efficient materials and constructions practices.
- Use of energy efficient systems & equipments.
- Efficient waste and water management practices
- Use of renewable sources of energy to the extent economically feasible.
HOW TO DESIGN AND BUILD AN ENERGY EFFICIENT BUILDING?

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

HEAT LOSS FROM A BADLY INSULATED HOUSE
ANY NEW BUILDING REPRESENTS A NEW IMPACT ON THE ENVIRONMENT

- All available statistics tell us that buildings are the problem, but incredibly, we propose to solve the problem by constructing new buildings while ignoring the ones we already have.
- Most recent efforts by the green community place heavy emphasis on new technologies rather than reusing existing buildings.
- No matter how much green technology is employed in its design and construction, any new building represents a new impact on the environment.
Upgrading the energy efficiency of historic buildings is a fundamentally important step towards energy efficiency. Historic buildings will only survive if maintained as living space – and energy-efficient retrofit can improve structural protection and “comfort”.

But we need to be very sure that any proposed works take account of the unique composition of the building and harm neither its performance nor its historic character!
REUSING AND RECYCLING OF CONSTRUCTION WASTE MATERIAL

- Construction waste material originated from new buildings, by reconstruction or destruction of old constructions, is no longer stored as a completely and permanently unexploitable waste and ballast that in many ways endangers environment.
- Contemporary technologies of destruction provide separation of useful, applicable components that are being recycled and reused for the needs of new constructions.
- This is trend and imperative in the world!
CONCLUSIONS

- Buildings are significant users of energy.
- The potential for energy savings in the building sector is large.
- We may need to improve energy efficiency in all buildings, modern or traditional.
- Energy efficiency is necessary precondition for sustainable construction in the context of sustainable development.
SELECTED ACADEMIC RESEARCH PROJECTS
of the Institute of protection, ecology and informatics-Banja Luka supported by Ministry of Science and Technology of the Republic of Srpska:

1. ENERGY EFFICIENCY OF ARCHITECTURAL HERITAGE, project in progress, Author and Head of researches Ph.D Jelena Božić

2. TECHNOLOGY DEMOLITION OF STRUCTURES AND RECYCLING OF WASTE BUILDING MATERIALS, 2008-2009. Author and Head of researches Ph.D Jelena Božić

SELECTED ACADEMIC RESEARCH PROJECTS

4. PARTICIPATION OF PUBLIC IN THE PROCEDURES OF IMPLEMENTATION OF RENEWABLE ENERGY SOURCES AND THE LOCATION OF RECYCLING FACILITIES IN RESIDENTIAL AREAS, 2008-2009. Author and Head of researches Ph.D Jelena Božić

5. RECYCLING OF CONSTRUCTION MATERIALS IN THE STRATEGY FOR SUSTAINABLE SPATIAL DEVELOPMENT, 2008-09. Author and Head of researches Ph.D Jelena Božić