Innovative and Energy Saving Tools: Sustainable Green Buildings

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Why is resource efficiency so important in today's world?

Natural resources underpin the functioning of the European and global economy as well as the quality of life

These resources include raw materials such as - fuels, minerals, metals

- food
- soil
- water
- air
- ecosystems

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Intensive use of world's resources puts pressure on the planet and threatens the security of supplies

- if current trends continue with this rate, the global population will be expected to have grown by 30% to around 9 billion by 2050

- this will cause some aspiration of the welfare and consumption levels of developed countries by the people in developing and emerging economies

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In response to these changes, increasing efficiency will be the key concept to secure growth both for the EU and other developed economies by

- improving productivity

- decreasing costs and

- boosting competitiveness

More specifically, according to the Europe 2020 strategy and the flagship initiative for a resource-efficient Europe, these conditions require to be fulfilled:

- technological improvements

- a significant transition in energy, industrial, agricultural and transportation systems

- changes in behaviors of producers and consumers

It has become necessary to develop new products and services, and find ways of reducing inputs and improving outputs by

- reducing costs,
- minimizing wastes,
- improving efficiencies,
- changing consumption levels,
- optimizing production processes
- improving business methods,
- improving logistics services
- improving green technologies,
- sustaining international trades and intra-national trades within the EU
- opening up to new markets
- focusing more on sustainable products

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At this point, ***innovation*** issues play vital roles in achieving these goals

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According to Europe 2020 Blueprint and the European Institute for Innovation and Technology, the EU emphasized and recognized that *innovation* is one of the major critical tools that can bring the EU common market economies a synergy to boost up the existing leading economies in the globe and not be negatively affected from domino-effect arising from interdependent economies.

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Horizon 2020 Framework Program for resources and innovation has included

-the adoption of policies for innovation and technological improvement within the EU with flagship initiatives aiming to secure EU's global competitiveness

- Horizon 2020 combines all research totaling a budget of €80 million to place programs for research and innovation between 2014 and 2020 under the activities of *the Competitiveness and Innovation Framework Program (CIP)* and *the European Institute for Innovation and Technology (EIT)*

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The mission of the European Institute for Innovation and Technology (EIT) is to

- increase EU's sustainability growth and

- competitiveness by reinforcing the innovation capacity of the EU

- by also considering the fact of improving the resource efficiency concept.

It becomes necessary to focus on some innovative and energy saving tools in daily life

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The “Green Building” concept, as one of the *innovative* and *energy efficient* solutions, has exponentially been expanding since the last two decades both in the USA and Europe.

Involvement of structural engineering and architecture fields have been prominent as well as considering the environmental and energy saving issues in this area.

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Market research have been focused on real-time operating costs of building structures, where

- energy consumption,
- water use,
- occupant comfort,
- landscape management and
- construction material

have been at the forefront of sustainability to develop green and innovative technologies.

At this point, this study brings attentions to focus on structurally-oriented green buildings to highlight recent and innovative developments aiming sustainability in saving energy

According to U.S. Environmental Protection Agency, the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by

- efficiently using energy, water, and other resources,

-protecting occupant health and improving employee productivity, and

-reducing waste, pollution and environmental degradation

Goals of environmentally-friendly construction practices-green buildings are to achieve benefits and to reduce costs arising from

- Life cycle assessment (extraction of raw materials through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling)
- siting and structure design efficiency
- energy efficiency
- materials efficiency
- indoor environmental quality enhancement
- operations and maintenance optimization
- waste reduction

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In order to achieve these goals, impacts taken into account include

- embodied energy
- global warming potential
- resource use
- air pollution
- water pollution
- wastes

In terms of building *"green buildings"*, some certain practices have been considered better for environment stemming from scientific evaluations such as

- ISO 14040,
- Green Globes rating system of the American National Standard,
- Green building protocol for commercial buildings,
- Green building standards code, and
- the LEED certificate system

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Insulated concrete form (ICF) solutions with poured-in-place concrete walls surrounded by expandable polystyrofoam (EPS) panels with reinforced steel bars have been one of the ways in constructing *"green buildings"* with advantages over traditional constructions in terms of

- energy efficiency,
- thermal comfort and
- construction costs

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Insulated concrete forms (ICFs) are built like lego blocks by having many advantages over traditional building methods, i.e.:

- ICF buildings are easier to build
- ICF buildings are faster to build
- ICF buildings are more durable
- steel reinforcing offers extra stability
- materials of ICFs are easier to handle and construct
- ICF walls offer superior energy efficiency and thermal comfort
- ICF walls do not have any openings or gaps
- More secure than wooden buildings
- safety issues
- Environmental-friendly by saving wood and trees
- Recyclable
- Easy to calculate life cycle
- cost of construction vary between 10% over and 20% under conventional building costs

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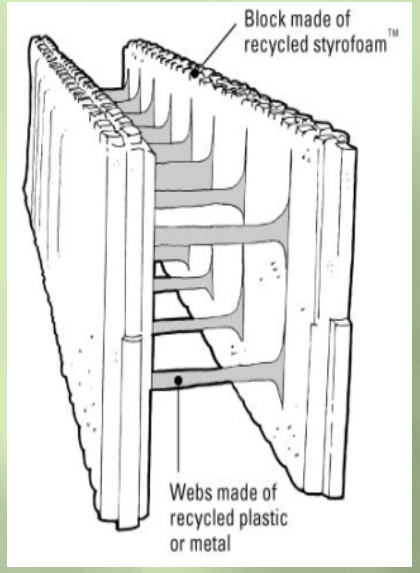
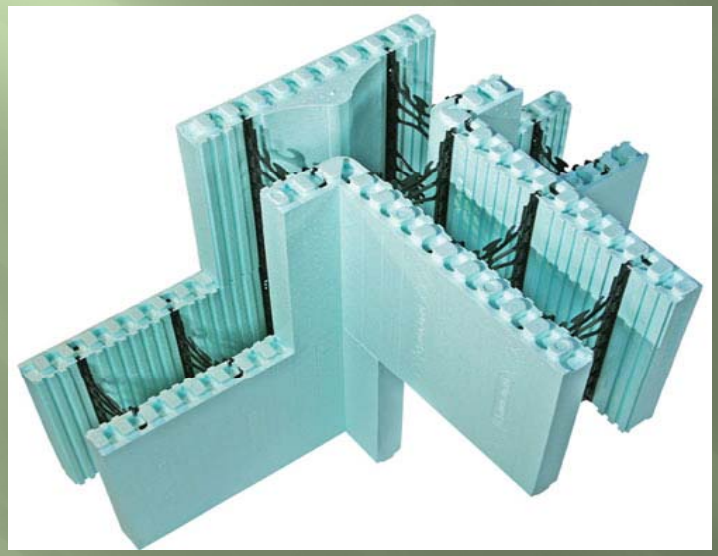
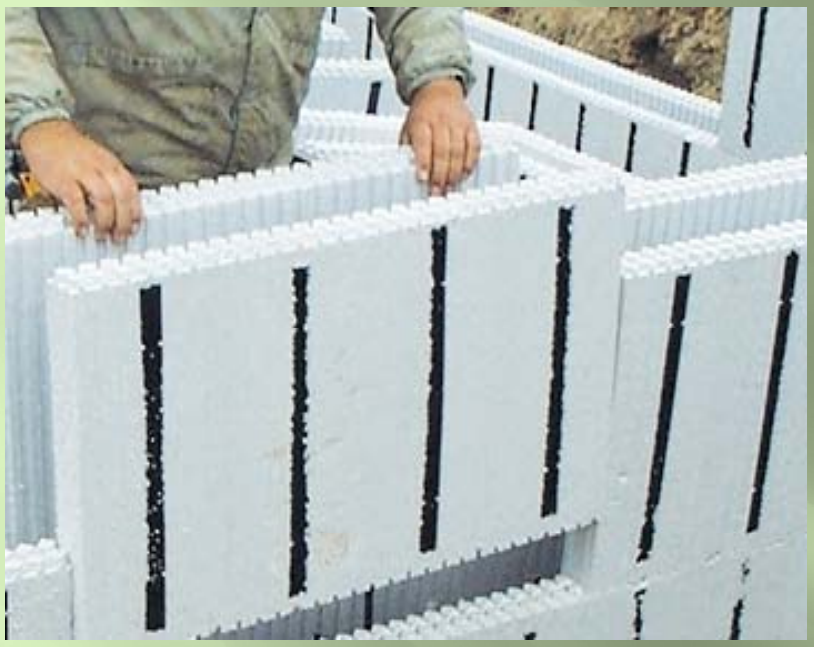
ICF applications are common in the USA, Canada, in some of the European countries such as Norway, Sweden, France and few examples in Turkey

Insulated concrete forms (ICFs) are built like lego blocks







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