

## THE EFFICIENT USE OF ENERGY CONSUMPTION IN TODAY'S CONSTRUCTION INDUSTRY

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### ABSTRACT:

Respecting to the necessitate to improve the energy exploitation in the housing section and respecting to module of the optimization system of the energy consumption and production in the country construction and the basic axis of the technology in the stable explains applying practical and scientifically methods in design and structure of the building, considering to civil management issue complicates with the modern trend toward energy consumption optimization to establish building complexes in the fine general sections with the following items:

- 1) Principal of site design and energy consumption
- 2) Bases of plan design with energy consumption
- 3) Key points in making view and energy consumption
- 4) Construction detail and insulation methods
- 5) Innovations and new idea hoping that with promotion policies to prevent irregular consuming of fossil fuel, notes and items of this article can decline energy consumption exploitation with urban life standards toward the stable expansion and decrease of environment pollution the next and it be reaching path to the traditional architecture standard principals of the any country.

**Keywords:** Construction Method, Energy Consumpton, Construction Industry, Environment Pollution

### INTRODUCTION

It is clear that for standardizing urban life and finding methods of supplying cheap housing (as the sense of the word); there are no other ways better than encouraging the optimization of energy during the construction and utilization of buildings. From this point of view, this article has been framed from two aspects: design and implement. In other words, in both the design and implementation in constructive workshop, some points are mentioned which optimize massive energy usage of a project.

This instruction can obtain the operation index of energy consumption of any project in future. Operation index of energy consumption in building gives this ability to us that like tools for comparing newly built buildings with each other and with management mechanism points of this article and regarding urban management methods with observing

Macro-economy and a modern look to economical methods of housing construction and optimization of energy consumption create executive solution in production process of planning program in municipality.

It should be noticed that this article does not cover all executive and designing pints in construction and considering above cases it has attempted to obtain normalization methods and standardization of energy consumption and finally its implementation in city's sphere of influence.

The author believes that promoting energy consumption efficiency can be improved by

- 1- information culture
- 2- educating and training along with creating culture
- 3- thought legislating rules and regulation

Site designing and energy saving Principles:

Winds are basically convective flows in aerospace that try to create thermal balance among various regions. Cognizing movement patterns of these flows that are adjusted with Earth's rotation are a method for the best site designing and orientation of building blocks.

In this regard, below points for designing and building optimum site are recommended:

- 1- Cognition of main direction of winter winds:  
In this site natural windward (appropriate foresting, preferably always green) should be used.

- 2- Cognition of main direction of summer breezes.

Below methods can help in design or implementation:

- a) Orientation and design of windward (natural and artificial) with regards to length of considered region and windward angle and also permeability and density rate of windward
  - b) Creating central green area regarding topography and orientation of blocks can help a lot in dividing summer breezes.
  - c) In some area of the site that it's surrounding is open filed, contacting to environmental conditions (wind, direct sunlight, etc.) can be reduced with protecting green coverage, etc.
- 3- Optimizing orientation of building blocks:
    - a) Form and shape of the block:

A COMPEET construction form which lacks nubs and indentions can minimize the amount of energy loss.

- b) Optimum volume suggestion with absorbing maximum solar energy
- c) Optimum orientation each site

4- Smart control of sunlight and shadow in site:

- a) Areas of site which are not placed in shadow can absorb more heats and need lesser secondary heating. This matter should be utilized maximally with smart controlling of sunlight and shadow (creating artificial-seasonal canopies or natural, etc.
- b) Cooling with the help of evaporation can help thermal comfort outside of the building. This matter maximizes the amount of cool air which sent to building and natural air conditioning become desirable and effective.
- c) Controlling heat of sunlight reflection:

1-Because the amount of sunlight on earth during summer time is almost two times more than other months, therefore, reflecting sunlight from earth to windows and walls can be a tool to intensify the amount of heat load. Controlling these surfaces in two seasons of summer and winter together is a difficult job but with dividing site into summer and winter regions a solution can be found.

2-Utilizing new and modern materials that have lesser reflective level in summer and can present higher reflective level in winter and the effect of region's climate can be a great help in implementing phase of optimization.

Principles of plan design and energy conservation:

1- Maximizing skylight and absorbing heat or minimizing it:

Noticing coefficient of absorption of thermal energy is different for various colors, this coefficient is 70-75% for bricks and concrete. It is necessary to reduce or increase this coefficient with color variation in those regions of the building that this coefficient is higher.

### 2- Smart and natural awning:

Possibility of building a complete awning in summer for southern face of the building (Ivy trees close to the building with a special design) can have a very effective role in thermal exchange of the building. The same awning in winter that light angle is lower and noticing leaves shedding naturally perform very suitably and smart.

### 3- Steep roof

### 4- Designing compact form

The best form of building shell is that from which the minimum thermal drop has in winter and the minimum thermal absorption in summer.

### 5- Dividing plan to cold and warm regions

If building plan designed somehow that daily activities are in accordance with sun path a better conservation will occur. In the internal area of the house divided into cold and warm areas, the efficiency of the mentioned system will be more effective.

Below samples are some of the methods:

- Appropriate direction of window for bedroom and kitchen
- Skylight window
- Design of fore-area (main fore-entrance), etc. Design of fore-area, roof projection, steep roof
- Utilizing central patio and pilot for better air conditioning
- Roof-projection prevents rain falling to side surfaces and also prevents direct sunlight.
- Preventing incomplete implementation of steep roof
- Cold roof or warm roof has to be created

Important point elevation & energy consumption:

1- Windows and energy consumption:

In designing dimensions, form, and even material used in window considering a complex system of determinative factors in case of energy consumption seems to be necessary.

Architectural design of the window has to be done with comprehensive knowledge of climate condition (wind, rain, moisture, etc.) of the region. Complete and knowingly design of the window considering above principles and with below utilizations are:

- a) Exchanging heat and cold air
- b) Exchanging light and amount of it
- c) Controlling solar thermal reserve
- d) Air conditioning
- e) Internal transpiration of window

2- Utilizing Pilot

Placing structure on pilot in cold areas has several usages. Because of high moisture of these regions air conditioning is very important and with this method beneath the surface of building will be free of moisture. Also, in height speed of air flow is higher and air conditioning is better.

3- Complete artificial awning:

Designing complete awning in frontage and windows in winter and summer has its own desired function. This awning can be designed and implemented in various below methods:

- Utilizing a type of metal blinds between two surface of window
- Utilizing movable blinds for window's net.

- Utilizing insulated glazed windows which air conditioning between their surfaces are controllable, etc.

Structural details and methods of insulation:

Moreover than resistance against moisture, reducing thermal energy loss in the whole set has to be considered. All of the elements of a building which are facing climate conditions partly or completely should be insulated to have a comprehensive insulated set. This matter caused to reducing heat loss with preventing cold contact which is the most economical method in macro level.

#### 1- Wall insulating (thermal)

In addition to protective insulation against moisture which is done in some places like foundation, walls, roofs, toilets, bathrooms, and kitchen, wall thermal insulation as the most element of a set which contact external climate has to be considered.

#### 2- Insulating foundation and floor (moisture and thermal)

For preventing earth moisture through foundation into walls and its rising, the surface of foundation has to be covered with an insulation layer and stop moisture penetration and then construct walls on the insulated foundation, but because foundation surface is lower finished flooring, foundation surface risen to beneath the flooring with the help of sleeper. And then cover it with sand and cement coat to have a smooth surface for insulation. And then insulate its surface. Also, both sides of the sleep covered with cement coat and insulate to eradicate the possibility of moisture penetration and connection to adjacent insulate coat become possible.

Floors normally are insulated in two states: first, in situations that there is possibility of moisture penetration from earth and second, in situations that there is possible danger of water penetration from up to down (bathroom floors and kitchen, etc.)

New Ideas and Innovations:

External surfaces of the building which are facing direct and indirect sunlight can be cooled down with using effects of water evaporation in various methods; some of these methods are as below:

- 1- On the Roof and balcony pools which has to be combined into structure in design phase.
- 2- Creating awning (artificial or natural) which is combined into cooling infrastructure of the building
- 3- Automatic watermark (with special details), it has to be mentioned that this system has maximum efficiency when:

- a) Roof of the building has implemented with light materials
- b) Beneath the roof area is residential and designed usably
- c) Noticing descent lateral temperature in this system, conducting cool air is also done.

- 4- Utilizing new materials in coverage of various surfaces of the plan
- 5- Using earth depth in mountainous regions in coordinated to climate design

### CONCLUSIONS

what is transferring these scientific and academic points from architecture engineers' knowledge level to implementation body of municipality is noticing these information and combining them with economic persuasive policies in implementation rules (since plan order issuing to end of job) which this importance should start in form of a new project derived from some parts of this article as a reciprocate process in one municipality region and in case of positive feedback, rules and regulation for them codify and in from of case study with workshop and group work methods, these engineers' scientific knowledge and these points implemented together in form of rules and regulation (economic-administrative). Hope to see that day.

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