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Study of Intelligent Architecture Techniques along Energy Consumption Optimization with Solar Energy Approach

Hesam Nikbakht[1]*, Mohammad Reza MehdiNezhad[1], Seyed Mohsen Allah GholiPour[2]

[1] *Member of Iranian Elite Society, Mazandaran Branch, Babol, Iran*
[2] *Department of Architecture Engineering, Islamic Azad University, Babol Branch, Babol, Iran*

*Corresponding author's Email: HesamNikbakht@gmail.com

ABSTRACT: Consciously design of the buildings and human residences especially dwelling, with due attention to energy problem can decrease to considerable extent dependence amount of them to energy consumption side heart and cold of structure. Used energy in building part base of statistics is allocated very high digitals to self which are generally no generator and consumed. By consumption more of 40% of total produced energy in country and cost spending equivalent 30 % of resulted revenue of oil sale, it is allocated the most amount of the energy consumption to self. Building pattern improvement and composing with environmental life views lead to consumed materials quality arising, structure methods, exploitation methods and salvage that moreover negative impacts decrease on life environment, new fields provide for innovation and employment in the building part. Buildings design to kind must perform that side use of energy optimum and fuel in the buildings acted various methods and has optimum use of energy together with. Architecture meantime correspondence to climatic condition and optimum use of energy by creating of reasonable relationship between man, nature and architecture in self-final evolution gives interesting patterns as life space. In this direction, exploitation of intelligent architecture principles can play important role. Intelligent architecture pays to two main principles. Principle 1: Attainment of possibilities maximum and capability by the least energy and materials. Principle 2: Consolidation principle and harmonize all possibilities in design and structure steps. Intelligent architecture acts all self-trying to design used possibilities all side and harmonic together till building acts such as harmonic and consolidated system. Other important problem is that try to man with nature and each other have closer relationship that to this manner, man psychic comfort condition give to very extents.

Keywords: Sustainable Development, Smart Building, Design Purposefully

ORIGINAL ARTICLE

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INTRODUCTION

Buildings design must perform to kind that side use of energy optimum and fuel in the buildings acted various methods and has optimum use of energy together with.

Energy consumption divides into three main parts of industry, transportation and building whose building part is the most important energy consumers. One part consists of structure various steps, building materials production and consumed energies in the structure time and other part which will be involve the most important energy consumption. It is exploitation time of the building that this consumed time consists of cold, heart, ventilation, light and other building activities (Sharon and Reddy, 2014).

In today world, extensive motions in investigation labs side less use of energy and more operation of it is flowing with due attention to economic advantages to can make usable abundant energies , cheap and nature stable for human whose the most important of these energies is solar waves energy both light and heart. Architecture meantime correspondence to climatic condition and optimum use of energy by creating of reasonable relationship between man, nature and architecture in self final evolution gives interesting patterns as life space (Gevorkian, 2009) (Figure 1).

Figure 1. The Use of Natural Elements in Design Can Have an Important Role in Reducing Energy Consumption (Aldinga Arts Eco Village Sustainable House, Aldinga, South Australia).

Intelligent Architecture Principles

Intelligent architecture pays to two main principles.

- Principle 1: attainment of possibilities maximum and capacity by the least energy and materials (Guzowski, 2012).

Therefore, if in attainment way to abundant possibilities, materials and energy spent out of size, it is designed intelligent architecture aims of the researcher.

- Principle 2: consolidation principle and harmonize all possibilities in design and structure steps.

Intelligent architecture acts all self-trying to design used possibilities all side and harmonic together till building acts such as harmonic and consolidated system (Guzowski, 2012) (Figure 2).

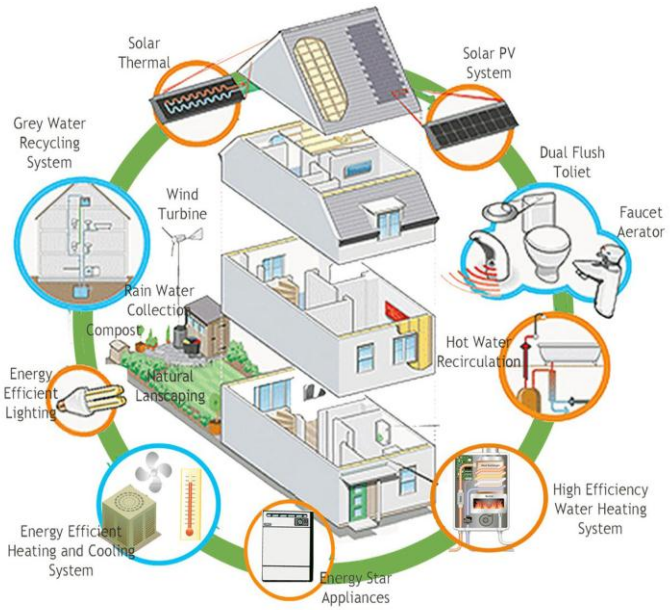

Figure 2. Tips to Create Energy Efficient Homes

From smart building aims can called security, comfort, immunity, people health; strength, spatial flexibility and suitable condition regulating which perform to harmonic systematically help. Other important problems try to man with nature and each other have closer relationship that to this manner, man physic comfort condition give to very extents (Editors of Fine Homebuilding, 2011).

Now, life environment problem is one of human serious apprehensions, life environment pollution problem in devastate risk of parts of it is motivated abundance worries. This problem reached to such step that with due attention to life environment, protection and guarding of it is changed to inseparable principle of all work areas and human effort.

Important point this is that architecture important role in this among is making-building industry which spent half of the world consumed energy to self. This statistic indicates architecture main share in analyse of land sources, consumption of it and land pollution. Therefore, it isn't odd that attention to life environment pollution problem is use of renewable energies and economy in energy consumption that they change to intelligent architecture main participle (Rubin Edward, 2000).

One of other intelligent architecture aims is economic aims. At the present, economy is changed to one of the most important application sciences. Today, economic problems, direct and very deep effect on all man life cases. Now, with relationships expansion and universal economy design is given vast and new dimension to this important post. But today sustainable economy problem and attention to all subject aspects is considered. About smart buildings yet for primary very high costs of them is very necessary subject economic study and economic comment of it.

Attention to all lifelong of a building during structure and operation, to consider impact that building put over consumers and operation power of them, lifelong of more buildings and other reasons change structure and operation of smart buildings to economic order.

Intelligent architecture to optimum use of materials, energy and use of pure energies try in don't pollute of life environment.

Other intelligent architecture aims is technologic aims. Periods that we put in it, call relationships age. Relationships and information environment flow is sewn our world such net to each other. Any building can't use this technology and approaches of it and ignore it. On the other hand, this technology appearance can help us in buildings and be new tool side efficiency increase. Intelligent architecture yet with see to future tries in using maximum of human technology power for reach in operation extreme in building and making-building industry. In intelligent architecture uses relational and computer development technology.

Building Technology and Optimum Consumption

Structure techniques and building technology is as effective and categorical factors in to lower building consumed energy. As cases that energy consumption in our country, Iran put in so suboptimum and high shacked extents is non-operation of techniques and building new technologies. Non operation of these structure approaches is long project performance time and increase amount of loss. From other side, for loss of building new

technologies especially suitable material and development that has important role in energy decrease and building fuel.

More of country buildings put mostly in structure personal and small buildings collection, by old, simple and full of shapes building techniques is abolished in very countries in years. Moreover this that it makes suboptimum building from security and economic viewpoint, it increases energy consumption to wonderful amount in years that will be operation of it. Whatever that building technology is more improvement and accounted in great buildings, but building industry technology generally can put in the most retarded range of implementation and design parts of it. Imagine the future urban buildings can be developed so that the maximum use of renewable energy could provide almost 100% of its energy needs (Figure 3). For reach in first principle of the intelligent architecture (accessing to maximum possibilities and capability by the least material and energy), we suggest use of solar energy.

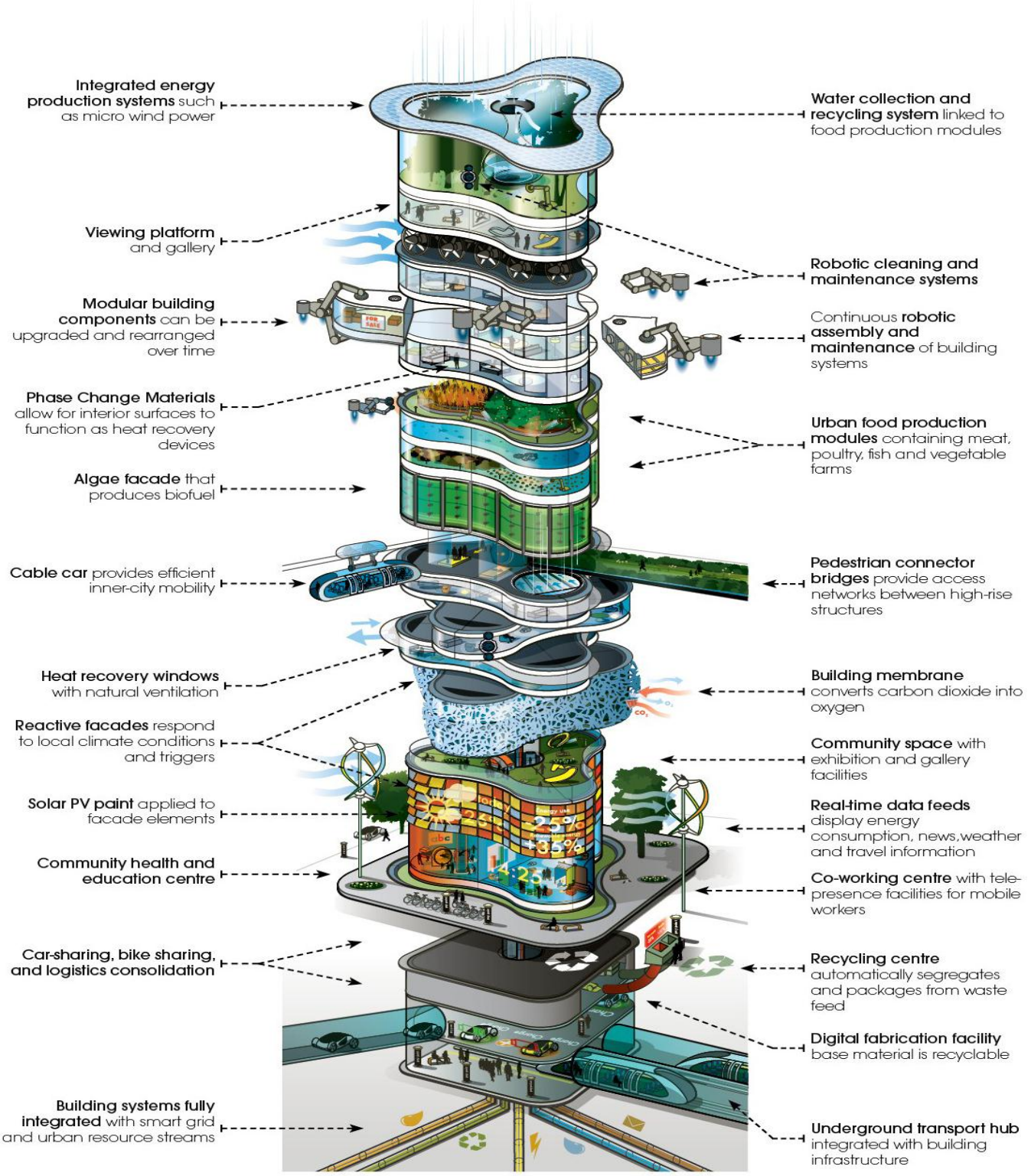

Figure 3. Future Urban Building Capacity Using the Most Advanced Manufacturing Technologies Are Used to Taking Maximum Advantage of Sustainable Energy.

Solar Energy

Solar energy is all great hope for accessing to economic development and trend continuity of it in the future years. Solar energy always been in accessible and be renewal, enjoyment of these two characteristics provided easy use possible of this energy source for communities and various nations. Using of solar energy in vast scale is quite practicable order, so that can replace fossil and nuclear energies in one or two decades of the future. This paper aims to show ways of taking advantage of solar energy and how it is expressed in the building (Figure 4).

Benefits of Solar Energy

Solar energy has many advantages. As examples can be mentioned the following:

- Free after recovering upfront capital costs Payback time can be relatively short (Robertson et al., 2009).
- Available everywhere and inexhaustible.
- Clean, reducing demand for fossil fuels and hydroelectricity, and their environmental drawbacks (Robertson et al., 2009).
- Can be building-integrated, which can reduce energy distribution needs (Editors of Fine Homebuilding, 2011).

Solar Energy Reserve Side Consumption Decrease (Industrial Energy Sources)

Increase face to fuel sources costs growth, energy and shortage of them has our on it that we economize in common energies consumption. In industrial countries, 25 to 35 percent of consumed energy in buildings consume for heat and warm water. There is a suitable method for consumption decrease that we pay to several sample mention of them.

- Thermal resistivity quality improvement of the buildings (walls, windows, controlled ventilation)
- Use of heat retrieval tools (for use of balcony air in ventilation, sewage, Exodus)
- Use of electrical and gas pumps (Sharon and Reddy, 2014)

Solar Systems Design

Passive, Active and Hybrid Solar: Solar buildings work on three principles:

- Obtaining
- Storing

And Distributing Solar Energy (achieved in the sunlight). A passive solar building makes the greatest use possible of solar gains to reduce energy use for heating and, possibly, cooling. By using natural energy flows through air and materials—radiation, conduction, absorption and natural convection (Robertson et al., 2009). A passive building emphasizes passive energy flows in heating and cooling. It can optimize solar heat gain in direct heat gain systems, in which windows are the collectors and interior materials are the heat storage media (Robertson et al., 2009).

Passive solar system design provide use possible of solar energy with due attention to structure design and internal architecture of a building with building blocks.

- In fact, passive solar system design determines building formation side structure, architecture and taking-direction of it for more exploitation of solar energy (Figure 5).

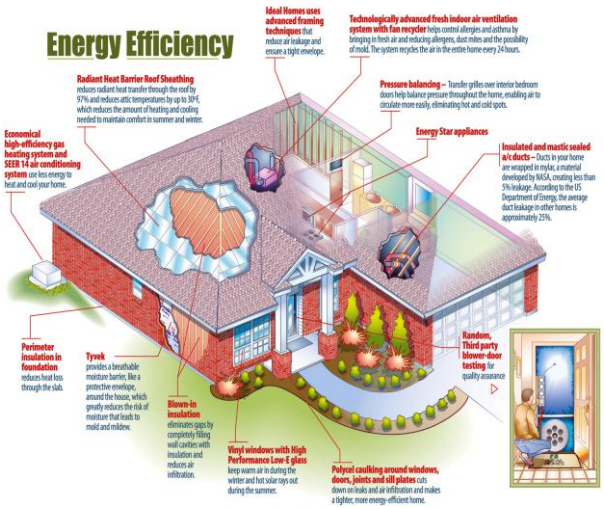

Figure 4. Examples of Solutions to Optimize Energy Consumption

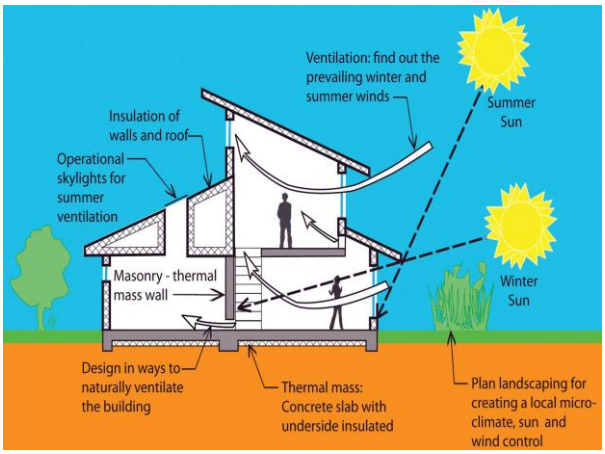

Figure 5. Elements of Passive Solar Design

The principle can also be applied to water or air solar heaters that use natural convection to thermosiphon for heat storage without pumps or fans (Robertson et al., 2009).

An active solar system uses mechanical equipment to collect, store and distribute the sun's heat. Active systems consist of solar collectors, a storage medium and a distribution system (Robertson et al., 2009) (Figure 6).

Active solar systems are commonly used for:

- Water heating
- Space conditioning
- Producing electricity (Figure 7)
- Process heat and
- Solar mechanical energy

Hybrid power systems combine two or more energy systems or fuels that, when integrated, overcome limitations of the other, such as photovoltaic panels to supplement grid- supplied or diesel-generated electricity (Gevorkian, 2009). Hybrid systems are the most common, except for the direct gain system, which is passive.

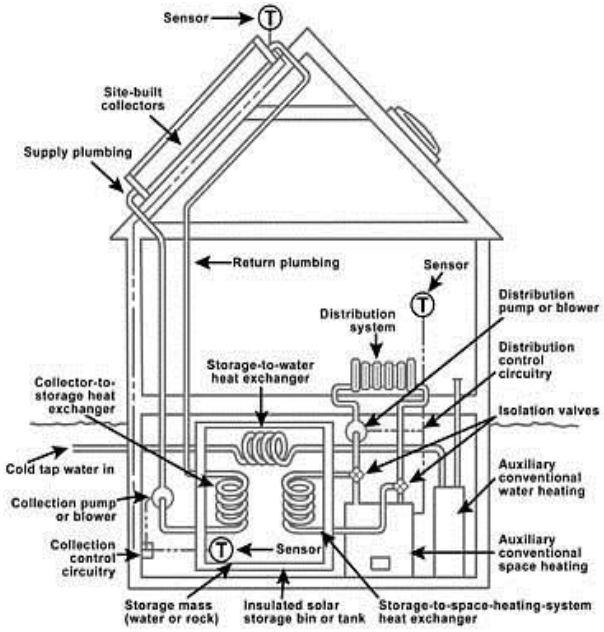

Figure 6. A Typical Active System

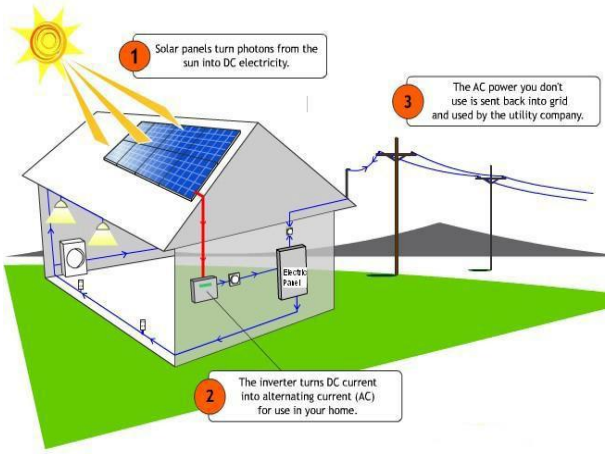

Figure 7. How Active Solar System Produce Electricity

Advantage Use of Passive Solar System

1. Financial Economy

In contrast to active solar system that conducts heat by special system under pressure into building space, above-mentioned system considers more desired. Passive solar system preparation expenses be few more than design and making of a traditional residential house which additional cost usually doesn't exceed ten percent of total value, this system in long-time can economize 70% of usual costs for heat production.

2. Thermal Position Improvement of the Building

In use of passive solar system, internal heat controls space and keeps it about 18 to 20 degrees during year, means in addition to needed heat security in winter; it guarantees space cold in summer too (figure 8). In case of thermal changes out of building, internal air harmonizes to these changes slowly, apart from this, internal space air always protect self-natural state and doesn't become dry and unpleasant yet (Henderson et al., 2010).

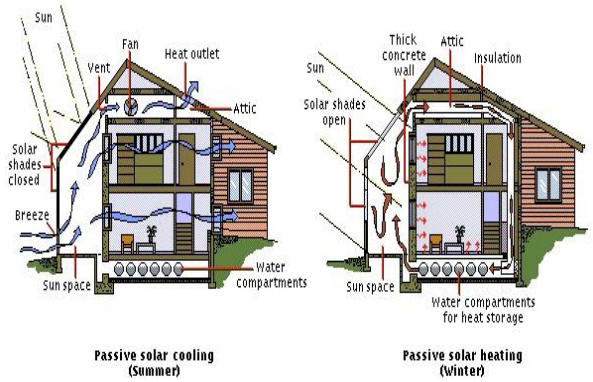

Figure 8. Passive Solar Cooling and Heating

3. Simple Performance

For better and more use of heat amount, residents of these buildings kind must observe points, as in necessary times, they must close curtains and Venetian blinds in necessary times (Brainbridge and Haggard, 2011).

4. Elasticity of the System Make

Above-mentioned system for every place, every kind of material and used technique in building has self-special design.

5. Factor Effect on the Environment Beautification

This system is one of the most important inventions that for problem solution used heat and cold security, for economy in building energy consumptions, it is economical completely.

It is supported that this system:

- Because of that doesn't use oil and derivations of it that is so effect in cure of life environment.
- It plays effect role in economy of the energy consumption, from this side, be attention help to country national economy.
- It causes considerable economy in performance times of a worker, for suitable technology is used in make and use of it.

If geographical position of considered local be agree to solar systems retentive , use of solar energy and active solar will be cause more and higher efficiency. This system can use in industrial places, hospitals, school and residential assemble.

Building Orientation

Operation System Design of Solar Energy for Cold and Heat Production in Residential Places: Use method of sun radiation energy in every of geographical conditions is determination of system efficiency amount from economic viewpoint, with due attention to information and exact statistic that weather station will be put it limitation in authority of designer, system designs. Orientation is crucial since it can provide free savings from the concept stage (Figure 9). Related information in both cases study average of heat degree amount in night, day, month and year and amount maximum of humidity, direction and area winds speed. Investigation of settling local and area on meridian will be show our whom this area to what extent can take light and sun heat and this amount will be consist what time in day (Brainbridge and Haggard, 2011) (Figure 10).

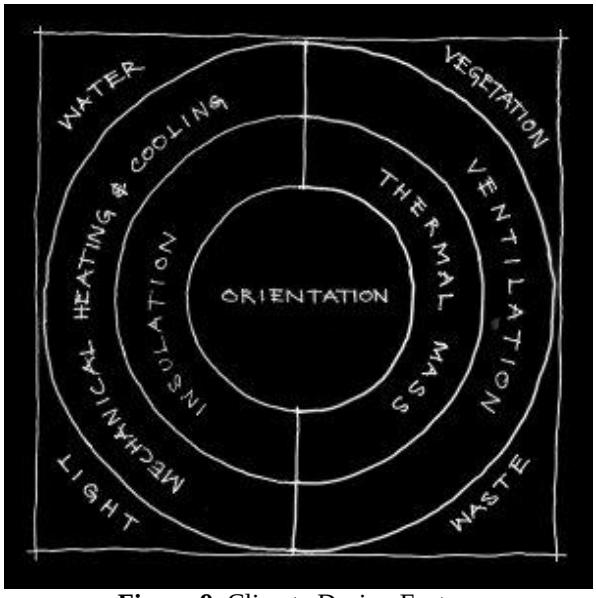

Figure 9. Climate Design Factors

Day time Living areas are oriented toward north to ensure maximum winter solar gain. The impact of summer sun is impacted shading on northern faces and by minimising exposure, and avoiding windows where possible in east and west elevations. (www.energyarchitecture.com.au). Balance is necessary so there is a need for considered flexibility ensuring thermal comfort.

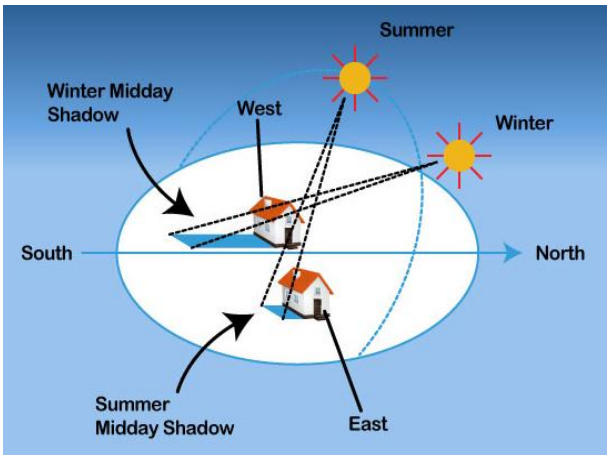

Figure 10. Investigation of Area Settling on Meridian

This study make clear for our whose building placing and settling method is to what case and under what angle, building enjoy the best of sun light, environmental factors interfere like buildings true in above-mentioned local neighbourhood, hills, trees and other elements in method of sun light receipt amount (Moldovan et al. 2014).

Generally, buildings with long axes running east and west have greater solar-heating potential if their window characteristics are chosen accordingly. Buildings with east-and west-facing orientations have greater potential for overheating in the non-heating season and get little solar gain in winter (Robertson et al., 2009).

Building material selection is made to ensure long life and low maintenance while maintaining the lowest environmental impact levels, and assisting in thermal performance and beauty (www.energyarchitecture.com.au). Structural existence materials in area (abundance amount and cost) method and existence systems kind for cold and heat is from other points that must be exact study.

Other factor which must be attaining is cultural and social position of resident people in that area. This study will be show us that people acceptable percent will be what thing of a new system and to what extent can rely on their cooperation side more efficiency of above-mentioned system. In addition to above points, mentioned factors are forcible as usable materials in building, resistance amount of this material in relation to light, heat, light reflection coefficient and also make of a building, take-direction amount in southern front , walls thickness, insulation (Figures 11 and 12), drawing, dye and etc. yet in design of a building by solar system (Zahedi, 2014).

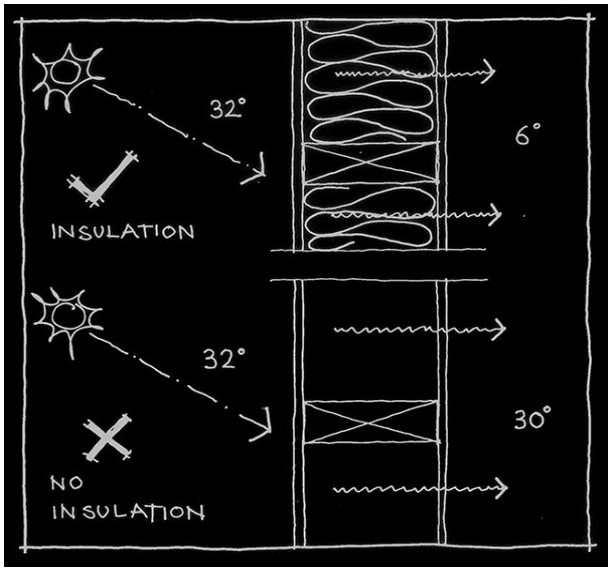

Figure 11. External Wall Insulation

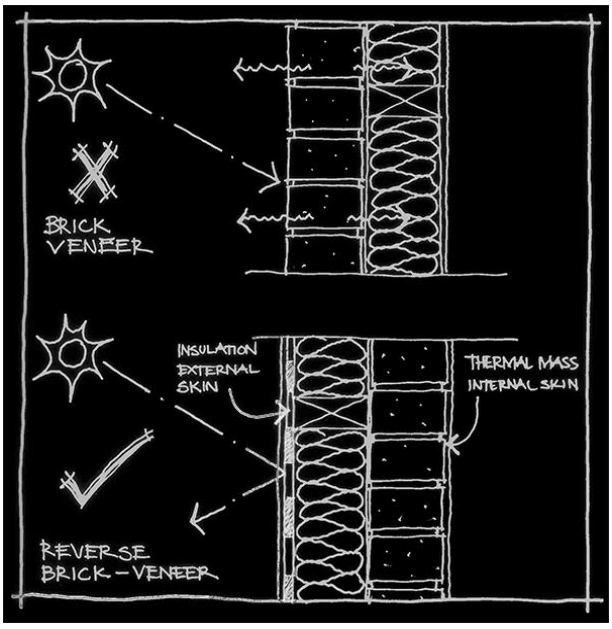

Figure 12. External and Internal Wall Skin Insulation

Use of solar energy from passive solar kind controlled space internal heat and keep it about 18 to 20 centigrade during year. Means, in addition to needed heat security in winter, it guarantees space cold in summer too.

This problem is attainable for areas which have long and warm summer. Warm water security been economy and profit via solar systems even in residential assembled completely Thermal collections element collections are that save received solar beams in self (Henderson et al., 2010). Use of collections which are like flat plates, it completely is usual and economy order. Rainwater collection, storage and use are considered as relevant to anticipated frequency of rain events (figure 13). Pumps and valves ensure continuity of water delivery, and maximum space in the tank to collect the next rainfall. Overflow water can be used in ponds and other landscape features like drainage swales to monopolise the water on your site, and thus reduce water sent to the street (sea). Tap ware, WC cisterns, and shower heads are selected to reduce the outflow of water to a minimum without compromise to your daily experience (www.energyarchitecture.com.au).

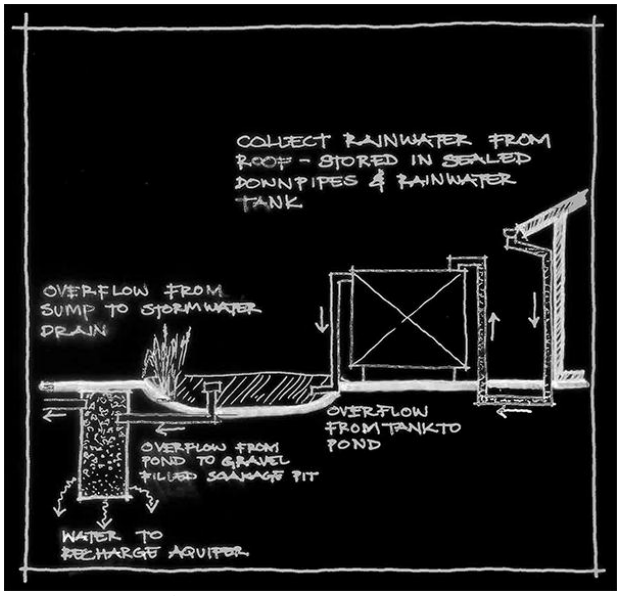

Figure 13. Rainwater Re-use

Energy Optimum Preparation Introduction in Revival Project of Residential Assembled "READING BOROUGH, UK" (Case Study)

This project centralizes on one of the most limited problem and for new technologies introduction in energy efficiency field and for special properties that has, is so creative and original in both climate properties fields and used day technologies in it too.

Project Position: Totally 48 houses revived in high surface from related standard viewpoint to energy consumption optimization in small part of "reading" limitation of BRITAIN. Primary position of these houses whose lifelong of them reach to 100 years be poor severely that been establish to without insulation porter walls or worthless insulation and in most material without central heat and building optimization performs base of notified repair program to owners (Serrats, 2011).

Executive Preparations: Distributed spectrum of energy optimization technologies is used usual samples to innovative cases in this project and generally, can tell that in little-income private dwelling field, this project is acted very innovative. Used preparations collection consists of:

- Humidity insulation of the structure main elements consists of A) Walls: 70 mm of the mineral overlap below rendering; B) Dry parts and house-top coating: 200 mm of mineral overlap in under-gable roof space; C) Ground floor: 150 mm of the mineral overlap under floor coating (Moldovan et al. 2014).
- Use greenhouses which coats kitchen and sitting-room walls of house cushion part
- Using solar glass gallery for front door
- Use two- screen glass with less reflex coating in the wooden frameworks
- Lightening doing with less need to energy consumption
- Thermal salvage ventilation performance for total house
- Give heat with solar warm air and with broom help of Photovoltaic
- Central heat performance with compound boiling drum without pore, TRV and an optimum control system for turn on or off (Zahedi, 2014).
- Thermal system by solar warm water

Executive Creatorship

Face most innovative of this project, use of evacuation mild flow is in solar warm water system which is taken of "ATON" company in HOLLAND and it is related to a compound boiling drum without hole. This combination is so unusual in BRITAIN (Serrats, 2011) (Figure 19).

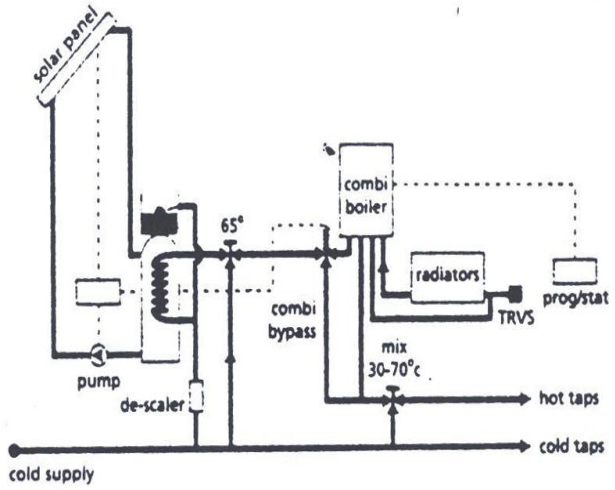

Figure 14. Diagram of Heating System That Is Used In This Project

Innovator spaces of this solar system are:

1. Use roof undivided solar panels, protected against "UV" beam and for purpose of resistant visual, from castled polycarbonate goods with chrome oxide selection able surface and little water volume (Serrats, 2011).
2. Mild flow system which uses 10 to 15 % of common systems flow and creates classified store of warm water. This system provides more useful hot water in less time.
3. Little consumption pump of 3 V "DC" that lead to the least energy throw down, finally it is suitable for feed source of "Photovoltaic".

4. Water discharge to approach of "Thermo siphon" via narrow copper pipe which be obstacle boil and to ice water without use of anti-ice. In this method use only of water valves and don't need to any programmed pair (Serrats, 2011).

5. System control by sensitive sensors help to light surface instead of sensitive controllers to temperature changes for harmony creating with compound boiling drum and efficiency increase used number of mentioned indexes of below preparations (Serrats, 2011):

- Use solar heat saving by heat changed winged pipes due to net pressure guarantee and also, using water which is warmed to solar energy before instead of use boiling drum that need to energy guarantee via fossil fuels.
- Valves composition for prevent bigger make of boiling drum and also, protection of used against burn.
- Use boiling drum equipped to "economy cycle" for solar warm water guarantee which is selected in temperature of 45 degrees.

Use compound billings drum as considerable increased in BRITAIN (more than 50 %) and can tell this project gives innovative solutions in use of solar energy as practicable. For example, one of the direct results of this project is "ATON" solar system that now distribute in total BRITAIN by Imagination Solar Company.

CONCLUSION

A large part of the environmental ravages facing the world today comes from fossil fuel consumption, particularly in the building sector. In the world whose architect designers today in addition to consider have different and main factors of cultural, social, fluency, style, performance and special attitude climatic to energy consumption and environmental life indexes in the architecture design. Whatever soon attention and necessity to whatever better in this regard is deep thinking. Attention to environment design and green space side compatibility to first step climate is optimum use of energy. Form this viewpoint problems as side of building, natural ventilation, sun radiation control and etc. with building architecture design can be second step of this work and finally, must be with internal architecture design and attention to problems as settling place of door, windows, walls, internal problems and pay. In last step can call optimum use of solar energy.

Among new and reviewed energies, sun radiation energy enjoys more important. Because from little viewpoint has high potential and is accessible and certain yet from application aspect. Building design with due attention to energy consumption optimization help of light and sun heat and with this property keep building in summer, cool and in winter, warm and clear and we must economize to considerable amount in energy costs. Today, hope that we can be maximum enjoyment by at least energy in all parts.

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