

## Architecture in age of climate change and energy savings, case in Arak city

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This article with once over on affection climate change in architecture. Also above article attention to show suggestion about prevent energy waste and the use of renewable energy in this article is tried, review effect of climate change on ARAK city, also building and architectur. Undoubtedly, climate change and global warming is one of nowadays concerns the human. Hydrological changes temperature and precipitation in area level of green house gas emissions and output data and input global is evaluated. For this purpose output data modeling global until the end of 21 century for three period: 2039 -2010 -2069 -2040- 2099 -2070 with two way and geostatistical is comparison and evaluated. Part of sun ray in collision with layer of earth, absorption and other part, reflection. Amount of absorption is 70 % and amount of reflection is 30%. This ratio of absorption and amount of reflection makes earth optimum temperature, increased the average temperature of earth and makes phonomenon by name of global warming.

This topic makes climate change, that's means of change architecture:

1 – What factors makes this problem ?

2 – What architecture suggestion helps to this ?

**Keywords:** Architecture; climate change; energy saving

### Introduction

This theory of climate change and followed by energy saving is one of most discussed subject of contemporary architecture. That such as previous subject not lead to architecture style and the main concern about environment, also, from all orientations about materials and energy benefit. Actually, building according to climate change employment maximum potential environmental for comfort consumers and in way from tools and suggestion benefits while decreases advers conditions caused by construction. Importance of climate changing on architecture makes studies and research in this context. Especially in iran for climate variability do research is inevitable generally, this article will be done to both practical and theoretical at the first the oretical about climate and building. After that studies about weather stats ARAK as industrial city in IRAN. Because increase of industrial plants in one area makes increases air pollution and creation green house effect this article with the aim of check this effects on temperature variations and rain fall and effect on building and presentation solution about energy saving.

### Definition

Meteorology and tendency of geography where in general condition atmosphere in the long period investigateid and results information it will be given to the researchers developed. Synoptic climatology in addition to analyzing all long data weather, schematization of pattern it will be given to the land use management. Climate change in the last three decades, even to the public is evident perhaps the news of an increase in temperature not important for people but for land use management and climatologists is big burglar alarm for drought and weather changes. Usually climate change is gradual but human performance on surrounding and geography is more severe. Instead of adapting to climate, continue to grab operation from nature. Be limited and fragil nature of ARAK, against climate change and exploit over capacity, it shows uncertain prospect from sustainable development. Comparison picture of satellite in 1882 – 2012 and severe change of decrease stain snow in the highlands and drainage basin and soil degradation and pastures and discharge villages due dry resources of water is worrying. Attention to in this regard schematization duty is development of the provincce that intelligent analyzing climate change and its relationship with architecture and energy saving with emphasis on new compatibility with climate compiled. Energy saving it means of consumption to properly this is to balance between income and expenses is crucial. Modify consumption pattern optimize the use of resources of the country for personal and social needs the most urgent national needs and the main pointconstruction engineers.

Modify consumption pattern means of instutianalize the correct way to use country source that's makes promotion index life and conservation unfailing and exhaustible.

Modify consumption pattern need to culture and after that need to solution on the other hand hand, climate and natureal structure is two main shaft and effective in tissue formation city.

The two axes in cold mountain climate.

According to the terms topography is depth impact,also,energy crisis and need to energy saving in use it,the need for revision how to build one of the pillars main schematization to convert.

## Problem statement

The aim of this research, checking how the impact ARAK climate change on how to build to save energy. cold and dry climate especially in ARAK city makes us to answer to this question :

1 – What factors makes that body and building on climate change will be not designed ?

2 – How to building in ARAK,according to climate change, what is the impact on energy consumption ?

The building that build according to climate change method, decreased to the need for heating and cooling mechanical, and instead we use nature energy in surrounding.

Climate design cause building have comfort condition.

## Literature review

In article by name of " zoning and climate design guidelines " concluded : his better to warm spaces put in center plan and no less important spaces such as ware house as thermal insulation be placed.

In article by name of " book review traditional building " stating the following results : the general character of the form in cold climate as follows, building has central court yard, introverted, flat roof, small openings, thick walls, porch and small yard (Figure 1).

## Introducing the reng for studies

The Arak city area is about 98.77 km.

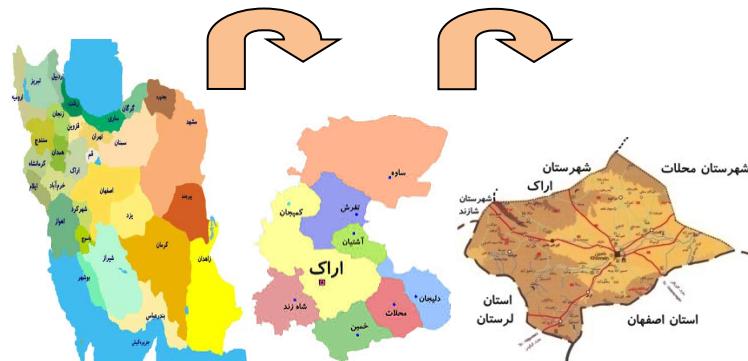
Arak is in eht west of Iran and in west south of Tehran in the distance about 288 km.

Arak is on the circuit 34 degrees and 5 minutes and 30 secend in north of earth from equator line. Arak from north arrive to Saveh and from north west to Hamedan and from east arrive to Mahallat. Arak have several weather because of it proximity to the Meyghan desert,also,mountains in the west and south.

Generally relatively mild summer and cold winter is the climatic characterstics of Arak.

Mountains in the west and smooth plain in the center and north the major characteristics of trith of topography.The most important mountains is Sefidkhani, Haftad Gholeh.

The centrality of city and on the other hand attracts industrial activity and services in Arak.



**Figure 1.** location ARAK city.

## Research method

Given that the conditions climate change decisive role in shaping property vernacular architecture in areas urban and rural. Identify the differences and climate and impact on body building in city of measures which can be useful strategy and presented in order harmonic architecture with climate change and energy saving.

Research method is description and analytical and based on documents and libraries and new article and observations.

At the first we want review body building in the cold city and factors in building design in this climate and review and analytical design solution can be used ro ARAK city and form fabric of the city towards sustainable development.

There are three ways for statics systems :

1 – Direct reception

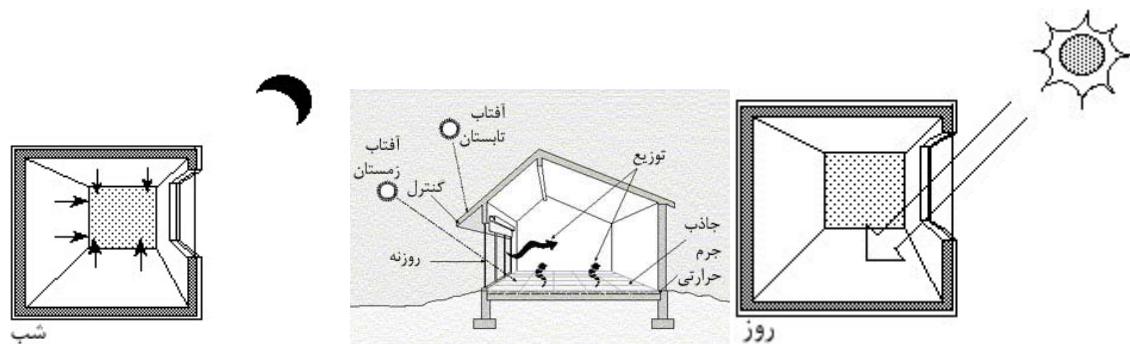
2 – Indirect reception

3 – Separate reception

The purpose pf the static systems is store solar heating in elements building and freeing it when sun doesn't shine.

### Direct reception

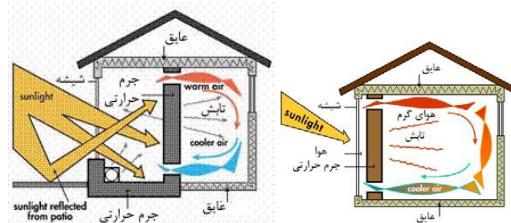
In this system, living space is solar thermal collector for absorbing heat and system distributor. Glass forward is an example of this system that enter the home solar energy and energy directly and indirectly to the materials (Figure 2).



**Figure 2.** Thermal mass, attracted the solar energy in day and night to radiate the heat.

### Indirect reception

In this system, the reception solar energy by part of the cover, transmitted to the space of the building with appropriate thermal mass. thermal mass it work such as thermal battery, The light beam that treats absorb and pass by lead to living space (Figure 3).



**Figure 3.** indirect reception systems.

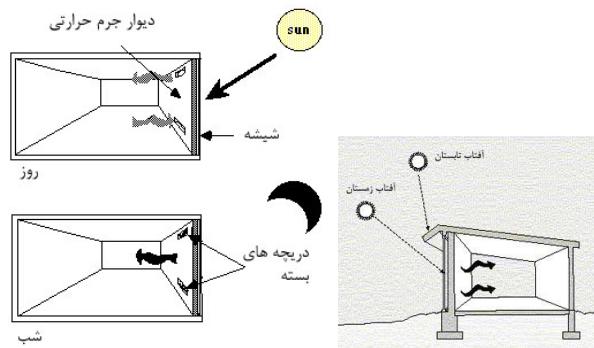
There are two types of indirect reception system:

- 1-Thermal storage wall systems.
- 2-pond on the roof.

### Thermal storage wall system

In winter, thermal mass alluring the heat of the sun and room with three process : radiation, convection, lead heated.

In summer thermal mass should be in the shade because of heat and cold room environment to attract. Thermal mass have two major task : heat storage and maintain a uniform temperature performance about heat and cold (Figure 4).

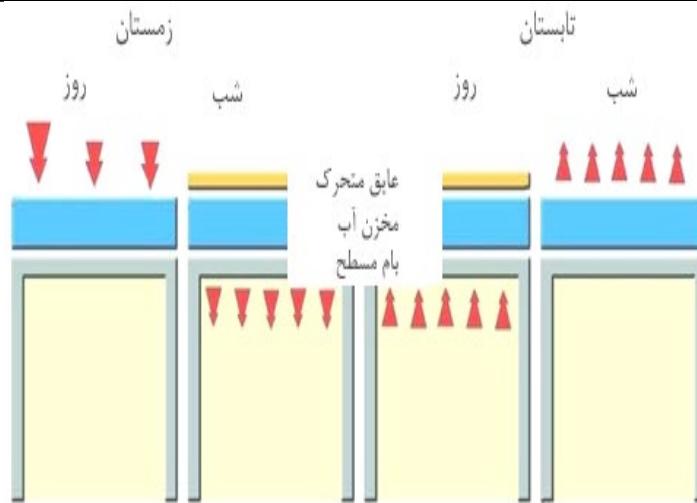


**Figure 4.** Thermal storage wall performance.

### Pond on the roof system

In this system thermal storage placed on the flat roof.

In this system is better for low humidity climate and that must change for hight humidity climates (Figure 5).

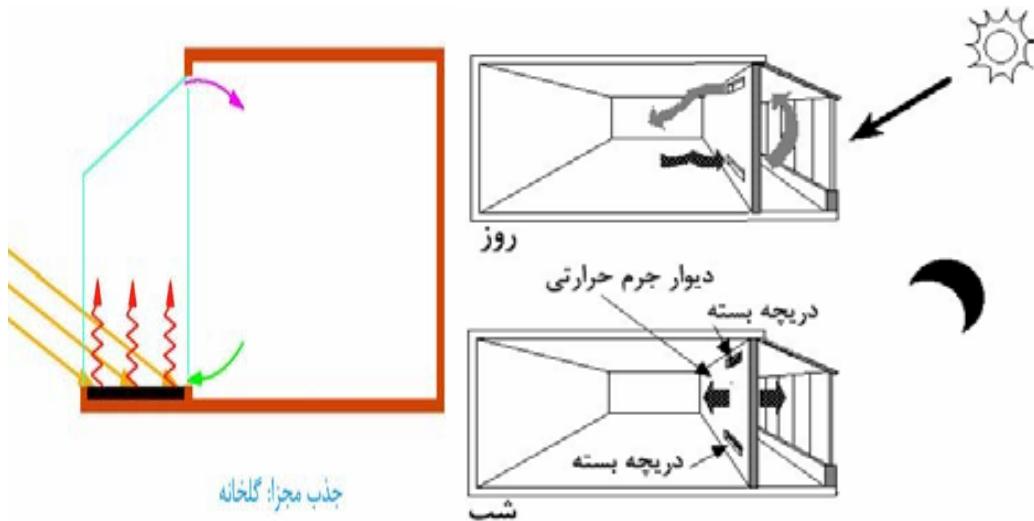


**Figure 5.** pond on the roof system.

#### Separate reception

Get exclusive to absorb solar heating for static and then transfer it into or out doors a liquid or air is used the separate reception system applies 15\_30 % sun deal hit the glass to warm up your living space.Solarium and green house sun the combination of direct reception system and indirect reception system.

Solar light entering to the solarium preserved in thermal mass and room air (Figure 6).



**Figure 6.** night and day the solarium performance in separate reception.

#### Stationary air conditioning

Because of building little need to air conditioning it should in air conditioning used of renewable energy.To this end.three major ways for conditioning can be named "Adjustable air conditioning and window.

The first strategy for conditioning without the help of mechanical equipment in hot and humid climate is the use of natural ventilation opening output should be greater than opening input be placed for supply air flow about low or middle height in room.

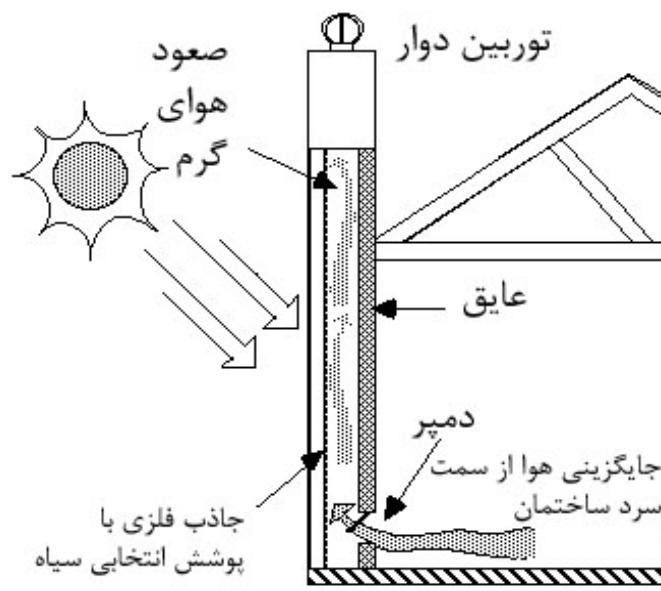
Should be tried decrease air infiltration.

#### Additional walls // air adjacent wall

This wall is perpendicular panel at the window for perpendicular to the wall.This wall natural speed due to the pressure difference.

#### Thermal chimney

Convection current for out air the building.Creating groups warm with an outlet valve located on the outer surface, air conditioning for structure can be drawn into the house.Thermal chimney can be built with narrow can configuration and should be ends above the roof level (Figure 7).



**Figure 7.** effects thermal chimney.

## Conclusion

Based on field observations and analysis of the structure and fabric of the buildings ARAK city and surroundings, this result is achieved:

Core and future development under the influence of geographical factors, and climate and elements makes believe more orientation effective form of. In cold climate should from exteriors building in contrast to the prevailing wind direction is, use double glazed window, run wall thickness to minimize heat exchange, also, moisture in the construction and the choice of material effects. So exactly natural causes in how the building form, investment, the street, alley and the choice of materials effects. In cold city should be used of materials with high thermal capacity to control the heat through building shell, also, in order to take advantage of thermal energy, should be used dark colored roof coatings materials used in ARAK city is rock and brick, the rock in areas available and be used in foundation that the moisture to enter the building does not. The stone to brick not good thermal capacity, so should be increase stone wall thickness.

## Suggestion

- 1-Used of plenty of material in the region and color suit with the climate,
- 2- Used of consultant and climatologists for resuscitation project in tradition context,
- 3-Decrease out level to the useful space in order to reduce the impact of cold weather,
- 4- Reduce the roof surface to useful levels of the building,
- 5- Adjustable ventilation window for fans create static,
- 6- Create additional wall,
- 7 – Create thermal chimney for fans create static,
- 8 – Using photovoltaic cell in public building,
- 9 – Use the appropriate glass and adjustable canopy to minimize exposure light and a little demand for air conditioning,
- 10 – Increased levels of insulation to cut costs of heating and cooling.

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