

Climate and energy responsive housing in Iran
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Passive Houses:

"Passive Houses are buildings which ensure a comfortable indoor climate in summer and in winter without needing a conventional heating system. To permit this, it is essential that the building's annual demand for space heating does not exceed 15 kWh/m² year. The minimal heat requirement can be supplied by heating the supply air in the ventilation system (www.cephus.de, 2005).

In passive houses the heat loss is extremely much reduced and passive solar heat gain through windows is so used that the building do not need a separate heating system.

Energy saving of passive houses on heating is 80% compared to conventional standards. They are cost-efficient, high quality, healthy and sustainable construction (Wolfgang Feist, 2005).

General characteristics of passive houses are:

- A Compact Building with minimal surface area
- Southern orientation with large south-facing windows
- Well insulated opaque envelope without thermal bridges
- Tight building envelope
- Passive use of solar energy
- Triple glazed windows and well insulated window frames
- Heat recovery systems for ventilation system
- Passive preheating of fresh air with underground ducts (pipe system)
- No conventional fossil fuel central heating

"The conception of passive houses was developed in the late eighties" (Wolfgang Feist, 2005) and the first passive house of Germany was built in 1991 in Darmstadt-Kranichstein (Anton Graf, 2003).

Passive houses have been used until now in Europe countries and for using them in other countries and climates, they must be adapted to other climates.

Research Area:

The research area is Iran, but the country has several different climatic regions and we must choose one of them for our research area.

The winter climatic regions of Iran are: 1-Very cold, 2-Cold, 3-Temperate and humid, 4-Temperate and dry, 5-Warm and 6-Warm and humid.

The research area is the cold climatic region of Iran, which from a geographical viewpoint is a mountainous region and due to the large amount of population and energy consumption of the city of Tabriz, we choose this city for research area.

The research Questions:

- What are the standard rules of passive houses (the houses without conventional heating system) in Iran?
- How can passive house concept be adapted for the individual houses with 1 – 3 levels in the very cold climatic region of Iran (the city of Tabriz)?

To simulate the passive houses and try their construction characteristics and rules in the research area, we use the software of "Passivhaus-Vorprojectierung".