

# Passive House – Tseri

## Architect

Christos HadjiChristou

## Passive House Design

Milos Ilic - Certified Passive House Designer

## Sustainable design

ENERGOPROJECT

## Construction

Hypercon ltd

### **Short description of the house**

Passive house Tseri is situated in Nicosias suburb of Tseri . Plot is 410 m<sup>2</sup> and the ground floor is 90 m<sup>2</sup> with 16 m<sup>2</sup> of covered veranda and 16 m<sup>2</sup> of garage . First floor is 95 m<sup>2</sup> with 4.5 m<sup>2</sup> balcony . Building has flat roof.

### **Orientation**

Plot has a very small front face of only 13 m , so this had a great impact on orientating the house and the shape of the house . Ground floor is open space plan with spacious kitchen dining and living area . on the first floor is situated master bedroom with ensuite bathroom , 3 bedrooms , bathroom , small storage and utility room . House dimensions are 6.5 m by 12.5m . Long side of the house is oriented west to east .

### **Structure and materials**

In our wish to make house as much as possible environmentally friendly , we opted for the timber frame skeleton , we tried to use as less as possible concrete to lower our carbon footprint . Only slab foundation is made of concrete. Timber used in our skeleton is from sustainable grown tree plantations in Sweden . For insulation in between studs we decided to use ECOSE Glass Mineral Wool from Knauf because it is extremely work friendly and is largely made of recycled materials , compared with other available materials on the market . For external finish we used materials from company STO wick

are organic based and not cement based as most similar materials again in our wish to lower our carbon foot print . All floors in the house except wet rooms are made of engineered wood parque . All windows are UPVC triple glazed with argon filling . Exterior walls have U value of 0.18 W/(m2K), ground floor slab has U value of 0.48 W/(m2K), flat roof has the U value of 0.15 W/(m2K), UPVC window frame has U value of 1.3 W/(m2K), And triple glazed windows with argon filing have U value of 0.8 W/(m2K). House is designed with Passive house standard wich means that there are almost no thermal briges.

### **Light and Air Ventilation**

Being a Passive House special attention was given to the air tightness of the building. Heat recovery ventilation system was installed to provide for pleasant indoor climate try all the year. With heat recovery of 90 % system provides fresh air with minimum lost of energy. HR unit has two very efficient fans that use only 80 watt/hour. House is oriented west to east which allows to have cross ventilation in every living space for natural airflow. Large windows are used to maximize natural light.

### **Energy Efficiency**

Efficient Solar Hot Water System used to save over 25% of household energy. All the lighting in the house is energy efficient fluorescent and LED. Super insulated house envelop saves 90% of heating and cooling energy. House appliances are all A+ rate. Master switch is installed at entry that can turn off power outlets to limit standby power consumption. There is a provision for Solar Energy Photovoltaic System, which will be installed in next stage.

### **Water**

Special attention was given to water management. Water-wise toilets, tapware, and white goods are used only. We optioned for the Grohe products which limits water flow to only 6 lt. per minute for taps and 9 lt. for shower even with high water pressure. Filters of AAA rate are connected to direct water supply to provide supreme quality drinking water. Rainwater storage of 2000 lt. is installed above the garage to collect rain water from the flat roof which can be used for cleaning the veranda and landscaping.

### **Heating and Cooling**

Super insulated envelop makes heating and cooling demand are to minimum. Annual heating demand is 6 kw/m2/year of a living area, this means that for all heating season for the whole house we need only 900kwh to have pleasant 21 degrees thru the entire house . Maximum Cooling Load is 13 W/m2, this means that one air-condition unit of 9000 BTU is adequate to cool the whole house and keep it on pleasant 27 degrees. Solar passive design makes the most of use of passive solar heating gains. Deep overhanging on the west veranda stops the overheating from strong afternoon summer sun but allows to low height winter sun to heat up the house. All the bedroom windows have shutters to prevent overheating. During the summer night flushing is being used to cool down the house. Cool night breeze blows from west to east in Nicosia allowing natural cross flow ventilation .

### **Recycling**

All Black water is sent to small On-site sewerage treatment plant that recycles water which we use to fertilize and irrigate native and low maintenance planting in the back yard. Modular drip irrigation system is used to maximize area of irrigation. In the house hold the do garbage separation and recycling. There is a small composting unit in the back yard which being used for garden plants recycling and food leftovers recycling.