

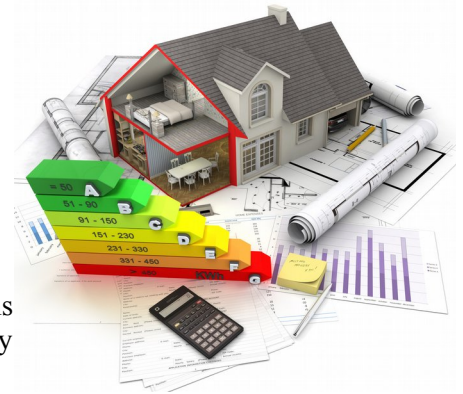
Transform an old house into a modern house

We will study a house built in the 70's

There are two objectives

- **improve the energy performance of the house**
- **transform the house into a smart house.**

You will offer ideas and solutions to meet these two objectives. If these solutions require electrical modifications draw them on the plans, if you need to buy equipment you will have to estimate the price and depreciation.



Technical data:

Surface area : 135 m² , length: 15m, width : 9 m. One- storey house. No roof insulation.
It was built in building blocks (concrete) of 20 cm (20cm*20cm*50cm) , without insulation.

Windows : single glazing (thickness : 5mm)

Shutters : in wood (in bad conditions) :

There is no controlled mechanical ventilation

Heating : electric convectors.

Thermal conductivities of different materials:

$$\lambda (\text{concrete}) = 2 \text{ W.m}^{-1}.\text{K}^{-1}$$

$$\lambda (\text{polystyrene}) = 0,029 \text{ W.m}^{-1}.\text{K}^{-1}$$

$$\lambda (\text{building block}) = 1,05 \text{ W.m}^{-1}.\text{K}^{-1}$$

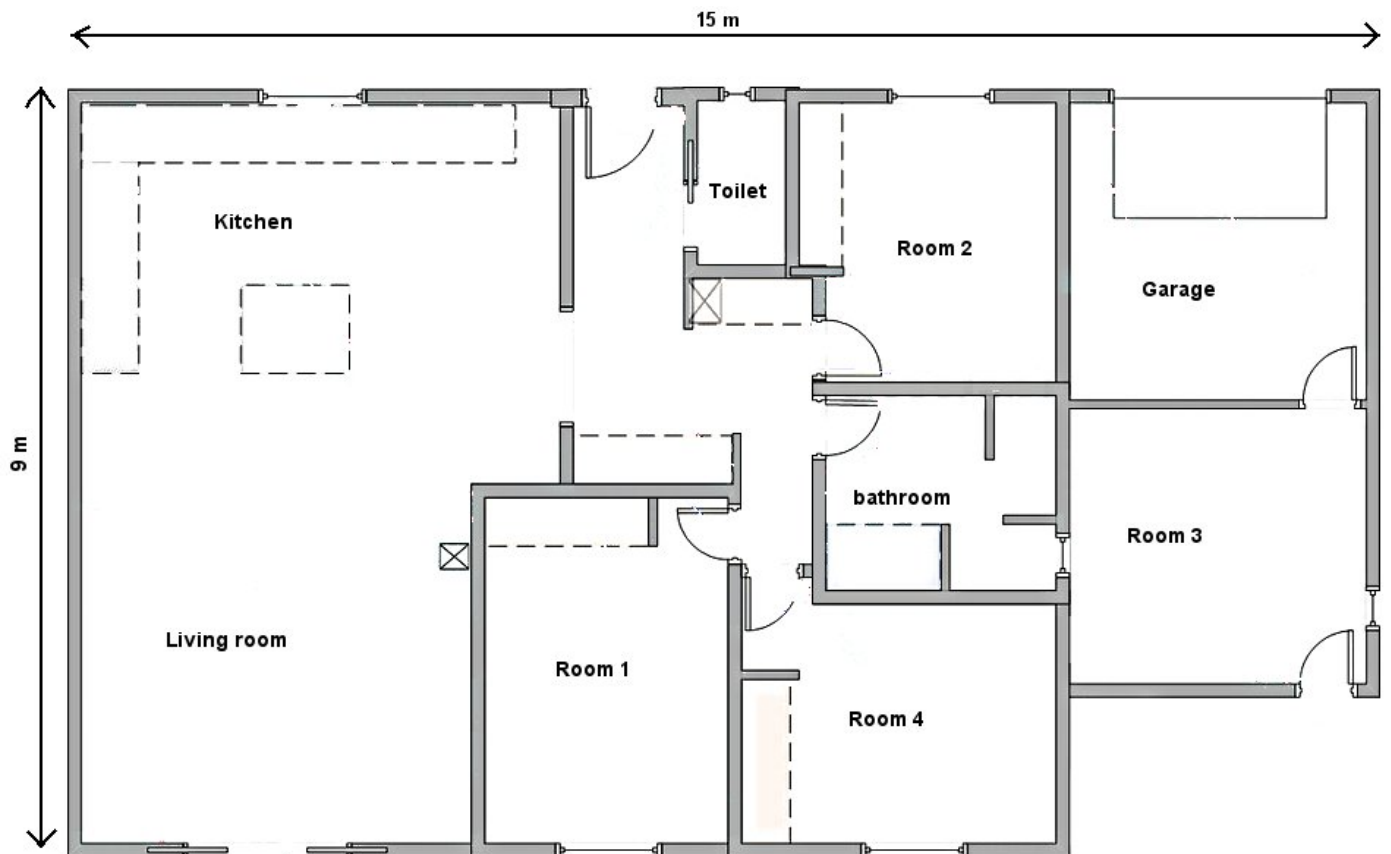
$$\lambda (\text{glass}) = 1,2 \text{ W.m}^{-1}.\text{K}^{-1}$$

$$R_{\text{th building block}} = \frac{e}{\lambda} = 0,19 \text{ K.W}^{-1} (\text{building block of 20 cm})$$

Building block :



The House plan :



Electrical diagrams :

