



The 'Energy II - Demand-side management - Public awareness campaign' project is funded by the European Union



## INCREASE THE VALUE AND COMFORT OF YOUR HOME

and lower monthly costs with energy efficiency features.



# 1. ENERGY EFFICIENT CONSTRUCTION OF BUILDING – THIS IS HOW A PROPER BUILDING MUST BE

Using modern building techniques and good practices, all homes can now offer an acceptable level of comfort without excessive use of air conditioners and heaters which result in big energy bills.

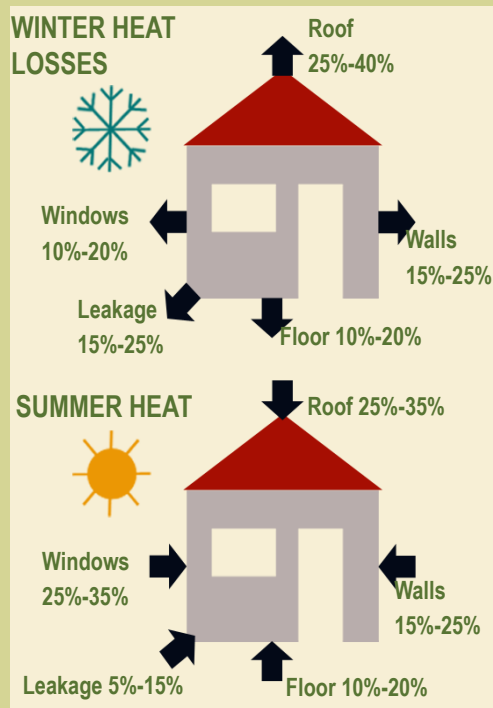


Figure 1: Heat losses and gains in a typical house.

**In winter**, houses lose heat through walls, windows, doors, floors, roofs and ventilation. Thermal insulation, good quality double glazed windows, and controlled ventilation can reduce these losses by as much as 50%, thus reducing the heating costs.

**In summer**, an energy efficient home featuring thermal insulation, shading, brightly coloured external surfaces and controlled ventilation also

greatly enhances your comfort by offering protection from the heat and radiation of the sun. This also helps to drastically reduce the bills you pay to run air conditioners.

As our example shows, it costs a lot less to achieve the same room temperatures in an energy efficient house, than in one that is inefficient. The savings mean that the additional cost of quality energy efficient features are quickly repaid, especially if these are installed during the building process when the additional cost is relatively small.

Making a property energy efficient retroactively will cost more, but will nonetheless greatly enhance comfort and reduce costs.

Remember too that energy efficiency features will enhance the resale value of your property, especially at a time when high energy efficiency standards are becoming mandatory. This is now happening in most European countries, as part of a drive to reduce energy dependency and the greenhouse gases that threaten the environment.

To achieve energy efficiency, here are some of things you should look out for.

## THERMAL INSULATION OF WALLS AND ROOFS

It's definitely worth insulating your house, especially if you are building a new one.

Around half the heat lost in a typical home escapes through the walls and roof, so insulation is a main protector against heat loss in winter. In summer the process is reversed, because the heat of the sun easily penetrates non-insulated walls and roofs.

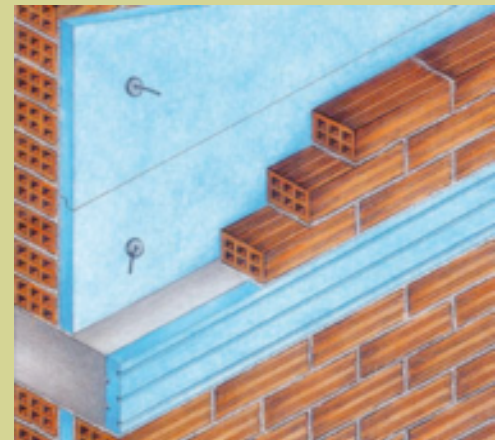


Figure 2: Internal cavity wall insulation is feasible when building a new house.

*Note: Water proofing such as asphalt membranes, does not provide thermal insulation. In other words it does not protect against the cold in winter and heat in summer!*



• **Walls:** There are many techniques that enable you to insulate your house without excessive cost. Although less easy to do if your house is already built, there are a number of options available, such as adding external insulation. This is especially recommended for north-facing walls exposed to the cold in winter or for south and west facing walls that get a lot of sun during summer.

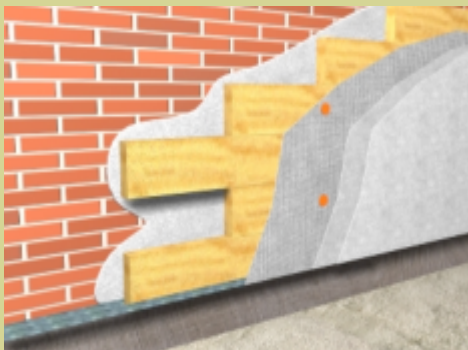


Figure 3: External wall insulation is feasible both when building a new house and for existing houses.

• **Roof/Attic:** Insulating the roof will have an even greater impact on comfort and energy use in both winter and summer, and is easier to do than insulating walls. Without thermal insulation, the top floor of a building can be unbearably hot in summer, and very expensive to cool. An apartment at the top floor would reduce its heating and cooling costs by 10%-15% just by insulating the roof, so that the cost of insulation would be paid back in less 3-4 years while also providing greater comfort.

Thermal insulation of flat roofs in existing houses is feasible and can be combined with improved water proofing

if necessary. If you have an attic, adding insulation to this is both cheap and easy. Thermal insulation materials like mineral wool could be just placed on the flat area under the roof and remain uncovered if the space is not used for other purposes.



Figure 4: Thermal insulation of a roof may be very easy to apply.

## DOORS AND WINDOWS

About 10%-20% of the home's total heat losses during winter, and 25-35% of total cooling loads during summer are due to windows and doors.

Simple metal or poor wooden window frames and single glazed windows lose heat in two ways: due to their poor insulation properties; and to uncontrolled movement of air through gaps and loose fittings.

In summer of course, the window panes augment the heat of the sun's rays that enter the home.

If your existing windows are single-glazed, have rotted or damaged wood, cracked glass, missing putty, poorly fitting sashes, or locks that don't work, you may be better off replacing them.

### When buying windows, look for:

• **Double glazing.** Double glazing insulates almost twice as well as single glazing by trapping air between two panes of glass. This also reduces noise and condensation problems. In summer double glazing reduces heat gain inside the house from the hot air outside, but does little to prevent radiation if the window is directly exposed to the sun.

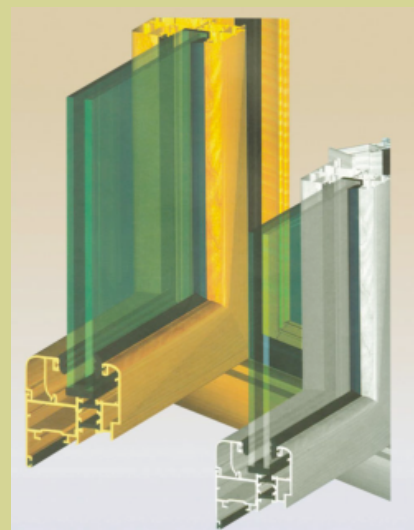


Figure 5: Double glazing is particularly important for conserving heat in winter.

### • Good quality window/door frames:

Cheap metal frames are very poor thermal insulators. Plastic or wooden frames that fit properly are much better. Energy efficient aluminium frames with special "thermal break" systems to minimize losses are also available on the market and recommended.

## BIOCLIMATIC ARCHITECTURE AND SUN PROTECTION

Sun entering the house is desirable during winter and an unwanted source of heat during summer.

Traditional houses were designed to respect “bioclimatic principles” as, at that time, mechanical systems of cooling and heating were either unavailable or overly expensive. To offer shading and protection from cold winds, traditional builders and architects incorporated principles such as favourable orientation, moderate window sizes, thick walls, and use of materials with good insulating properties such as wood, cane, adobe with straw, etc.

However, architectural fashions in modern times call for features that can be very inefficient (and uncomfortable to live in) such as large windows, regardless of whether or not these are facing the sun. These may offer good views but rely on expensive mechanical heating systems and cooling systems, especially air conditioners.

Curtains or shades placed inside a window exposed to the sun reflect part of the solar radiation, especially if these are brightly coloured. However once the sun penetrates the windows the rest of the heat is trapped behind these, raising the overall temperature in the room.

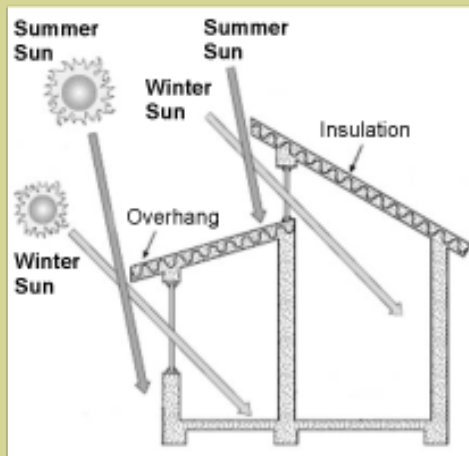


Figure 6: Summer sun is higher than winter sun, so that clever shading will not obstruct the winter sun.

The most effective way to stop overheating in summer is to keep the sun from entering your house in the first place. This can be done by:

- Clever positioning and sizing of windows in the house design phase.
- Use of external shading systems, such as shutters, many of which are adjustable to allow greater sun access during winter. These can reduce direct radiation by up to 90%.

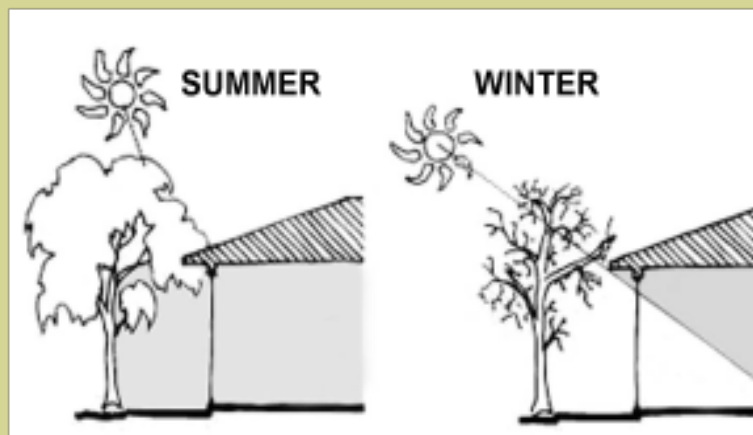


Figure 7: Deciduous trees will not block winter light.

- Planting deciduous trees close to the house where they can offer shade during summer but don't block it during winter

- If shading is not possible, you can use special low emissivity glass (or low emissivity coatings on the glass), especially on the windows which face the summer sun. This reduces radiation, without significantly reducing the level of lighting. During winter however, these also reduce heat gains from the sun.

Remember too that careful positioning of shading will not reduce heat gain or light in winter as the sun is lower in that period than it is in summer.

## 2. GENERATE YOUR OWN ENERGY USING SOLAR WATER HEATERS



Figure 8: Get the maximum energy from your solar system

Solar water heaters are a great way to cut your energy bills since they produce hot water free of charge that would otherwise add to your energy bills. A solar collector of 2 square meters can produce up to 1500 kWh per year and save up to 600 YTL annually. However, this can be achieved only if the solar system is of good quality, and properly installed and used.

Poor quality solar systems may seem cheaper in the shop, but work out more expensive than a good quality system over their lifetime, as they are much more inefficient and also a lot less long lasting.

### When choosing and installing a solar water heater it is important to:

- Choose good quality high efficiency solar collectors certified according to ISO/EN International Standards. Check the product brochure for this.
- Buy a system that is not bigger than what you need. A 2 sq.m. collector and a very well insulated 120 litre tank are enough for a 2-4 persons family.
- Position the solar panels facing south, and if this is not possible ensure the deviation is maximum 45 degrees. Also, the collectors of the solar system should not be shaded by other buildings, water tanks or tall trees during the day.
- Insulate all hot water pipes very well.

## 3. TOP TIPS WHEN BUYING OR BUILDING A NEW HOUSE

### When building:

- Ask the architect to design the house according to basic bioclimatic principles. Check especially that there is adequate shading of windows.
- Ask a qualified engineer to carry out a complete thermal insulation study of your house and apply his recommendations.
- Demand that the house has proper thermal insulation (i.e. ca. 5 cm thick) in ALL walls, concrete elements, roofs and ground floors, that the windows are double glazed and that quality frames are used.

### When buying:

- Ask a professional engineer to recommend ways in which you can make your house more energy efficient and to calculate the savings you could achieve and at what cost.





## Example : The impact of adding energy efficiency measures to a single house

We have calculated the costs to heat and cool a typical 2 storey house with a total area 165 square meters and compared these with what it would cost to heat and cool the same house with energy efficient features.



Figure 9: Layout of the 1st floor.

### Case A: Typical inefficient construction

The energy inefficient house has:

- No thermal insulation of roof, walls and floor
- Single glazed windows and doors with metal frames
- No shading of windows.

### Case B: Energy efficient construction:

We have then added the following features:

- 5 cm thick thermal insulation on roof, walls and floor
- Double glazed windows with metal frames, and
- Shading on south, west and east facing windows

Our calculations show that the total annual energy demand for heating and cooling such a house with energy efficient construction is about 50% less than in case A.

The additional investment for applying all the above measures in a building under construction will be paid back within about 4-5 years. In addition you will enjoy greater comfort and the house will be worth more.

**Remember !!!! You deserve to live in a properly built and insulated house that you can heat and cool at reasonable cost. The technologies and practices to build an energy efficient house are available, commonly used worldwide and relatively cheap. Ask for them.**

For more information visit our website :

[www.efficient-energy-use.eu](http://www.efficient-energy-use.eu)

[www.verimli-enerji-kullanimi.eu](http://www.verimli-enerji-kullanimi.eu)

## The European Union:

The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders.