# ENERGY EFFICIENT HOUSES

What is this Action Sheet about?

In cold weather, many people heat their houses by burning wood or coal indoors. This means spending more money and creating more indoor smoke, which can damage your health. However, there are many ways to design houses so that they make the most of the sunlight and keep the heat in. This Action Sheet looks at the design of energy efficient houses – ways to save money and breath more easily. There are also many simple ways to keep houses cool in hot weather, all free once you have built the house using some simple design principles.
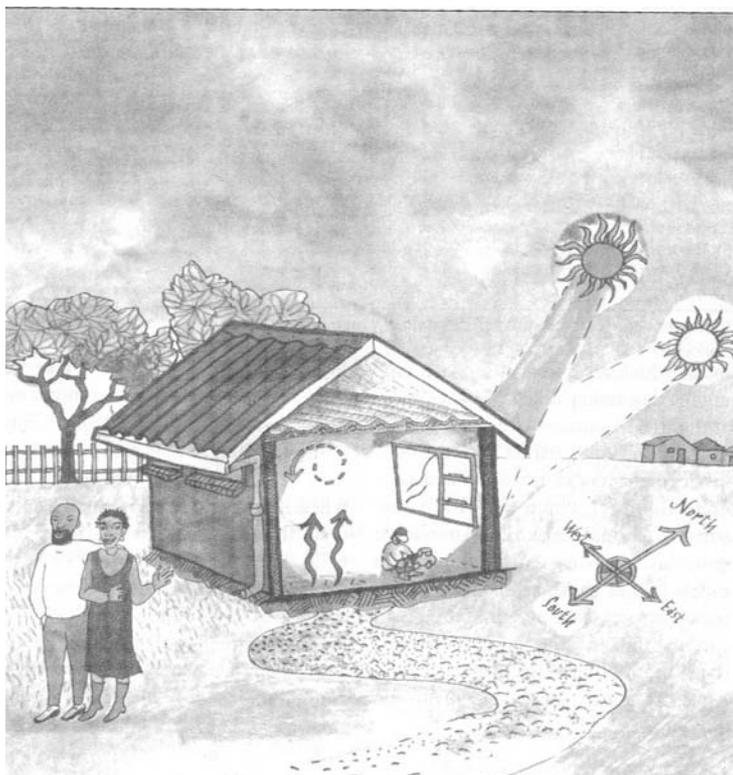
(Image: IIEC – Passive Solar Design Brochure)

How can you take advantage of free sunlight to keep warm in the cold season?

Design that uses sunlight to keep the house warm in cold weather is called PASSIVE SOLAR DESIGN. If you live in Southern Africa, south of the equator, the sun rises in the north-east and at noon, the hottest part of the day, the sun will be in the sky to the north. To take advantage of this, the front of the house (the widest side of the house, and the side with most windows) should point to the north. In winter, the sunlight can reach into the house and warm it up. You can also choose building materials which help store heat and keep it inside the house.

What kinds of building materials?

The best materials are those which have a high thermal capacity. This means that after being heated up by sunlight during the day, they store the heat, slowly releasing back into the house through the night. One of the best materials for heat storage is bricks made of earth. Hollow cement blocks and concrete have reasonable heat capacity. One of the advantages of single storey houses is that the floor can be made of heavy materials, usually better at storing heat. The ground itself also acts as a heat store. It is much more expensive to use heavy floor materials in multi-storey buildings.

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What about the windows?

Glazed windows let sunlight into the house. The sunlight hits the walls and floors, heating them up so they can keep sending heat out into the room. However, because windows are much thinner than the walls of the house and are made from material that allows heat to pass through, they are also one of the ways in which heat escapes. To let the most light in, but keep the most heat in, the wall area covered by glazed windows should be only approximately 20% of the floor space of the house (Holm, 1996) and almost all the windows should face north, so they collect as much sunlight as possible. Only small windows should be placed on the south, east and west sides of the house. Double glazing, where a layer of air is trapped between two layers of glazing, stops heat loss through windows very effectively.

Metal window and doorframes conduct heat out of the house. This means that heat inside the house is transferred through the metal to the outdoors. The house will cool down more quickly at night. Wooden window and doorframes, which do not conduct heat as well, would help keep heat inside the house.

How else can we keep the heat in?

Insulation is any material which stops heat loss. Because heat rises, insulating the roof is absolutely vital for energy efficiency. Putting in a ceiling is a simple way to insulate the roof. In South Africa, you can now buy new low cost ceiling material.

Building a double layered wall with an air space between – cavity wall insulation – is very effective, although uses more materials and labour than a single wall. Plaster walls or polystyrene panels can be added onto walls acting as an insulating layer. Building two or more houses joined together saves on materials and creates shared walls that do not lose heat to the outside air. Shared wall housing saves energy and costs less to build, but may not be popular where people are used to living in stand-alone houses.

What about keeping the house cool?

Any form of insulation not only keeps heat in, but also keeps heat out. Insulating walls and adding ceilings helps make houses energy efficient in winter and summer. With good insulation your house will be warmer in cold weather, and cooler on hot days.

Stay shady with a roof overhang

On hot sunny days, a cool house is one with lots of shade. Because the sun rises higher in the sky in the summer, you can block sun from entering the windows by building awnings that stick out above the window, or extending the roof further out from the house. The exact length of the roof overhang will depend on the shape of the roof, but it will have to be about half a metre long to shade the northern windows from the sun during the summer. It also helps to plant a strip of grass or vegetation under the roof overhang, so that the ground surface does not heat up.

What's needed to make energy efficient building common practice?

These ideas need to be taken up by governments and the construction industry, as well as people who build their own houses. If you live in a city, find out whether these ideas are being used in new housing developments, and if not, why not. Energy efficiency is not only about saving money, because the amount of fuel we use also affects the environment. Many houses are heated with fossil fuels, and by using less we will produce less of the carbon gases that are leading to global climate change.

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FOR MORE INFORMATION

CONTACTS

Practical Action (formerly known as ITDG): www.practicalaction.org

DOCUMENTS

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