Copper Development Association

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Solar Heating

The Ideal Home Solar House
Homeworld 81.
Milton Keynes.

Information sheet 30

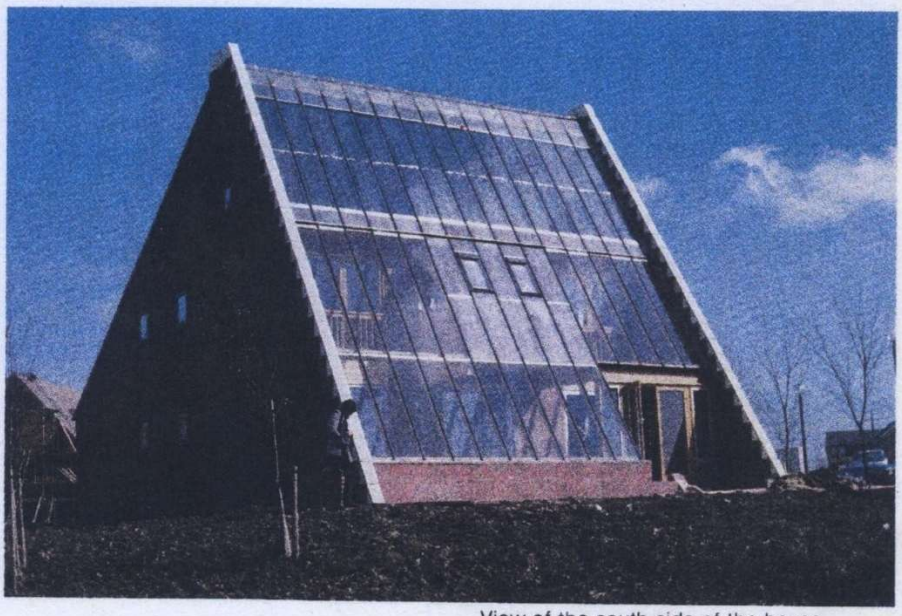
General Description

Promoted by Milton Keynes Development Corporation, the Homeworld 81 Exhibition brings together an international display of show houses and illustrates more than 35 of the latest and best ideas for housing. A focal point of the exhibition is the Solar House jointly sponsored by the Ideal Home Magazine and Copper Development Association. The area of the house is about 150 square metres excluding a south-facing two-storey conservatory acting as a solar trap and a double garage and porch on the north side acting as a thermal buffer. Two rows of solar panels are mounted above the conservatory. All the major rooms face on to the conservatory and the bedrooms have balconies overlooking this space.

The all-copper solar panels, pipework and associated hot and cold water services provide life-time reliability, high thermal conductivity with superior corrosion resistance; standardised fittings, valves, cylinders and wiring are approved to relevant specifications.

The building is insulated to a very high standard; in addition to 50mm Dri-Therm insulation in the cavity, there is another 25mm behind the plasterboard bringing the U-value of the walls down to 0.35Wm $^{-2}$°C^{-1}. The external doors, including the garage doors are insulated and most of the windows are treble glazed. Overheating of the building in summer is prevented by the high mass of the conservatory and a resulting slow response. In addition there are vents at the top and bottom of the glazing and a natural shading device (not shown in photograph) involving fast growing plants on the outside of the conservatory.

The inclination of the glazing and the solar panels is 60° to the horizontal and therefore optimises on autumn and spring days. The panels fit between rafters at 600mm centres and are connected to a Calor thermal storage system.

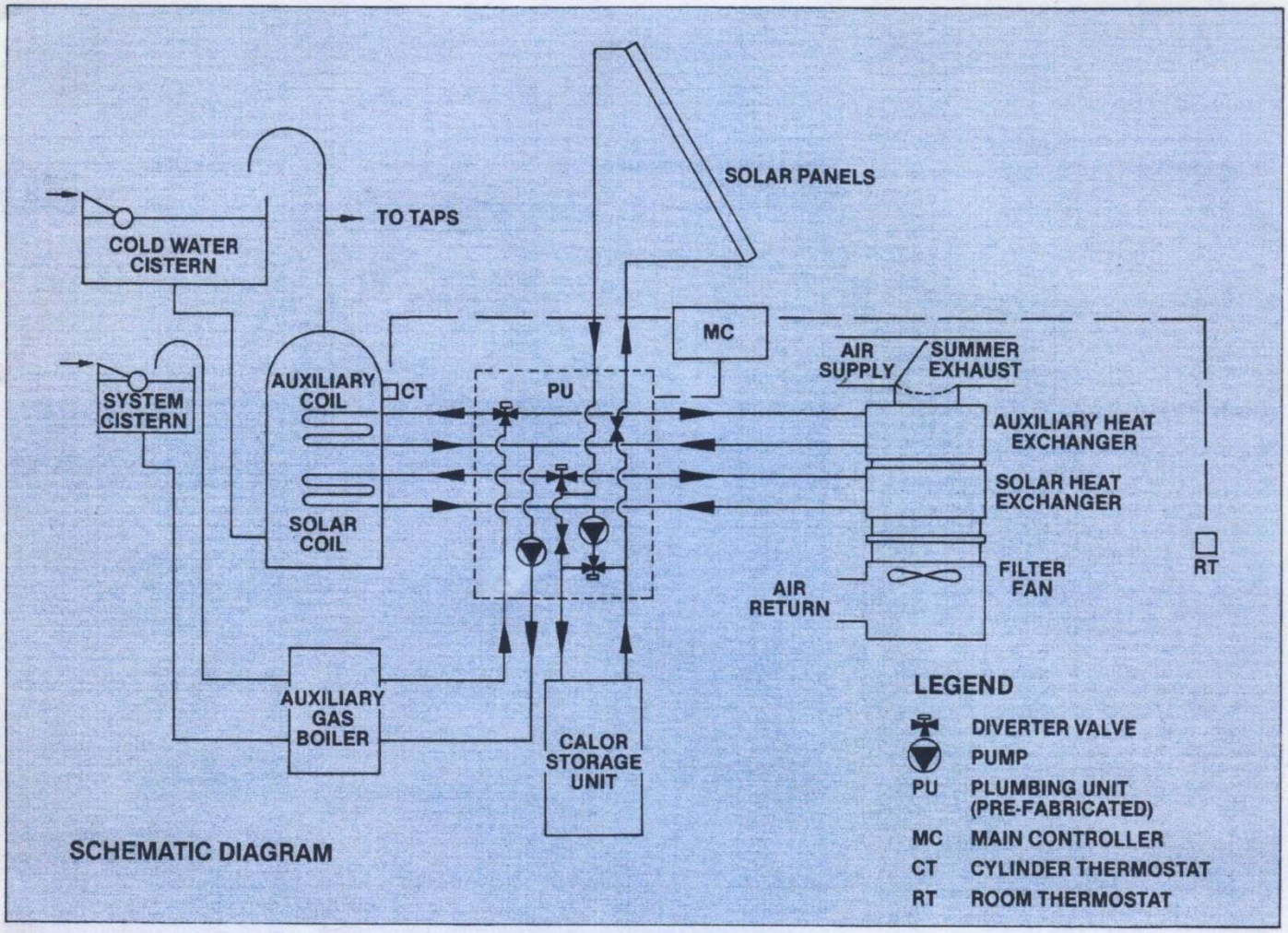


View of the south side of the house, showing the double storey height conservatory and the solar panels above.

The Calor system is based on the chemical heat of fusion of salts which enables a large amount of heat to be stored in a container about the size of a refrigerator. The store is charged by melting all the salt crystals with solar heated water passing through the solution in copper pipes. Up to five times as much heat can be stored in the salt crystals than in the same volume of water within a similar temperature range. When heat is required in the building, the circuit is automatically changed so that the flow is between the unit and a heat exchanger and air distribution system within the house. On cooling the liquid changes back to crystals and store-charging starts again. Should insufficient solar heat be available, or if the domestic water is not hot enough, the auxiliary boiler cuts in automatically. Overnight heating of domestic hot water by transfer from the storage unit is controlled automatically as required.

The solar panel integrated into a patent glazing system.

Architects Dominic Michaelis Associates, London W2 1PF
Contractors Abbey Homesteads (Construction) Ltd, Potters Bar
Solar system Calor Group Limited, Slough, and Solar Energy Developments, London W2 1PF



Panel Area

27m²

Design

Absorber: 0.25mm copper sheet ½H BS 2870 C106
Surface: Electroplated black chrome selective
Risers: 15mm copper tube
Manifold: 15mm & 28mm copper tube
} BS2871 Part 1 Table X
Manufacturer: Sunsense Limited, Peterborough

Installation

Panels are designed to fit between rafters at 600mm centres. The panels are backed by 80mm Ecomax insulation slabs. Glazing is single 6mm clear float glass.

Pipework

Pipework supplied generally by IMI Yorkshire Imperial Limited, Leeds; including 15 and 22mm plastic covered "Kuterlex" copper tube as required.

Calor 31 Storage Unit

The Calor unit is the principal storage component in the heating system. It contains copper tube heat exchangers and a specially formulated storage Calor material 31.

Type CSU 01

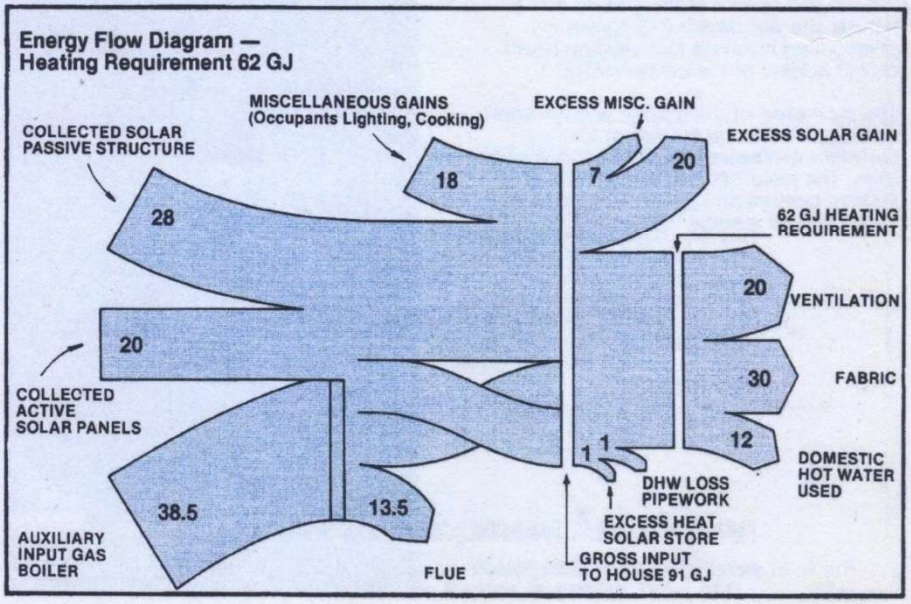
Salt volume 0.40m³
Salt weight 560kg
Gross weight 670kg

Container height 0.97m
Floor area 0.58m²
*Thermal capacity 60kWh
**Solar array size range 25-35m²

*Capacity for nominal temperature range 5°-65°C
**Assumes single-glazed flat plate collectors

Performance

It has been calculated that the active and passive systems combined will cut the annual fuel bill by 50%. An extra saving is made by using Thorn Lighting's new 2D range which reduce the energy used by the lighting by 80%.



Hot Water Cylinder

The non-standard IMI Range 280 litre unit with two separate heating coils is slightly taller than a conventional cylinder. The lower coil enables solar heated water to be available directly. At times when the solar temperature is sufficient, auxiliary heating by a Glow-Worm 38BF gas-fired boiler via the upper coil provides the required delivery temperature without reducing efficiency of solar collection.

System Controller

All the heating functions are controlled by a single unit. The controller automatically determines where and how much heat should be transferred by continuously monitoring temperatures at key points in the heating circuit and house. Priority is always given to the modes which reduce the use of expensive fuel. Additionally a Jetmaster Universal 600 wood/coal fire without back boiler, but with insulated flue, provides supplementary heating throughout the house.

Costs

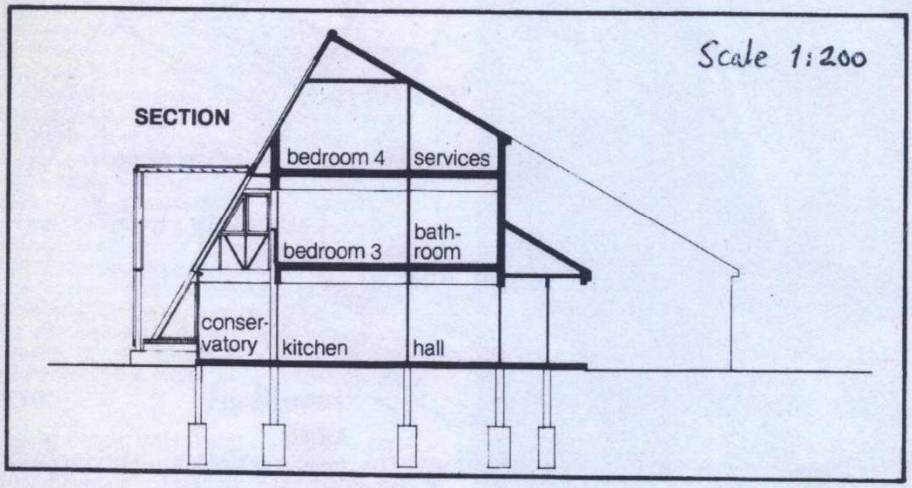
The calor system retails for about £3000. At current fuel prices the system will have a pay-back period of about 25 years but if this is linked to current rate of rises in fuel prices, it is anticipated that this figure will be reduced to about 10 years.

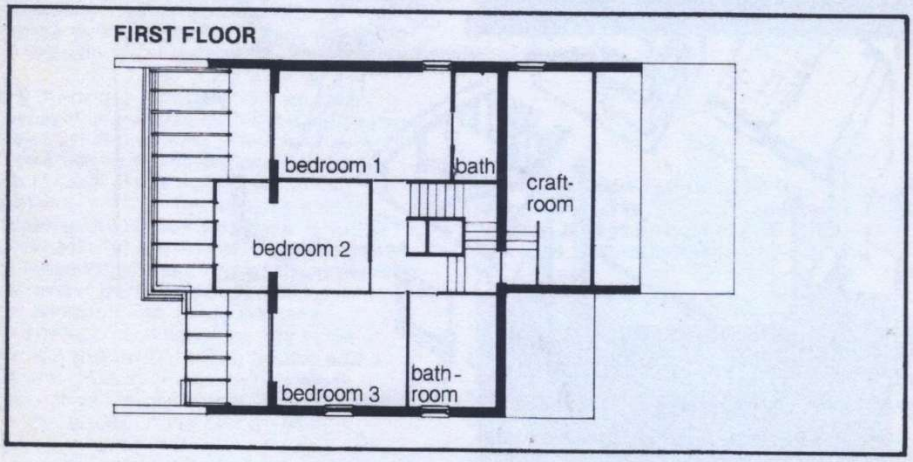
Plan and Section

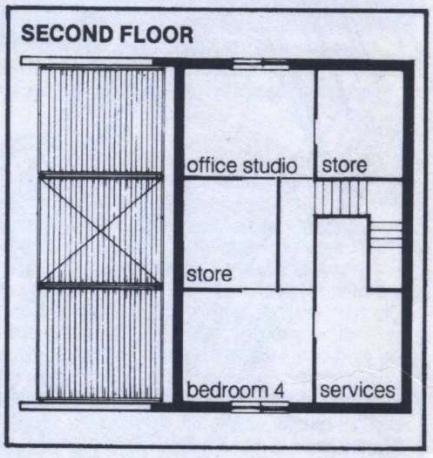
The Ideal Home Solar House has a conservatory on the south side, which acts as a solar trap, the garage and porch on the north side acting as a thermal buffer — preventing heat loss directly from the rooms to the exterior. In this way, the best use can be made of the sun's heating potential.

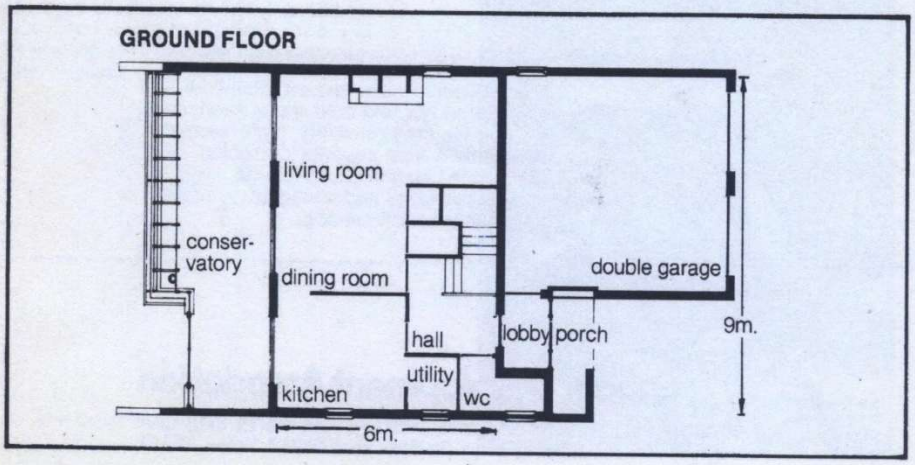
All the major rooms face south through the clear glass conservatory. On the ground floor, the kitchen, dining and living areas have a quarry tiled floor which collects the sun's heat during the day, preventing over-heating, and then giving off that heat in the early evening as the room temperature falls. On the upper floors, the bedrooms, bathrooms, and stores are planned around the staircase. The rooms have been designed for flexibility of use. The attic rooms could be bedrooms, studios or craft rooms. With the age of the micro-chip, we can expect to see more and more people working from home, and having only telephone links with their offices. The house has been designed to be adaptable under these circumstances.

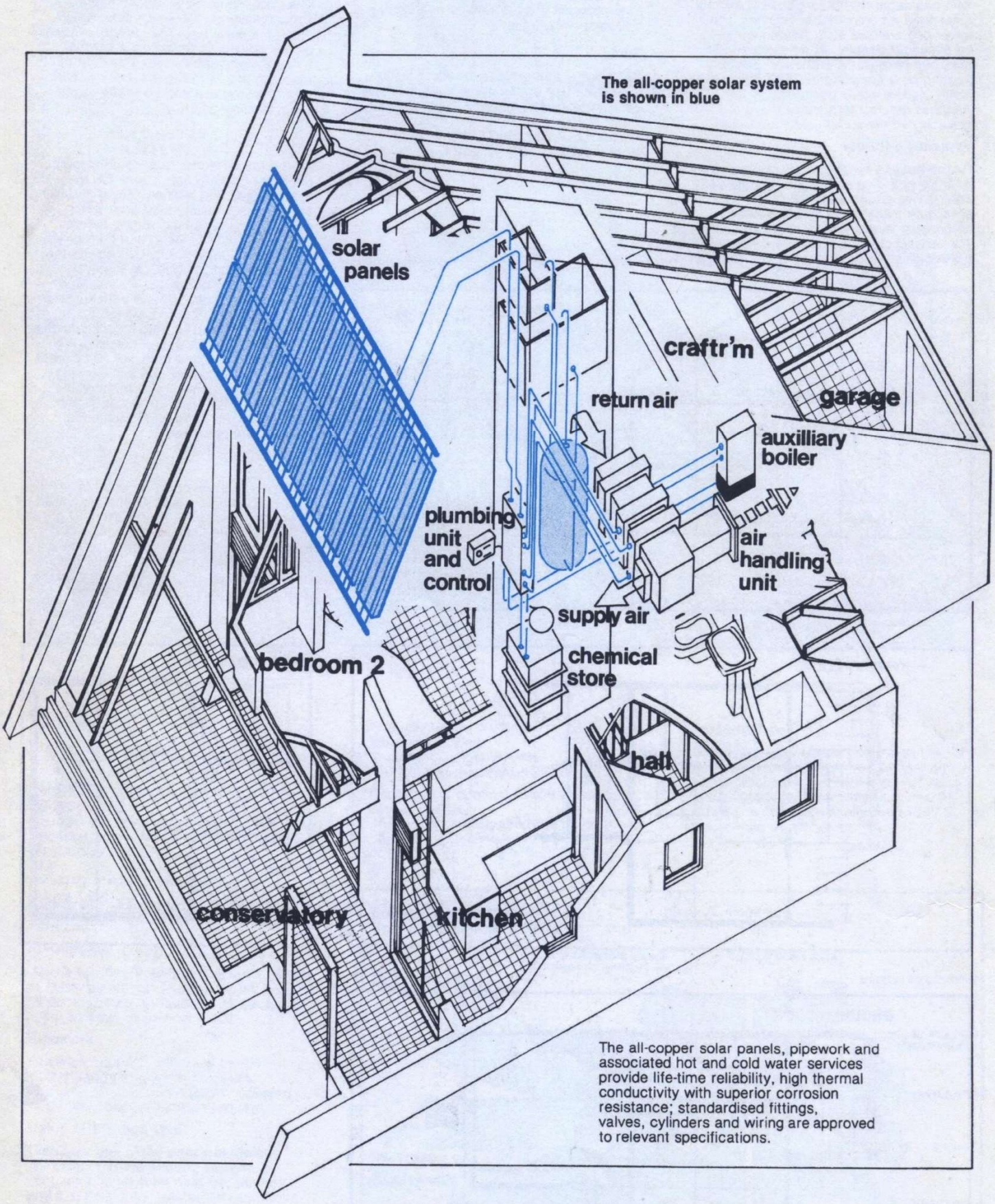
The conservatory could be used for a range of activities: a childrens' play area, a summer dining room or a place to grow home produce. Outside the conservatory, a structure will support plants, which will provide shade during the summer but will not impede sunlight during the rest of the year.











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