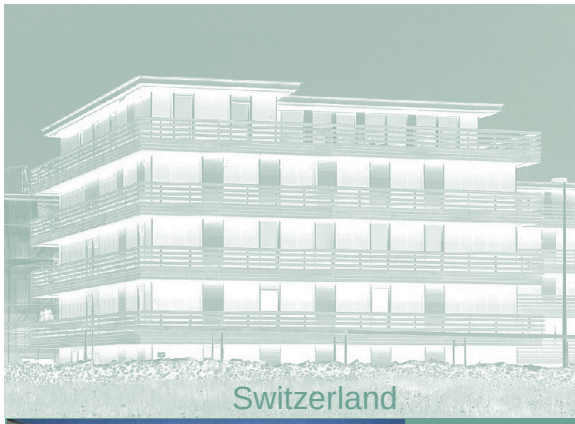
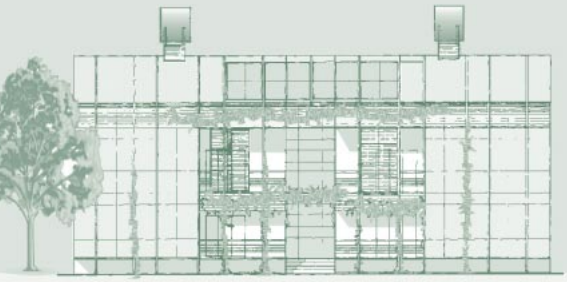

Switzerland


Austria

IEA - SHC Task 28 / ECBCS Annex 38

Sustainable Solar Housing

Marketable Housing for a better Environment


South - west facade

Italy


Germany


Sweden

Countries of the collaborating experts

Australia
Austria
Belgium
Brazil
Canada
Finland
Germany
Italy
Japan
The Netherlands
Norway
Sweden
Switzerland
UK

International Energy Agency

SHC - Solar Heating and Cooling Programme
ECBCS - Energy Conservation in Buildings & Community Systems Programme

Above:
Row house in Japan
Left:
Apartment building in Kassel, Marbachshöhe, Germany (funded by EU/CEPHEUS)

Sustainable Solar Housing

A research and demonstration project of the International Energy Agency

Building ecological housing with extremely low heating and cooling demand and minimal CO_2 emissions is a growing movement. Just as cars requiring only three litres of fuel per hundred km are entering the market, houses consuming annually less than the equivalent of three litres of heating oil per m^2 of floor area are now being built. Projects range from apartment buildings and row houses to detached housing. However, ambitious goals are not always met and higher costs among other factors hinder market penetration. An essential goal for this Task is therefore to help designers plan economical sustainable housing to increase market penetration and assure that the goals promised customers are met.

The standard approach concentrates on reducing loads. In heating climates this means extremely compact building form, thick insulation, super windows, air tight construction, and mechanical ventilation with heat recovery. Task 28/38 is exploring the combination of energy conservation and solar strategies in the context of marketable sustainable housing. A still unsolved problem is how to economically meet the remaining very small amount of heat demand, ideally also with renewable energy.

Energy use for water heating and appliances becomes important in such housing. Solar water heating is a proven technology. Photovoltaic panels can cover part of the electricity demand but needs a high investment. Systems serving multiple functions may be more economical, i.e. facade integrated solar collectors which also serve as the outer skin of the building. Further, heat losses from the back of the solar collector can reduce the space heating demand. Which mix of strategies makes sense under these new circumstances? How is comfort affected? What features will homebuyers accept? What spin-offs can be applied for retrofitting the existing housing stock? What integrated solutions lend themselves to achieving ecological housing in hot climates?

To address these questions, fourteen countries in Europe, North and South America, Asia, and Australia are collaborating in the four Subtasks described here.

Results

An internet web site offering advice for accelerating market penetration of high-performance housing

Design guidelines for high performance, environmental friendly and affordable housing

Testing reports to manufacturers for key building and technical system components

Documentation of exemplary Sustainable Solar Housing

Open houses and press articles

Apartment building in Freiburg, Germany
(funded by German Environment Foundation)

Above:
Row houses in Patschen, Austria
Right:
Solar collectors for social housing in Minas Gerais, Brazil
Far right:
Prosser house in Australia

Four Subtasks

A - Market analysis and Communication

In order to adapt sustainable solar housing to a larger market segment, it is important to know how the market will behave and change in the future. Information will be collected on national housing trends, governmental goals, preferences from the building industry, and most important - preferences from homeowners. Results will be used for technical, functional, and architectural solutions.

Communication of results is vital. Vehicles for this include a web site documenting existing projects, design guideline, and constructing next generation demonstration buildings.

B - Design and Analysis

This Subtask provides insights to plan housing with extremely low energy demand and minimal environmental impact that is affordable. The features and components that contribute the most at least cost may change according to building type, market segment, and region. Design guidelines are being developed through cross comparisons of built projects (input from Subtask D) and computer modelling.

Advice will be given for apartment buildings, detached-, and attached houses in climates ranging from temperate to Nordic. The basis for comparison is conventional housing built to local standards in 2001. In parallel, solutions for sustainable housing in warm climates address both comfort and the use of renewable energy.

C - Construction and Demonstration

What measures are necessary to initiate and successfully complete a demonstration project for high performance housing? Pioneers who have built such demonstration projects are sharing experience in planning for next-generation projects. Participants include innovative builders, financial institutions, and planners. At semi-annual meetings advice is offered on how to write a design brief, provide quality control during construction, debug the houses during commissioning and get the maximum public relations impact afterwards. The activity is led by an Australian team bringing fresh new ideas. Their motto is: Prove it by doing it!

D - Measurement and Evaluation

Monitored data from housing projects is being analysed to learn what has proven most effective. Results show the consequences of construction by traditional trades and occupancy by people. A Task reporting format allows information sampled according to national procedures to be reduced to common denominators and then compared. Thereby it is possible to learn what is effective under diverse climatic-, user-, and economic circumstances.

In a complimentary activity, key building components are being tested in renowned national laboratories. Valuable input is being provided to manufacturers to help them optimise their products to these new working conditions.

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Swiss Federal Office of Energy,
Robert Hastings

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The Netherlands and Norway:
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and SINTEF, Anne Gunnarshaug Lien

B - **Design and Analysis**
Sweden and Switzerland:
Lund University, Maria Wall
and Robert Hastings

C - **Construction and Demonstration**
Australia:
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D - **Measurement and Evaluation**
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