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Why do we neglect the proof ? Advantages without disadvantages.

Solar Energy can give more comfortable, healthier homes and sunnier streets
Why is passive solar design no daily practice all over the world?

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Adapt to the forces of nature instead of fighting them

In ancient cultures where energy sources were not easy available people knew they had to cope with their environment. Using the forces of nature and only fighting those where this could not be avoided was the most efficient way to survive.
All over the world people learned to adapt their buildings in such a way that the sun helped as much as possible in the heating season, whilst overheating in summer was highly avoided. Beautiful examples of designing in accordance with the forces of nature have been described by different authors.

Already before the last century the proven old lessons of nature were mostly forgotten in the industrialized parts of the world. Cities were built and increased in size. Street patterns emerged more or less at random. Heating energy was provided by burning of fossil fuels. Some large towns even became known for their air pollution caused by the burning of bad fuels. Nature forces were not used, only fought against.

Old principles rediscovered

Around 1970 more authors wrote books and others publications about the old art of designing in accordance with nature forces and using passive solar design techniques. All over the world examples of solar homes were built and some of them were highly publicized. Using the sun as an additional heating source in winter and at the same time preventing overheating in summer still proved to be possible.

At that time the city of Schiedam (pop. 70,000) in the Netherlands had to decide about a large addition to the town. More than 6,000 new homes were planned. In the decision process City Council cared for the environment and asked the board to make the new development as sustainable as possible. The decision was made that the new settlement at least should have a low energy use.

Large scale application surprisingly easy

The old principles of passive solar design were written down in a simple booklet. City Council accepted this booklet as the basic description that architects had to follow.
Already in the first project the average energy use of an average Dutch house (volume 265 m3, floor area 100 m2) could be halved without adding to construction cost. At that time annual heating load of slightly under 30,000 kWh could be reduced to under 15,000 kWh. (In Dutch terms from 2800 m3 gas to under 1400m3, 1 m3 gas roughly equals 1 litre liquid fuel).
The second project, designed by architect Kristinsson showed even more spectacular results. Using the best of passive solar principles and adding a special ventilation system with heat exchanger, he squeezed energy

use down to less than 10 % of the normal use. Only 3,000 kWh or 300 m3 gas were needed for heating. More than 170 houses were built. Construction cost was 10 % higher than average but included a large part prototyping as well.

Passive solar houses proved to be better and asked for more

Good passive solar houses proved to be more comfortable in other experiments in the Netherlands as well. The special ventilation system in the Kristinsson design was monitored and the surprising effect was that indoor air was nearly of the same quality as outdoor air. An extremely good result. Extra construction cost was minimal. Schiedam decided to make a jump forward.

Thousands of solar homes in one town on one building site

Looking at the results of the experiments the city of Schiedam introduced its own performance standard for new constructed houses.
At first an average new home (compared to standard size) had to have an annual energy need for heating of no more than 1,000 m3 of gas (1,000 litre or 10,000 kWh), without adding to the cost of construction. A dramatic improvement compared to the national building practice. The local standard did not give any problems in practice and was improved further and further.

Passive solar homes an solar collectors

Around 1991 the accepted annual heating need for an average new house was pushed down to between 700 and 600 m3 gas. This standard proved to be possible not only in the new developed area but also in "fill-in" projects in the older parts of the town. All the time under the rule: "no extra cost of construction compared to the national price level".
The annual space heating need thus became quite close to the energy need for domestic hot water (400 m3 gas). A solar installation could half this DHW energy need. The city decided new houses had to be designed with solar collectors, assisting in the preparation of hot water. Theoretically this added a slight amount (1 to 2%) to the cost of construction, but the price increase in reality was invisible.

Practical experience

Large scale passive solar building was not difficult at all. The houses were very popular in the market and performed in accordance with the performance that was calculated in advance. Thermal comfort and quality were highly appreciated. There was never a problem with visiting groups looking around through the area.

Side effects

In many cases city planners resist the idea of south orientated design. They fear for monotonous streets that in long rows stretch from east to west. There is no need however for boring designs at all. South orientation can go 25 to 30 degrees to East or West without losing performance. Boring one directional areas thus can be easily avoided.
Finally still one Schiedam lesson should be shared at the end. In order to please city planners a "wrong" south east running passive solar design was made. The sun came in through the roof and the design of the

house was pleasant and successful. When the houses were built an aspect that is always neglected became quite visible. East - West running streets give entrance to low standing morning and evening sun, even in winter. High standing sun at noon of course always comes in. North - South running streets never give entrance to morning or evening sun and are darker and much less pleasant than the ideal passive solar designed streets. Passive solar design thus does not only give better homes, but also a more pleasant city environment.

Conclusions

The Schiedam experience was followed by some more building plans in other towns. Still today passive solar design in the Netherlands seldom or never is the basic design rule for new construction.
The possibility of lower energy bills, less greenhouse gasses, more comfortable homes and better streets still is greatly ignored in new building plans.
Passive solar designs give no market place to extra products or no extra sell, only the final occupant gets a better product. The possibility of this better product (at no extra cost) obviously is not an incentive that is strong enough in most markets. Government should encourage this much stronger if we take the greenhouse effect serious and realize that fossil fuels in our society are used at a frightening high speed.