1979 Energy and Alternatives Quarterly 2(4):29-30.

Passive Solar – An Investment in Jobs

Ed. Note: Mr. Banbridge is a solar specialist in the solar office of the California Energy Commission.

by David A. Bainbridge

Many of the most effective and workable applications for new and retrofit space-conditioning and hot water heating are those called Passive Solar Systems. Although there are many definitions of what a passive system is, there are several points common to all, or almost all of them. Passive solar systems are those that:

- use energy from the sun and climate resources to provide heating and cooling;
- do not rely on external sources of energy to function;
- decrease the building's use of auxiliary energy;
- use various parts of the building for collection, storage, and circulation of solar energy for heating and climate resources for cooling; and
- are relatively simple and tend to be low in cost.

Passive systems are particularly desirable because they provide much more favorable employment impacts than active solar or more traditional mechanical systems. These beneficial impacts occur for three reasons. First, the materials used are commonly low in cost and readily available. Second, the skills and tools needed to manufacture most passive solar components are readily available and low in cost. And, finally, passive solar systems can in most cases be installed by local labor with tools and skills already in use.

All three of these factors are important. The availability of materials in the local market makes it less likely that supply hang-ups will occur. Installation can occur quickly and with little fear of delivery or manufacturing problems. And the low materials cost not only reflects the low energy cost of most materials used but it also ensures that new businesses can get started and probably survive even rapidly increasing energy prices.

The fact that skills and tools needed to manufacture passive solar components are readily available and low in cost is also very encouraging and suggests that very rapid market penetration can occur once local builders learn what to do. For example, steel tanks for water storage in a passive solar house can be welded by almost any local welding shop. Thermal curtains and shutters, equally vital components, can be manufactured by almost every drapery shop, seamstress, or cabinet and door company capable of using standard techniques.

Finally, passive components and passive solar systems can be installed by existing contractors and trades people with their existing tools. No special equipment is needed, nor is sophisticated training required. This ensures rapid delivery, fast penetration of the market, and good profitability for installers.

Taken together, these three factors also have another important impact: They are all local. This is significant because solar will have to be done locally if it is to be done. Federal and state bureaucracies, lobbies, and conglomerates won't catch on until the solar transition has already occurred.

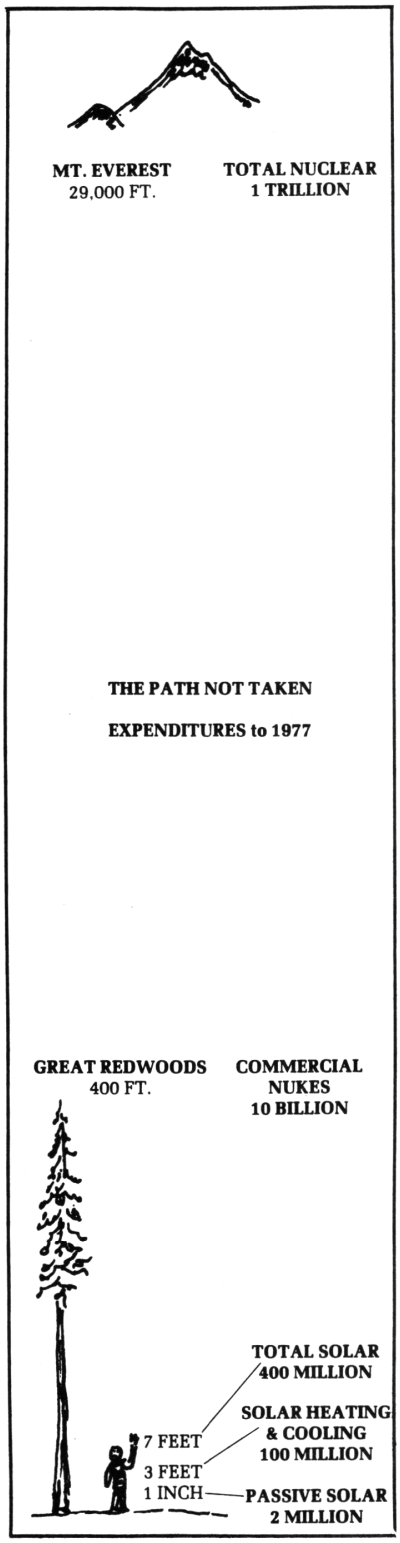
Local spending and autonomy can also help reverse local and national balance-of-payment problems. Money now going to distant heater and air conditioner manufacturers, and money flowing to Saudi Arabia for the oil to fire generating plants would remain and be active in the local market place. The tremendous value of this decentralization should receive more emphasis and research than it has to date.[1,2]

It is difficult to estimate the employment impact of widespread use of passive solar systems. However, existing information does provide a rough comparison of employment impacts of a given investment in passive solar versus either active solar or traditional sources used by public utilities. An investment of $100,000 will provide 10 jobs in passive solar, five jobs in active solar, or one job in a public utility.[3]

Based on an existing estimate of responsible investment in active solar systems, this figure can be used to generate an estimate of the projected employment impact of investment in passive solar systems in California from 1981-1990.[4] Assuming that the estimates made earlier and those from this study are reasonable (they may well be conservative), passive solar systems in California could provide 750,000 jobs per year between 1981-1990.

But this will not occur unless the major obstacles to widespread use of passive solar systems are overcome. The two major obstacles are ignorance and lack of information. Neither question is intractable nor even very difficult — but, at the same time, each will yield only slowly at the current level of activity in the local governments and building industry. The 1978 budget for passive solar in California is considerably less than $200,000, while even the fat Federal energy budget, although much larger, includes only about $2 million for passive solar. Both programs have really just begun, as the chart (below) of oney expended to 1977 shows.[4,5,6,7,8,9,10,11]

Much more attention should be focused on information delivery and development. Californias passive



Investment by Comparison

program is developing five information packages that should be made available for every area (climatically) in the U.S. These include the following:[1,2] A Passive Solar Design Manual for Builders (with companion catalog), [3]A Solar Access Manual for Developers and Local Government, [4]A 55% tax credit for Passive Solar Systems information packets on passive solar design for homeowners, and [5]a Manual on Retrofitting Solar (including passive). Much of this material could probably be better developed on the local level; e.g., the Davis, California Energy Conservation Building Code.

Three other elements also should be addressed in greater detail. The first and probably most important program is research in passive solar design and performance evaluation of full scale models. Let's get some built! A side-by-side comparison of six typical systems (suntempered, solar greenhouses, water wall, Trombe wall, massive construction, and roof-pond) in several climate areas would be extremely valuable.

Another program which should be pursued more vigorously would identify manufacturers of materials and components which can be adapted for passive solar design, and provide these manufacturers with information to work effectively in the market with existing and revised products.

And, finally, an expanded climate research program would be of value in refining passive solar system sitings and designs. High schools or even grade schools could be used to expand climate data at very low cost.[12] This would also involve students in solar design and research and prepare them for the solar transition.

The challenge is obviously large, but the solutions are available, low cost, and have many other very positive social impacts. The current sluggish pursuit of passive solar development is extremely frustrating for those who are familiar with the cost, performance, and potential of passive solar design. A reordering of priorities is much needed and long overdue.

REFERENCES

1. Berry, W. (1978) *The Unsettling of America*, SC Boks.
2. Van Dresser, P. (1974) *A Landscape for Humans*, Lighting Tree Press, Santa Fe, New Mexico 87501.
3. The Conference Board (1977) Capital Invested, Road Maps of Industry, Number 1799, N.Y., January.
4. Branfman, F. and Lamar, S. (1978) *Jobs from the Sun*, CPPCS, L.A.
5. Johnston, L. (1978) "Side Stepping," *RAIN*, April.
6. Balcomb, D. (1978) "A Question of Balance," *Solar Age*, May.
7. Welch, B.L. (1977) "Fission the Faustian Dream," *Nation*, Feb. 26, 1977, p. 231-235.
8. Staff (1978) *Special Analysis: Budget of the U.S. Government 1979*, USGPO.
9. Staff (1978) *Budget of the U.S. Government: Appendix*, USGPO.
10. Hammond, A.L. and Matz, W.D. (1977) "Solar Energy Research: Making Solar after the Nuclear Model," *Science*, J1. 15, 197:241-4.
11. Budget of the California Energy Commission (1978).
12. Jet Propulsion Laboratory is working very successfully with high schools in the Los Angeles area, and the Wagner Grade School in Lake Tahoe has a very successful weather station.