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A COMMUNICATION STRATEGY TO  
COMMERCIALIZE PASSIVE SOLAR ENERGY

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ABSTRACT

Although certain technical and economic issues remain to be clarified, passive solar market development is increasingly dependent upon communications such as information dissemination, education, training and promotional activities. Target audiences are identified as both recipients and disseminators of passive solar communications. Form and quality of information are discussed in terms of the stages of an innovation adoption decision-making process. Several communication-related barriers which impede the commercialization of passive solar are discussed and general information and education responses are suggested. The paper ends with a statement of precepts which should guide passive solar communication programs.

1. INTRODUCTION

This paper is based on A Passive Solar Communication Assessment (1), a report prepared for the U.S. Department of Energy (DOE) in support of the National Program Plan for Passive and Hybrid Solar Heating and Cooling (2). The President, DOE and the U.S. Congress recognize that information dissemination, education, training and promotional activities form the cornerstone of the passive solar commercialization process (3), (4), (5). The purpose of the Assessment was to provide DOE with a coordinated plan of specific communication tasks which complement non-federal activities to support passive solar market development. Although the Assessment is national in scope, this paper presents a problem statement, conceptual methodology and suggested strategy which should be applicable to passive solar communication programs at regional and local levels, in both the public and private sectors.

\* This paper is based on research performed under contract to the U.S. Department of Energy. The opinions expressed are solely the authors' and do not necessarily represent the views of the U.S. Department of Energy.

2. THE PROBLEMS

The following problems impede the commercialization of passive solar systems:

- The lack of awareness and understanding of passive solar processes among the design-and-build professions as well as among current and potential residential and commercial building owners;
- The difficulties of influencing attitudes toward passive solar design concepts given this low level of awareness;
- The motivational problems of obtaining decisions to adopt and use a technology so little known or understood.

Accelerated commercialization of passive solar requires that those in position to influence the marketing and application of the technology be informed accurately and on a timely basis about passive design methods, materials, technical and economic performance and applicable codes and standards. These commercializers cannot be expected to acquire this needed information incidentally or by accident. Awareness and understanding are first requisites but they are not in themselves sufficient for the widespread commercialization of passive solar technologies. The decision to adopt an innovation such as a passive solar system is based upon attitudes. These attitudes stem from an end user's needs and desires, a designer's appreciation of the implications of the innovation, a builder's assessment of the market acceptance of and demand for the product, regulatory acceptance, and lender willingness to provide funding.

A great deal of information exists about passive solar because of historical accounts and the well-documented efforts of a group of recent practitioners of passive solar design. Additionally, passive solar technology depends, to a great extent, on the effective use of common building materials and construction techniques. However, information about passive solar is not widely

known and thus it has not entered the marketplace to any appreciable degree. An effective national solar energy effort requires comprehensive information and education activities to promote an awareness of passive solar designs and products, a consumer demand for them, and a supply to fill that demand.

In order to structure the assessment of passive solar communication programs, a methodology was developed around two concepts: 1) target audiences and 2) stages of an innovation adoption decision-making process. The form and quality of information is different not only for each target audience, but also as people pass through different stages of understanding in terms of adopting passive solar techniques.

### 3. TARGET AUDIENCES

Four major target audiences of individuals and organizations are both recipients and disseminators of passive solar information (6). These target audiences, which play different roles in the commercialization of passive solar systems, are described as researchers, commercializers, influencers, and end-users. The following is a description of the important subgroups of these target audiences and their general information needs.

#### 3.1 Researchers

Researchers are directly involved in generating passive solar research and performance data and design tools (national labs, contractors, research institutes and associations, university and private researchers). They develop concepts and basic information and test applications as part of generating passive solar technologies. Researchers' information needs include the timely and accurate exchange of R, D & D results and design tools.

#### 3.2 Commercializers

Commercializers are involved in the design, manufacture, marketing, distribution, installation and servicing of passive solar products and systems (architects, engineers, builders, utilities, product manufacturers and distributors, professional and trade associations). They are not directly involved in R & D but rather translate research results into marketable products and designs. Commercializers' information needs include the timely dissemination of user-oriented design tools, marketable designs, performance data, economic and marketing information and case studies of building industry experiences with passive solar systems.

#### 3.3 Influencers

Influencers affect passive solar commercialization through zoning, legislation, financing, appraisal, citizen advocacy, education and building codes (legislators, lenders, appraisers, code officials, educators and lobbyists). They help to remove barriers, raise consumer awareness and provide incentives and an application environment conducive to the use of passive solar. Influencers' information needs include accurate and timely reports on the operation of passive solar systems, their economic benefits and marketability, and their development and application status.

#### 3.4 End-users

End-users are organizations and individuals from public and private sectors who are now or may become adopters of passive solar technology (residential, commercial, government, agricultural applications). They are, of course, the consumers of products and services that result in passive solar installations. End-users' information needs include an appreciation of economic and aesthetic benefits of passive solar and an awareness of the technology's development and application.

The activities of any passive solar communication program should strengthen existing information flows between and among members of these four target audiences as well as to determine any information gaps that may currently exist so to create the information products to fill those gaps. The existing and new information can then be disseminated to meet the needs of those individuals and organizations who influence the marketing and use of passive solar systems.

### 4. INNOVATION ADOPTION DECISION-MAKING

The adoption or rejection of an innovation, such as passive solar technology, is a decision made by an individual. If the individual adopts, s/he begins promoting or using passive solar technologies. In this sense, "adopt" does not necessarily mean "buy." In the case of a banker or appraiser, "adopt" may mean that a passive solar system is looked upon favorably in a mortgage application as a means of reducing monthly fuel bills. In terms of a builder, "adopt" may mean that homes get built with passive solar design features. There are three stages of the innovation adoption process: understanding, persuasion and decision-making (7). In the first stage, an individual learns about passive solar technology and gains some knowledge of how it functions.

In the second stage the individual is persuaded to form a favorable or unfavorable attitude toward passive solar. Finally, the individual makes a decision to adopt or reject a passive solar technology based upon that attitude toward the idea. The following is a discussion of these stages including mention of communication sources and channels which provide information appropriate for each stage.

#### 4.1 Understanding

Understanding passive solar is a stage dominated by conditions or characteristics which are present prior to the introduction of the idea. They consist of an individual's personality characteristics, attitudes toward energy crises and the need to conserve energy, and the strength of a perceived need for passive solar technology. These prior conditions also include social system values and norms which serve as incentives or constraints to an individual's decisions. For example, if one's close friends and neighbors feel a need to conserve energy and also have some knowledge of passive solar systems, this will probably positively influence the attitudes of the individual decision-maker. However, conflicting signals about energy crises or the usefulness of passive solar will probably have a negative impact on the individual. Typically, a potential consumer will first learn about passive solar through a media source.

#### 4.2 Persuasion

Persuasion that passive solar is "good" or "bad" is a stage of attitude formation. Here, the individual gains perceptions of the new technology from more interpersonal channels such as conferences, workshops, seminars and college courses, as well as personal conversations with those who already have a passive solar system. Direct feedback to questions is an important aspect of persuasion as is more specific information such as product specifications and standards and plan books of marketable designs.

#### 4.3 Decision-Making

Decision-making occurs as a result of very practical, credible information such as eligibility (or lack of) for a tax credit, a market research study, or the mastery of a new skill such as installing a passive solar product. As a consequence of a decision, a passive solar design or product may be used or not. Adoption of the technology implies possible discontinuance at a later date because of disenchantment in that the technology did not perform to the individual's expectations or simply because something better came along. Similarly, a decision to reject the use of passive solar now implies the possibilities of

continued rejection or adoption later on if a new situation (a worsening oil shortage) or new information (better performance data) comes along.

### 5. MAJOR BARRIERS

There are several major communication-related barriers which impede the commercialization of passive solar systems:

- (1) An unclear image of the product;
- (2) Regional differences in climate, styles and codes;
- (3) Lack of awareness among designers and builders;
- (4) Poor quality and form of existing information;
- (5) Lack of coordination of existing communication activities.

Each of these barriers is discussed below and general communication responses are suggested to help overcome them.

#### 5.1 An unclear image

Consumers have a limited recognition of passive solar as a product. Part of the problem is that passive solar is a conceptual technology and Americans tend to best understand product-oriented technologies. Also, passive solar applications are often hard to see: design can be integral to the building and components are common materials. Passive solar is often associated with a general image of "solar" in terms of active collectors on the roof: still very expensive and a lot of problems need to be worked out. Many solar professionals also have an unclear image of the technology. The relationship of passive solar and energy conservation is sometimes confusing because passive solar components tend to be energy conservation materials. The recognition of retrofit opportunities has been slow because of the view that passive solar is a performance based design technology as opposed to a "tack-on" technology.

An important communication response to this barrier will be the promotion of a "marketing image" of passive solar. The image should be one of "inexpensive solar" that is based on energy-efficient design and materials application. The use of active control components will blur the active/passive distinction and passive solar's image will assist the commercialization of hybrid solar systems. Whereas energy conservation is protection from the environment (insulation against temperature, weather-stripping against wind), passive solar's image will be one of the utilization of the environment (time-lag construction, natural

ventilation) which is complementary with energy conservation. This connection will make clear the possibilities for retrofit "space-glazing" as well as new designs based on annual system performance criteria.

### 5.2 Regional differences

To refer to "regional" differences is not quite accurate because passive solar is responsive to local microclimates. Nonetheless, broad regional differences determine, for instance, whether the main interest is heating or cooling. If the need is for a heating load, degrees of winter cloudiness will determine the emphasis on thermal mass and movable insulation. If the need is for a cooling load, degrees of summer humidity will determine the emphasis on evaporation and night time ventilation configurations. Other broad regional considerations include materials availability (crucial for thermal mass) and building codes which can regulate siting, orientation and amounts of glazing.

The "problem" of regional differences is that designs, planbooks and materials applications ideas cannot be promoted nationally, or for that matter, even "regionally." Designs and ideas will have to be passed through information transfer mechanisms which have as local an impact as possible. In terms of a communication response, this will mean focusing the activities of the Regional Solar Energy Centers through offices and programs at the county and city level.

### 5.3 Lack of awareness

The lack of awareness of passive solar systems and processes by designers and builders is both a knowledge and persuasion problem. The issues include: 1) the siting, orientation and shape of a building; 2) the use or glazing and related materials such as overhangs and movable insulation; 3) the use of thermal mass elements; 4) the use of natural ventilation and daylighting; and 5) the importance of insulation. Many designers and builders have a theoretical understanding of some of these issues but don't have any personal, practical experience or evidence regarding passive solar processes. Other designers and builders simply don't know.

A general communication response to this barrier includes short courses for architects and engineers and workshops for builders and contractors. The focus must be on demonstrating applications of the technology so that these people can get a personal sense of passive solar processes. These activities should proceed immediately and need not wait or be dependent upon the final development and dissemination of design tools.

### 5.4 Poor quality and form of information

The quality and form of existing information about passive solar is, unfortunately, poor. Quality refers not only to misinformation (e.g., large temperature swings and glare are necessarily problems), but also to sources of information which lack credibility. "Solar" has been endowed with an ideological and political component which alienates some people. Poor form of information refers to the fact that valid economic and performance data are simply not available in many cases. When they are available, the information is technical and not accessible to people who make marketing and institutional decisions.

A general communication response to this problem will be to provide wide dissemination of economic and performance data which are acquired through research contracts. Importantly, however, the data must be "repackaged" a number of different ways such that the concepts and wording are appropriately matched to the language and points of view of a number of relevant audiences. This approach will translate technical information into forms appropriate for design, educational, public information and marketing applications.

### 5.5 Lack of coordination of existing activities

The lack of coordination of existing communication activities which support passive solar commercialization is a result of a synergy of the above problems. Also, although passive solar components are familiar enough, the "product" itself is new (ignoring the fact that passive solar processes are ancient). There are two parts to this problem. The first is simply the failure to use existing delivery mechanisms to disseminate information. The second is duplication of efforts because new product developers are isolated and ignorant of each other's activities.

This problem requires less of a directed communication response because existing communication channels will increasingly transfer information about passive solar systems as market development momentum builds. The indicated general response therefore is the identification of existing communication sources and channels so that new information efforts are complementary and provide a coordinated overall communication response in support of passive solar commercialization.



## 6. THE PRECEPTS

In conclusion, the following precepts are presented. These general criteria are based upon the concepts of target audiences and the innovation adoption decision-making process and reflect the suggested communication responses to the major barriers discussed in the preceding section. These precepts can serve as explicit guidelines for the implementation of any passive solar communication program.

Target audiences must be clearly identified and defined in terms of their role in the generation, commercialization, application and utilization of passive solar technologies. Information must be directed to the appropriate knowledge, persuasion or decision-making stage of each target audience. By carefully placing and timing information that is accessible and convenient to use, people will be motivated to change their behavior regarding the adoption of passive solar.

Communication activities must be responsive to local conditions, markets and needs. This is so primarily because of the microclimate-dependent nature of the technology as well as social variation around the country. The more local the focus, the more credible the information will seem to individual decision-makers.

Existing communication channels should be utilized to the maximum extent possible. People are more likely to accept information that flows through familiar channels. There may be hidden linkages which need to be identified and made visible. New communication channels should be created only when a crucial linkage is needed within or between target audiences, and no appropriate channel exists.

Communication tasks must be carefully timed and coordinated so that supply and demand realities are matched over time as market development occurs. Communication activities have a tremendous impact on the marketplace and without coordination, economic dislocations could occur (consumer expectations are unmet or businesses fail due to lack of demand).

Information transfer is a feedback as well as a feedforward process. Continuous evaluation is required to provide timely adaptability to changing information needs. Outcomes of communication activities should be evaluated in terms of their influence on information users. The emphasis should be on the quality rather than solely the quantity of information made available.

## 7. ACKNOWLEDGEMENT

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