PRESENTING A PASSIVE SOLAR PROJECT TO A LENDER OR APPRAISER

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ABSTRACT

A critical point in any passive solar project's survival is the appraisal and lender approval. This paper will present a detailed step-by-step procedure for the preparation and presentation of a passive solar lender package.

The financial community has standard rules of thumb used in evaluating any real estate project. It is important that the builder/developer understand these critical points and present his solar project in a meaningful way. Acceptance of a solar project depends on how well the financial and market benefits of passive solar are translated into terms understandable to the lender. Based on our experience, communication with lenders and appraisers is greatly helped by preparation of a formal presentation. This paper will explain each of the parts of the presentation package and how to compile the necessary data.

The presentation is divided into economic and non-economic elements. Non-economic issues include researching the market for solar acceptance, preparation of a buyer profile and analyzing the selected apssive solar system for design acceptance in a local market.

The economic factors for a specific project will be discussed and a presentation format suggested. The economic components will include simple pay-back and various life cycle costing methods, and a simple method of establishing cost effectiveness on a life cycle basis will be suggested for the lender presentation package.

The residential appraiser and lender are both interested in establishing a value for a passive solar heating system on a home.

The value of a residence is usually computed as an average of three factors: the construction cost of a property; its value if it were rented as an income property; and the market value of other comparable homes that have sold recently.

A passive solar system will affect this average and the appraised property value by raising the construction cost; by lowering the operating expense and therefore raising net income and value; and by having comparison actual sales of similar solar homes.

In our region the lender is most concerned about the ability of the borrower to pay back his loan. He relies primarily on the appraiser to establish value of which his loan is a set percentage.

Appraisers are a conservative lot whose job is to reduce the risk for the lender. The appraiser is skeptical of design on functional innovations in housing unless they are well documented with historical sales.

All of this would lead us to believe that time and the accumulation of comparable sales is the answer to solar acceptance by lenders and appraisers. This is true. However,

some of you are building now and need loans in areas where there are no comparable sales. With passive solar this is especially true because of its newness.

The best solution to this problem is to spend some time in preparing a lender package and presenting your home to prospective lenders or your appraiser.

I would suggest meeting with your lender or appraiser early in the design process. We have found that explaining how a passive solar home works and getting ideas from the lender can be helpful in increasing the loan by incorporating his suggested changes into the design. For example, Unit No. 1, First Village was appraised for more because in meeting with the appraiser we found he was willing to count the greenhouse as heated space with a high sq. ft. value. At the appraiser's suggestion, we increased the floor space of the greenhouse and were able to get the solar system.

Figure 1 is a table showing a simplified possible incremental passive solar cost over conventional 2/6 construction for a 30' by 40' 1,200 sq. ft. home with a 200 sq. ft. attached mass backed greenhouse, a clerestory, 240 sq. ft. of direct gain on the south side, and a 3' to 4' berm on the sides and back walls. The house is a single story and achieves an estimated 70% solar fraction in Denver.

Total primary and secondary incremental cost for the solar system is shown at $6,154. This extra cost is approximately half related to primary solar construction elements and about one-half to secondary solar elements.

Calculating the Energy Savings

This part of the lender presentation may be the same by using any of the available methods for calculating the solar fraction on a month by month basis. We use the solar load ratio method developed by the Los Alamos Laboratory. It may be desirable to hire a solar engineer or consultant to prepare this part of the lender presentation.

On the sample 1200 sq. ft. house whose costs are shown in Figure 1, the total amount of the annual heat load supplied by solar was calculated at 36.8 million Btu's for Denver. This can be translated into an annual energy savings by converting the load into killowatt hours and multiplying by the average energy costs for Denver. The energy cost is approximately 3.5¢ per K.W.H. which gives a savings of $377 per year.

Annual Energy Savings from Solar in Kwh Solar Load 36.8 BTU's = 10779 Load in 3,414 BTU's per Kwh
Solar Load in Kwh 10779 x Average Price Kwh $.035 equals = Annual Energy Cost Savings $377

Calculating Property Value

This annual savings is an important figure to the lender. This figure does not reflect energy savings of a solar home over a similar conventional home. The $377 is the amount of energy generated annually by the primary solar heating construction elements for the particular home.

To add value to a home because of its ability to save energy, the appraiser must translate the stream of future cost savings into a present value. The standard procedure in

real estate financial analysis is to capitalize this annual savings by a selected percentage rate--called a capitalization rate. For example, our $377 savings will be valued at $3,770 at 10% cap rate.

$$\frac{\$377}{.10} = \$3,770$$

If he uses higher cap rates (such as 12 or 14%) because he feels the venture is risky or uncertain, the value attributed to solar will go down. If he uses a lower cap rate, such as 8% to 9% because he feels there is little risk, the appraised value of the solar system will go up.

We feel there is a good argument that passive solar should get a lower cap rate than other real estate assets. The return in cost savings for a passive solar system is virtually risk free and will expand or increase at a rate equal to the real energy cost growth rate.

The appraiser may also use a simple payback method to evaluate the solar. This approach is not recommended because it ignores energy cost increases and the time value of money.

Telling the lender or appraiser that the home provides energy at a cost of so many dollars per million Btu's either on an annual or life cycle basis, will have very little meaning to him. This is not a measure that is useful in translating energy savings into real estate value. It is helpful in comparing one solar system with another and this is where it should be used.

From a financial analysis point of view, the most realistic way of translating energy savings into value is by a present value approach. This is also a method that will be

familiar and understandable to the lender.

This is called a life cycle costing method but it is really a technique of calculating the value of the benefits over the appropriate life cycle. This value is then compared to the cost paid now for the energy savings capacity. The passive solar system is cost effective if the cost we must pay is less than the present value of the energy savings. For every dollar we pay, we buy more than one dollar's worth of energy.

The life cycle costing approach takes into consideration the trends in cost over the project life. This is especially important for solar where its justification lies in assumptions about future energy cost increases. By using present value or discounting techniques, we can adjust cash flows from energy cost savings for the time value of money.

Present value is the concept that a sum of more of the incremental solar costs covered in the loan.

Once you have made initial contact with your lender or appraiser, continue to keep in touch at each stage of the design process. Money market conditions can change rapidly. Until you have a final loan commitment you may find you were assuming financing that changed over night with the flick of the Federal Reserve discount rate.

As the final design of a home falls into place the designer, builder or owner should put together a final financial presentation package. This package should contain all the information an appraiser needs to establish value of the home and the extra value, if any, for the solar system. In some locals, residential lenders rely on appraisers to

establish value for loan purposes and in some areas, the lender himself determines value. In either case, the procedures for calculating a property's value are the same.

The appraiser will take your information, process it into the form acceptable to the lender and standard to his profession. The basic ingredients he will need are:

- The incremental cost of the passive solar system.
- The projected energy savings from the solar system on an annual basis and translated into both kilowatts and dollars.
- A thorough description of the basic energy conservation measures that have been included in the house that cost extra but are not specifically passive solar construction elements, such as berming, extra insulation, double glazing, air lock entries. These all cost and all add value to the home.
- Give him presentation drawings of the solar system for the house with a detailed explanation of how all the passive elements work. He will probably copy this directly into his appraisal to flesh it out and justify with paper any allowed extra value for the solar.
- Most important, research your market for other passive solar homes that have been built and especially ones that have sold. Get cost information on homes that did not sell in the open market along with drawings or pictures. It takes three comparable sales to develop a basis for market value to an appraiser.
- We have also found it helpful to give the appraiser a statement of our development goals or philosophy and to

include other resource conservation features in the home such as water saving devices.

The above process is really doing part of the appraiser's job for him. For us, this has proved to be a good way to get his support and the deserved extra value for the solar system.

Putting together this information will take time but the pay-off is worth the effort. The most difficult data to get will be incremental solar cost and the annual solar contribution.

Incremental Costs for Passive Solar

Determining incremental costs for the passive solar system is extremely difficult. We suggest first breaking the home design into two types of construction elements: those directly used for the solar system such as Trombe walls, shutters, water walls, etc.; and those that contribute to the energy conservation such as berming, extra insulation, clerestories, etc. We call these primary and secondary solar costs, respectively. Interior mass is critical to performance, but should probably be counted as a secondary solar cost unless it is clearly separatable from the structure such as water filled barrels. This kind of separation matches the N.E.A. Rules and will help later in calculating the solar tax credit.

We have found the appraiser or lender is more open to accept costs that are broken into these two cost categories. A very large incremental passive solar cost that lumps these two together will scare off a lender and raise doubts about the feasibility of the system. At the same time, it is important to make sure the appraiser or lender is aware of all the

energy conservation features and their related costs.

If you are a designer or owner, get the builder to prepare this cost analysis. Work with him closely to identify the categories of primary and secondary solar cost. If you are a general contractor using subcontractors, get your subs to submit cost breakdowns that identify incremental costs for the solar and energy related features. The problem is, of course, that the passive solar system is woven into the fabric of the structure and is not easily isolated.

Our concern in our own building activity in Santa Fe is that the incremental passive solar cost may be more than we suspect. We presently build a high quality custom home and it is hard to separate out solar costs from the cost of our custom quality construction details. Our next project, La Vereda, will be lower cost production homes and it should be easier to identify both primary and secondary solar costs. This secondary cost of making a home ready for the solar may be higher than we think and usually left out of any feasibility analysis of money invested today will earn interest. Therefore a dollar received today is worth more than a dollar to be received in the future, by the amount of interest it could have earned between now and the future time of receipt. There are tables that show the present value of a dollar that will not be received until some known time in the future. These tables assume a discount rate or interest rate that reflects the time value of money. As a rule, interest rate is made up of the inflation rate, a risk factor, and the pure interest yield which runs between 2 and 3%, For our analysis of our passive solar home we need to make several assumptions.

Summary

Passive solar incremental costs and projected energy cost savings are important in arriving at a value added for a passive solar system. The appraiser or lender will not use incremental cost in calculating value by the income method with a capitalized energy savings.

They will use incremental cost in the replacement cost portion of a property appraisal.

Incremental cost is extremely important in determining the feasibility or cost effectiveness of a solar system. It is not used in calculating the present value of a stream of future savings.

The lender or appraiser must be shown both primary and secondary incremental cost for a passive solar system. Most important, he must be given both an annual energy savings generated and a present value of the stream of energy savings over the life of the property.

Discount rates are critical in calculating present value and lower discount rates are justified by the risk free expanding nature of solar generated savings. Remember: the best way to make a passive solar system cost effective is to get as much of the solar cost included in a mortgage with payments based on 30 year amortization. Failing a federal loan program, the only way to get solar cost covered by the mortgage is to convince the appraiser or lender that passive solar systems work, are acceptable in their market and the dollar savings are real.

In closing we should note that passive solar is by its nature more appealing than active solar systems to

lenders and appraisers. Initial cost, operating cost, and maintenance cost are all lower. A well organized package and presentation is all that is needed to convince them of its increase in property value.

	Standard 2/6" Cost Per Sq.Ft.	Passive Solar Cost Per Sq.Ft.	Cost Difference	Area in Sq. Ft.	Total Incremental Cost
2/6" Frame Walls	$2.51	$2.51	$ .00	405	$ .00
Mass Wall Below Grade	2.51	6.87	4.36	280	1,220.00
Mass Wall Above Grade	2.51	6.87	4.36	316	1,397.00
Mass Wall to Greenhouse Block 8"	1.98	3.67	1.69	140	236.00
South Glass	2.51	4.88	2.39	240	568.00
Shutters for South Glass	.00	4.10	4.10	240	984.00
Greenhouse Glass	2.57	4.88	2.39	80	190.00
Roof Clerestory	1.89	7.94	.85	1,200	1,020.00

Total Extra Cost = $5,595.00

Plus 10% Overhead and Profit = 559.00

Total Incremental Solar Cost = $6,154.00

Assume a basic house cost of $42,600 or:

Basic House = 1,200 sq.ft. at $33.00/sq.ft. = $39,600

Greenhouse = 200 sq.ft. at $15.00/sq.ft. - 3,000

Total Conventional Cost $42,600

Then the incremental solar cost is $6,154. This, added to the basic house cost of $42,600 equals a total cost of $48,759. The solar is 12.6% of the total cost or 14.4% of the basic house cost.