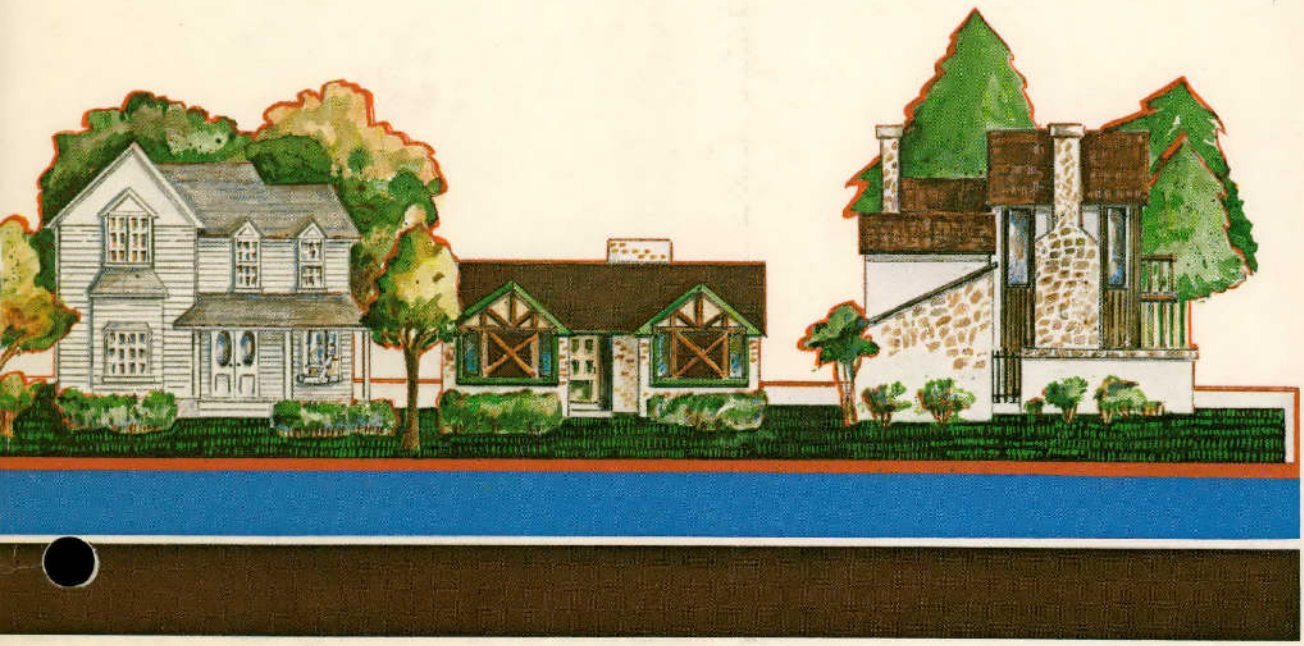
A New Home Buyer's Guide to Energy Efficient Homes



A New Home Buyer's Guide to Energy Efficient Homes

How would you value your new home if, three years from now, you could no longer afford to live comfortably in it due to the costs of its high energy consumption?

Today there are homes built in Texas that will require half the energy of otherwise comparable, but far less efficient, new housing. Energy efficient homes offer a significant investment opportunity. This pamphlet is designed to help you, the prospective buyer, locate and recognize these superior homes.

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September, 1978

An Energy Efficient Home is an Investment

Let's face it. Buying a new home isn't as simple as some would make it sound. There's a lot more to it than choosing the carpet color or exterior brick.

Home buying is serious business. For most, it is the single largest investment you'll ever make.

This booklet was written with the conviction that your investment is more likely to be sound if one of the factors you carefully consider at the time of purchase is energy efficiency. It's not the only factor, but it's one you should be certain to include.

This booklet may pose some questions you might not think to ask. After you've read it, you may have a few questions of your own—questions for your builder, your designer, your architect or your real estate agent.

What an Energy Efficient Home is and What it is Not

This pamphlet explains why you should buy an energy efficient home and how you can tell when you've found one. But before we get to those subjects, we need first to agree on what is meant by the term "energy efficient home:"

Energy efficient homes are homes with potential. They have the potential to provide comfort and convenience using far less energy than conventional houses. The key word is *potential*. The people who live in energy efficient homes will make the final decision—sometimes daily—on whether to waste energy or conserve it.

Advantages of a New Home

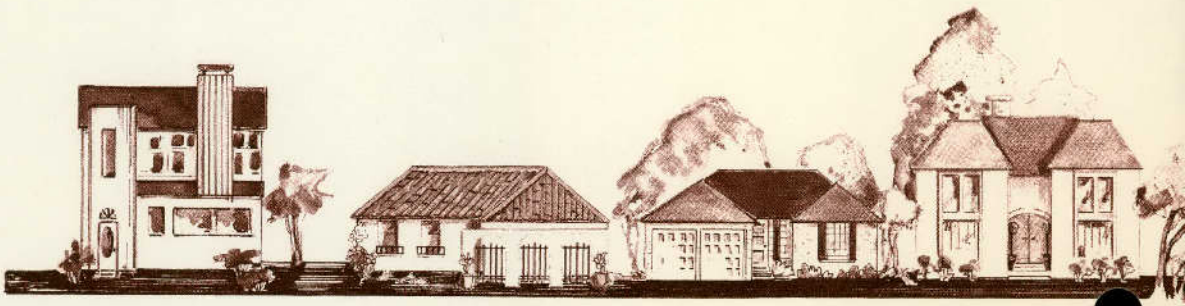
When it comes to saving energy and dollars, a new home offers these special opportunities:

Flexibility. There are simply more cost effective energy conserving possibilities when working with a new, as opposed to an existing, home. You can construct a new home weather-tight so that it will meet standards of excellence virtually impossible for an older home. And so many improvements are inexpensive to do during construction, things that would be very costly if you had to tear into the structure later to take care of them.

Financing. You can finance energy conserving features right along with the rest of your new home in your general mortgage obligation. Often, financing is available for up to 30 years. The addition to your mortgage payment will be so small that it should be easily exceeded by the savings on your monthly utility bills.

If You Can Afford to Buy a New House, Will You be Able to Afford to Live in It?

That may depend on the house. Operating costs for the real energy guzzlers may soon be so high that many buyers won't be able to afford the costs of heating and cooling to acceptable comfort levels. What happens to real estate prices then? The need for expensive energy conservation improvements in such homes may become a factor affecting their resale values.



Will Energy Efficiency Mean My New Home Will Appreciate Faster in Value?

No one can promise you that. No one can promise you that it will appreciate in value at all. Real estate prices depend on a great variety of factors such as location, business and employment conditions, and the condition and attractiveness of your home.

Energy efficiency *can* mean that your new home will be capable of providing comfort and convenience while it uses much less energy than today's standard housing. Rising energy prices could then become a factor favorably affecting the resale value of your home. That will happen if energy prices continue to climb to the point where owners of inefficient homes have trouble affording the costs of operating their heating and cooling equipment.

Put it this way: how would you value your new home if, three years from now, you could no longer afford to live comfortably in it due to the costs of its high energy consumption?

A Word About Taxes

Investing in energy efficient features for your new home will result in your paying a higher mortgage payment each month. In most cases that additional payment will be more than offset by the reduction in your energy consumption reflected in your monthly utility bill. That's true even at today's utility costs.

There is, however, a further kind of savings opportunity involved—savings on your federal income taxes. This is not due to any special federal tax credit. (At the time this pamphlet was written the proposed federal tax credit had not been finally adopted.) The savings on your income taxes will be possible because of the difference in the way current IRS rules treat your expenditures for utility bills compared to those for interest on your mortgage payment. There is no income tax deduction for your utility bills, but under present law there is a tax deduction for the interest portion of your mortgage payment—including the additional interest you will pay due to the presumably higher purchase price of an energy efficient home. Buying an energy efficient home can enable you to replace a non-deductible expense with one that is partially tax deductible. Over the years that may mean substantial savings.

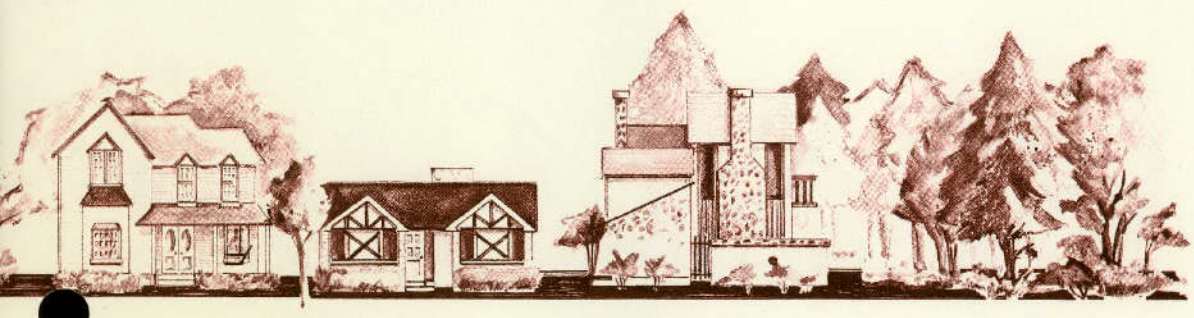
If, by the time you read this, a one-time federal tax credit is available for the added cost of energy efficient features, that will add just one more tax advantage—some icing on the cake.

Your Basic Monthly Obligation:

Principal, Interest, Taxes, Insurance ..... and Utilities.

Until recently, few people considered utility costs when closing real estate transactions. But we all will in the future.

Cases have already been reported where monthly utility costs are exceeding mortgage payments. It's time to take a closer look at how this problem affects Texans.



The Economics of Energy Efficiency

Let's take a look at a hypothetical example:

Suppose that you wanted to buy a 1,600 square foot home in Dallas. The price for a "standard" construction package is $55,000, while the same house with a special "energy efficient" package costs approximately $1,500 more. The question is whether the additional cost is justified.

The "standard" package has single glazed windows, solid core wood exterior doors, R-11 wall insulation, R-19 ceiling insulation, standard weatherstripping and a central air unit with an Energy Efficiency Ratio (EER) of 7.5.

The typical "energy efficient" package features double glazed windows, storm doors, R-19 wall insulation, R-26 ceiling insulation, superior weatherstripping, thorough air infiltration controls, and a high efficiency heat pump central air unit of smaller size with an EER of 8.5.

Your purchase of the "energy efficient" package could result in an average monthly savings of approximately $33.58 ($403 per year) on your heating and cooling bills (assuming 5.5¢/KWH summer and 5¢/KWH winter). On the other hand, the energy efficient package would cost you an additional $150 in the down payment and an extra $11.61 each month (for principal and interest, assuming a 30-year loan @ 9-3/4 percent with 10 percent down).

How long before you would reach the point of being money ahead due to the energy efficient home package? The answer may surprise you: only about seven months.

You would save approximately $22 each month due to the energy efficient package (the difference between $33.58 and $11.61). In seven months you would have saved approximately $150, which would be equal to the additional down payment you had to make when you purchased the home.

Beginning in the eighth month from date of purchase, you would reap actual savings averaging $22 per month . . . for as long as you own your home. That's assuming that utility costs remain constant. If they continue to go up as experts predict they will, your average monthly savings would also grow.

There may not be a better investment.

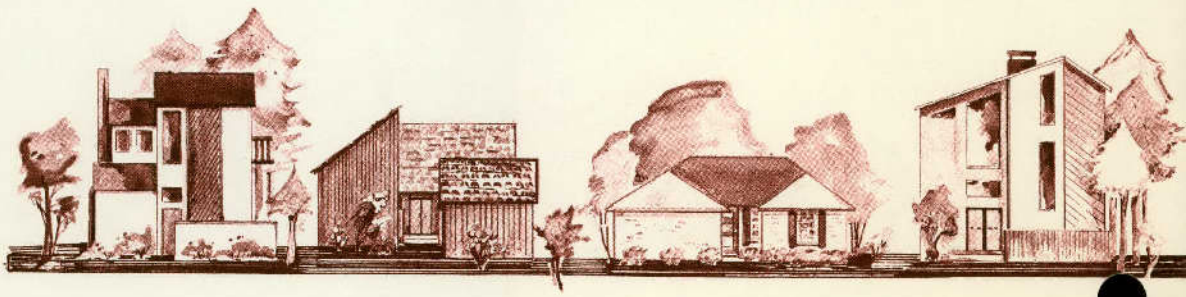
Seven Months! How Accurate is that Calculation?

It's reasonably accurate. Obviously a great deal would depend on you and how you live in the house—what thermostat settings you use and so on. But the point is clear enough. The short run costs of including energy efficient extras in your new home are extremely slight and the potential benefits can be substantial.

Life Cycle Costs and Your New Home

Life cycle costs are the total costs of home ownership for the life of your home. Included are not only the principal, interest, taxes and insurance, but also your utilities and the costs of general maintenance and upkeep.

No one can predict the future with certainty, but it does seem clear the era of cheap energy is at an end. If your current monthly utility bill is $50 and utility costs double, you pay $100. If they double again, you pay $200. But if you start out today



with a monthly utility bill of $200, when it doubles you'll pay $400. And when it doubles again, you'll have a monthly utility bill of $800. That might not happen. But many experts seem to think it will.

Energy efficiency can reduce your life cycle costs for utilities substantially. And energy efficient appliances and equipment offer another bonus: since they generally feature better design and manufacture, they should also last longer.

Yes, But What If I Am Only Going to Hold Onto This Home For Two or Three Years?

That wouldn't be too unusual. Many of today's home buyers will move again in only a few years. What you have to ask yourself really is how smart you think home buyers will be in 1980, 1981, 1982 or whenever you decide to sell? Will utility costs be high enough then to convince them of the relative value of energy efficiency?

And besides, within the first year an energy efficient package can put you money ahead through savings on utility costs.

Can't I Buy the Home Now and Add the Energy Efficient Improvements Later?

Yes and no. Some of the improvements can be added later. Others, such as hot water pipe insulation through your concrete slab or complete air infiltration control, cannot. And some of the improvements that can be added, such as wall insulation, will be extremely expensive once construction has been completed.

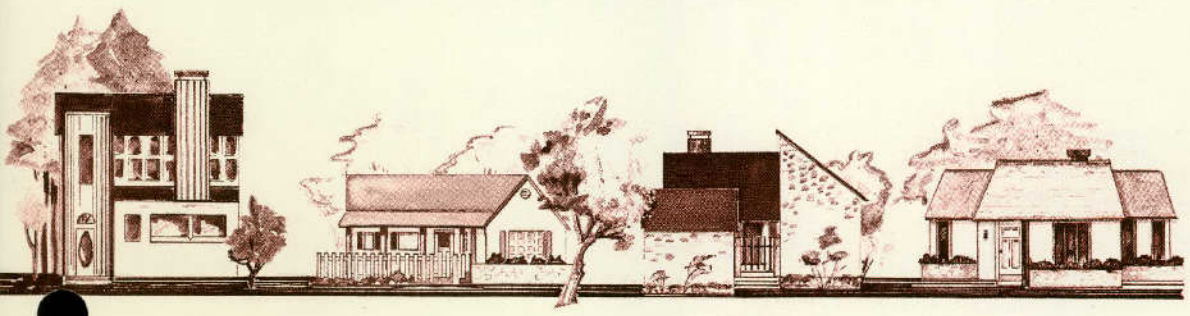
The real loss, however, may not be due to the physical problem of trying to make subsequent improvements in the home. It is the loss of the 30-year financing which would have been available to you if you made the improvements part of the original home package. In the home improvement market, small loans of the size you would need are usually confined to periods of from two to five or, at the most, fifteen years. And the monthly payment on a short-term energy conservation loan will often exceed the monthly savings on utilities until the entire loan is paid off.

How Much More Will an Energy Efficient Home Cost Me?

That depends on several factors: the square footage, the specific energy saving features, the builder's profit margin, the design of your home, and the availability of labor and materials. But to give you an idea: during the spring of 1978 the added costs of energy efficient packages on new homes ran across a wide range of prices up to $1.20 per square foot. For a 1,500 square foot home you might be talking about as much as $1,800 in added purchase price. For a 2,000 square foot home, it could mean as much as $2,400 in added purchase price. Many energy efficient packages cost less than that, and all of them must be evaluated carefully in terms of what you are actually getting for your money.

Are All Energy Efficient Homes the Same?

They are nowhere close to the same. They are as different as the architects, designers, builders and sub-contractors who design and build them and as different as the



people who live in them. They change with the availability of construction materials. Some are every bit as good as the claims made for them. Some are not.

Some homes are advertised as being energy efficient homes, but really aren't that at all. They may not use enough of the quality materials. Or they may be poorly constructed. Buying an energy efficient home is like buying anything else. It pays to be a smart shopper.

How Can I Be Sure That My Builder Has Perfected the Most Energy Efficient Home?

You can't. In fact, you can be sure that no builder has perfected the energy efficient home. But today many builders are including energy conserving features with commendable results.

Builders are still learning to live with the energy crisis. They are like consumers in that respect. None of our houses is completely in order.

As a smart buyer what you really have to do is comparison shop. Look for the best in ideas, design, construction and overall quality.

What If No Builder in My Area is Advertising an Energy Efficient Home?

That probably means that no builder in your area thinks consumers are particularly interested in energy efficiency. Talk to the builders. Let them know that energy efficiency is one of the factors you consider important—that it's one of the factors that will help you decide which home to buy.

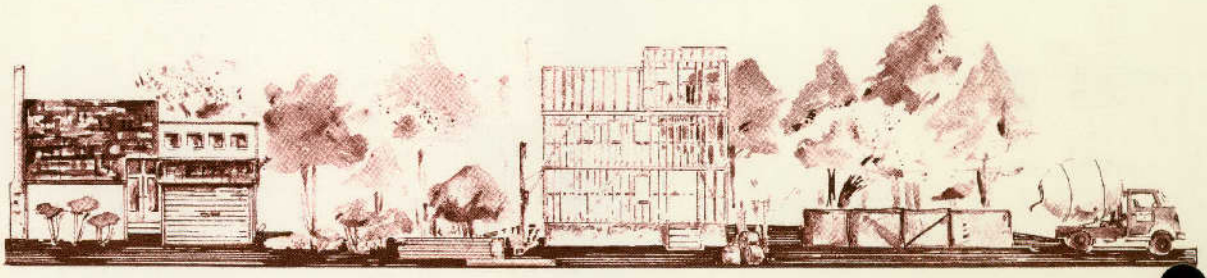
Chances are you will find a builder anxious to give energy efficient construction a try. It is *challenging* to build a truly weather-tight, well-insulated, energy conserving home. Builders want the experience both because they will be happy to sell you a house and because they know that the future will require them to build more and more energy efficient homes.

Your New Home Is a Total Energy System

It's a system because all of its elements are interrelated. Your home's insulation and its air infiltration controls, for example, will affect the size of the heating and cooling equipment needed for your climate. The placement and size of your windows and their treatment (or lack of treatment) with shade or reflective films will determine how much heat gain will occur in your home through the changing seasons due to solar radiation.

But we're leaving out one of the most important elements in your home's total energy system—you—the occupants. Your lifestyle, the ways in which you decide to waste or to manage your use of energy, will play an important part in determining your home's total energy consumption.

In the sections that follow, we'll look at some of the elements of your new house as a total energy system. We'll present a number of the energy saving opportunities available in new homes where central heat and air conditioning will be relied upon; and we'll explore a few of the alternatives to whole house air conditioning.



What to look for in a New Home...

Air Infiltration Control:

Air infiltration is the uncontrolled movement of air into or out of a home. It goes on constantly and occurs for many reasons such as wind action, pressure differences caused by inside-outside temperature differences—even the operation of furnaces and fireplaces.

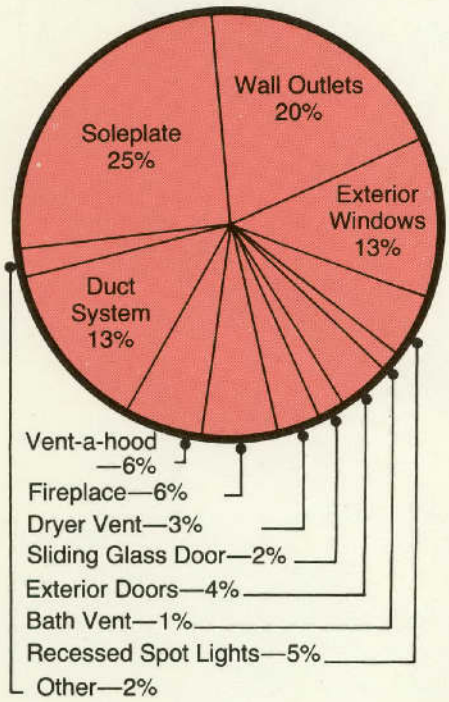
If cold air is penetrating warm space, then it must be heated (at your expense) to maintain a constant inside temperature. If warm, moist air penetrates air conditioned space, then heat and humidity must be removed to maintain comfort levels.

How serious a problem is air infiltration? Very. Most existing homes have significant air infiltration problems. Many of them have the potential for air infiltration in one hour's time equal to two to four times the total volume of their interiors. What this means is they are leaking like sieves. Air infiltration commonly accounts for up to 40% or more of the total energy requirement in a home for heating and cooling purposes.

Air infiltration cannot be completely stopped in a home, but it can and should be controlled. It's realistic in new home construction to hold air infiltration to one air change or less per hour. This is still more than enough to provide adequate ventilation and safety, and you won't pay for heating and cooling so much of the great out-of-doors.

Where does air infiltration normally occur in a home with its windows and doors securely closed?

Air Leakage Test Results for Average Home of 1,728 Sq. Ft.



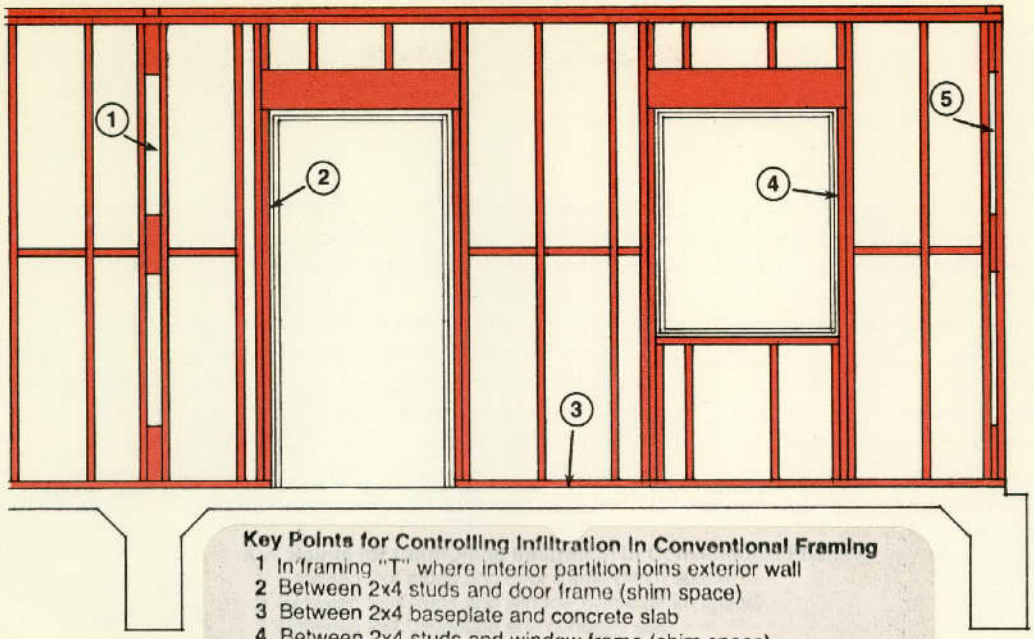
Source: Texas Power and Light Co.

There Are Two Important Things You Should Remember About Infiltration:

1. Unless properly treated during construction, a significant opportunity to control air infiltration will be lost forever. Although an existing home's air infiltration problems can be improved significantly, *an existing home can never be made as weather tight as one that is properly treated during construction*.
2. Air infiltration control is largely a matter of common sense. You can understand it. Ask your builder to show you what he is doing to control air infiltration, then evaluate his answer. Ask to walk through some of his homes under construction. Ask to see where air infiltration control materials such as film, caulk, foam and weatherstripping are being used. *If you were air, could you leak into one of these homes?*

A Closer Look at Air Infiltration: Details Make All the Difference

How small an opening can air move through? The details that should concern you as a prospective home buyer are just exactly that small. A tiny 1/16 inch crack



Key Points for Controlling Infiltration in Conventional Framing

1 In framing "T" where interior partition joins exterior wall
2 Between 2x4 studs and door frame (shim space)
3 Between 2x4 baseplate and concrete slab
4 Between 2x4 studs and window frame (shim space)
5 In corner where exterior walls join

along the sides and top of a typical doorway, for example, is equal in surface area to a hole in the wall 4 × 4 inches. The more complete and uniform the air infiltration barriers around your new home, the greater the savings and comfort. The precautions shown in the accompanying diagram are some that will pay big dividends.

Unless properly treated during construction, air will leak under the soleplates on the exterior walls of your home. A variety of foam products, caulks and pads are available to treat this problem during construction.

Wiring and plumbing penetrates the exterior shell of your home at a great number of points. Each penetration should be carefully treated by your builder to avoid creating breezeways for air infiltration. Even interior walls need air infiltration measures around plumbing and wiring if leakage problems are to be avoided.*

During construction, window and door frames are installed in openings built of 2 × 4's or 2 × 6's. The gaps between the window and door frames and the wooden studs can be troublesome passages for heat loss and air movement. To keep that from happening, openings should be stuffed with insulation and treated with foam, caulking or plastic film. Exteriors doors should be solid core or foam-filled metal units, and must be sealed tightly.

Examine the exterior of a new home carefully for points of air infiltration. Are there cracks in the masonry or gaps in the siding? Have the windows and window frames been tightly caulked and weatherstripped?

* Wall outlets are responsible for a great deal of the air infiltration in standard home construction. This is because air follows the wiring through the studs and cavities of your walls, and comes in through your switch plates. This is true of wall outlets on both exterior and interior walls. Proper caulking of holes around wiring during home construction can substantially eliminate this major problem.

Ask your builder to show you in detail what is being done to stop air infiltration. You may find for example, that a polyethylene plastic film is being used beneath the sheetrock or paneling. Or the builder may want to show you the high quality weatherstripping on your exterior doors. Satisfy yourself that the builder is doing enough and that the job is being done right.

Efficient Ductwork

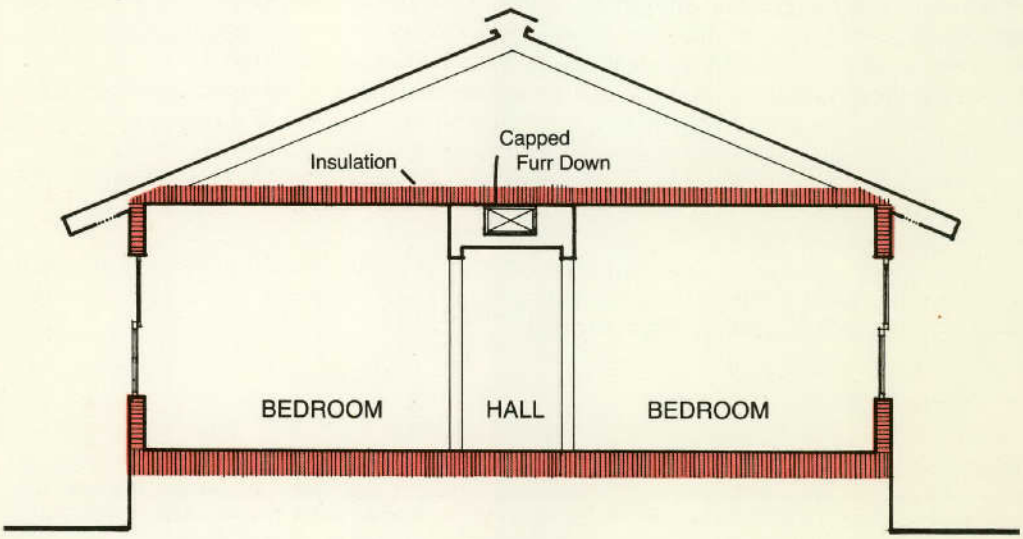
If your new home will have central cooling and/or heating, it will have ductwork. Ductwork is the air delivery system for your central heating and cooling. It is found under the house, or in your attic or in the furr downs (low areas) in the ceiling of your home.

Ductwork presents very important requirements for both air infiltration control and insulation. Basically, since you are paying to heat or cool the air, you don't want it to leak out of the ducts before you can deliver it to your living areas, and you don't want the lining of the ductwork to become much hotter or colder than the air you are trying to move. That's why you want the ductwork tightly sealed and well insulated.

Ask your builder what efforts are being made to take care of these requirements. Ductwork outside the living space should be insulated to somewhere between R-7 and R-11. If it is included in the furr downs it will effectively be within the air conditioned space of the house and less insulation is required.

One of the most important considerations in designing an energy efficient heating and cooling system is the actual length of the ductwork. Where two systems are of comparable quality, a design that cuts the length of a home's ductwork in half may also cut duct energy losses in half.

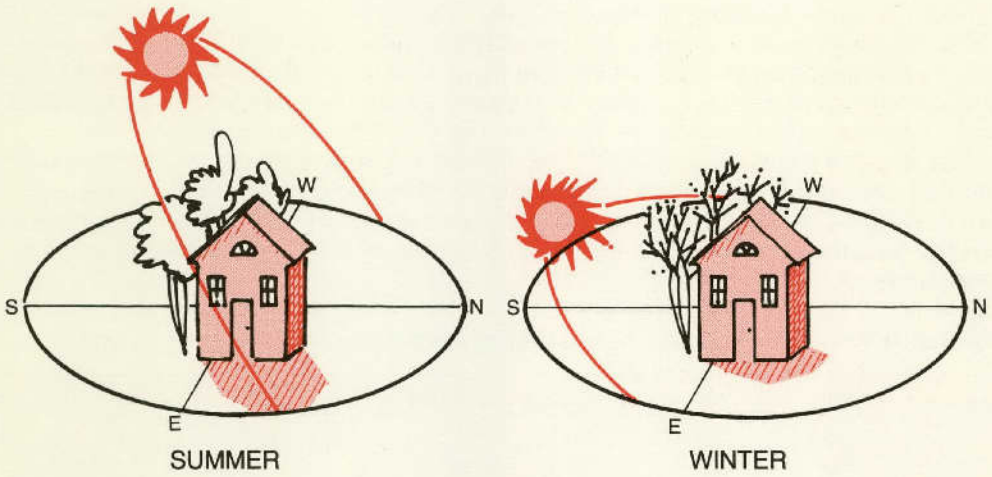
The ends of the ductwork should be joined tightly to the outlets in your ceiling, wall or floor, and the joints between the ductwork and the interior surfaces of your home should be taped or sealed beneath the register cover. It's a good idea to remove the cover from one of your registers and take a look for yourself at how the ductwork is attached. Check to see that all avenues have been blocked so that air won't leak back into the attic or under the house. After all, it's bad enough to have an air infiltration problem with cooled or heated air that you have had the opportunity to enjoy, but it's doubly bad to let it escape before it has even entered your living area.



If your home does have ductwork in furr downs, one more thing should be checked. Look to see that the top of each furr down has been capped off and insulated so that, when viewed from the attic, you can see that the entire attic floor has been covered with insulation. Otherwise your furr downs will be large uninsulated surfaces and will do a poor job of protecting your ductwork as it delivers the air you've paid to heat or cool.

Shade for Your New Home

Your house will be easier and less expensive to cool in the summer if it is shaded from the sun. The east and west sides are where the most heat comes through. If you have shade on those sides it will result in a smaller air conditioning bill and a cooler home. Anything that stops the sun before it gets in through the glass is *seven* times as good at keeping you cool as blinds and curtains on the inside. So trees and vines that shade in the summer and lose their leaves for the winter are what you really want—they'll keep the sun out in the summer and then they'll let it back in your home for the winter months. You can plant these trees yourself and also save money.



Window Size, Location and Treatment

Single pane glass will allow as much as 20 times more heat to move through your new home by conduction and radiation than would flow through a comparable area of well-insulated wall. Twenty times. For that reason you should plan your windows carefully. Assuming your home is to be cooled by air conditioning, use as little glass as you can comfortably live with and you'll be money ahead—both in your new home's purchase price and in your monthly utility bills.

That's not all. Your builder should place the glass properly so that most of it will be facing south. In Texas most of our windows should be on the south sides of our homes, protected from the summer sun by roof overhangs, shade trees or awnings. With proper design, your new home will permit the sunlight and radiant heat to come streaming in during the winter when the sun is lower in the sky. You should have little or no glass on the east and west sides. Reflective glass coatings or films should be considered for any east or west windows which are included in your new home. But you should consider their applications carefully and in light of other available

alternatives. The warmth from solar radiation in winter may be an asset you won't want to give up through the use of a year-round reflective coating.

Windows have not yet been devised which have the insulating value of properly constructed walls. You can, however, improve substantially on the performance of ordinary single pane windows. Double pane glass costs almost twice as much as ordinary windows, but pays for itself in decreased utility bills. Storm windows are also effective, and the builder can install them before you buy the home.

Insulation

Insulation keeps a home cooler in summer and warmer in winter. In summer, uninsulated homes gain more than twice as much undesirable heat as insulated ones. In winter, the same insulation keeps in the heat you've paid for. Good insulation is permanent, requires virtually no maintenance and will keep your family comfortable year after year.

To understand how insulation works, it is important to realize that heat flows from areas of higher temperature to areas of lower temperature. In summer this "heat flow" moves into the living spaces of your home through walls and ceilings adjacent to garages and attics, as well as those directly adjacent to the outdoors. Insulation provides a barrier blocking the flow of heat.

The effectiveness of insulation depends on its resistance to heat flow—its R-value—rather than just on its thickness. Different insulating materials have different R-values and, therefore, different thicknesses are required to do the same job. The larger the R-value, the more the resistance to heat flow and the better the insulation.

How much R-value do you need? The minimum property standards for federally-financed construction call for R-11 insulation within the walls and R-19 in the attic. You need more in the attic because hot air tends to rise, and because without insulation the only thing between the inside of the house and the attic would probably be your sheetrock.

Nominal R-Values for Various Thicknesses of Insulation (in inches)

	Batts or Blankets		Loose and Blown Fill*				
R-Value	glass fiber	rock wool	glass fiber	rock wool	cellulose fiber	vermiculite	perlite
R-11	3½ in.	3 in.	5 in.	4 in.	3 in.	5 in.	4 in.
R-13	4	3½	6	4½	3½	6	5
R-19	6	5	8½	6½	5	9	7
R-22	7	6	10	7½	6	10½	8
R-26	8	7	12	9	7	12½	9½
R-30	9½	8	13½	10	8	14	11
R-33	10½	9	15	11	9	15½	12
R-38	12	10½	17	13	10	18	14

*The R-Value for urea-formaldehyde foam is 4.2 per inch of thickness. However, a recent bulletin (Use of Materials Bulletin No. 74, Sept. 15, 1977) from the Department of Housing and Urban Development (HUD) indicates that the effective R-Value of this type of fill is only 3.3 per inch when installed, due to a 6 percent average linear shrinkage. Therefore, urea-formaldehyde foam in a 3½ inch wall cavity would have an R-Value of 10.5.

How Much is Enough?

Experts disagree on the question of just how much insulation is the right amount. What they all agree on though is the overall importance of insulation. *No one recommends less than R-19 for the ceiling and R-11 for the walls in Texas*. You should require your builder to install at least that much insulation. *At the other end of the scale, there*

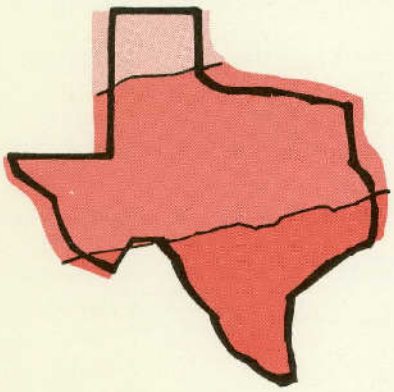
is no need in Texas for more than R-30 for the ceiling and R-19 in the walls. The reason there are no higher recommendations for Texas climates is the "law of diminishing returns"—after you already have so much insulation, adding more just doesn't do you much good. In other words, the costs of adding more insulation simply won't be justified by the benefits.

Between those recommended high and low R-values, the choice is really yours. One cautionary note though—while your home is under construction you should do all of the insulating you ever intend to do. For example, adding more insulation to your attic later, on top of R-19, will pay for itself, but the payback in utility savings will take years due to the law of diminishing returns. The most cost effective way to insulate is to do all of your insulating at once.

Generally, if you live in the northern third of the state you should insulate a little more heavily. And wherever you live in Texas, if your new home will be on a pier and beam foundation, you should insulate the floor area with between R-11 and R-19.

If you need assistance in making up your mind how much insulation to include, you may want to call your local electric or gas utility. Most of the Texas utilities are prepared to make recommendations regarding the cost effectiveness of insulation R-values. And their recommendations can take into account local climatic conditions, energy costs and past experiences.

But, whatever you do, insulate when you build.



R-Values		
Ceiling	Walls	Floor
30	19	19
26	19	19
26	13	11

These R-Values correspond approximately to current recommendations of the National Bureau of Standards.

These R-Values are a broad generalization of insulation practices, and individual cases should be based on specific building conditions and utility costs.

Proper Equipment Sizing

A home built to follow the above guidelines is a different sort of home than was commonly built anywhere in the United States until the last three or four years. More of these new homes are being built everyday. One of the things that makes these homes special is that the old rules of thumb for determining the proper size of air conditioning and heating units don't apply to energy efficient homes. These homes can be cooled and heated using smaller equipment, while providing greater comfort and using less energy.

What this means to you as a new home buyer is that you will be able to save on the cost of air conditioning and heating equipment, and in that way recover part of the expense for such items as added insulation and storm windows. *You recover part of your investment in energy efficiency before you even move in, because your heating and cooling units will have less work to do and can therefore be smaller and cost less*.

Equipment sizing is extremely important. Equipment that is too large for your energy efficient home will not run at peak efficiency, but rather will cycle on and off much more often that it should, using energy in a way that is not useful. If your equipment is oversized, you will pay more for the unit, the installation, and for the

energy to operate it. Maintenance expenses may also be larger than necessary. And you still won't be as comfortable in your new home as you would be if the equipment were properly sized.

Make sure that your builder has taken into account your new home's energy efficient factors in sizing your heating and air conditioning equipment. Make sure. Ask for a copy of the heating and cooling "load calculation sheet".

Energy Efficiency Ratio—EER

Until recently most homeowners were not concerned about the efficiency of their air conditioners. It was cheaper to buy a less efficient air conditioner and use more energy than to buy a more costly air conditioner and use less energy. This is no longer true.

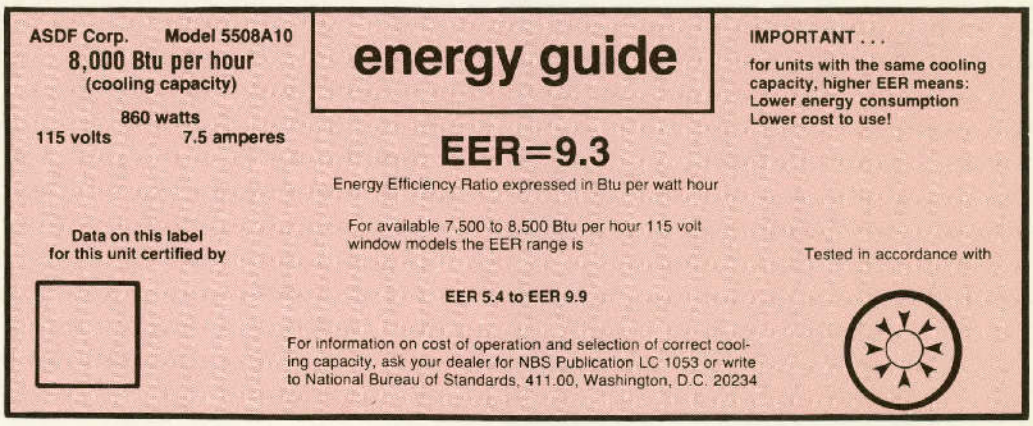
Air conditioners are now available which operate on 25 to 30 percent less energy than models normally installed. That's an important advantage.

The more efficient an air conditioner is, the higher its EER (Energy Efficiency Ratio). EER represents the amount of heat that one watt of electricity will remove from the air in one hour. It's figured by dividing the number of BTU's required for cooling purposes by the number of watts needed to produce it.

Suppose a 36,000 BTU (three-ton) air conditioning unit requires 6,000 watts to operate. It would have an EER of 6.0 (36,000 ÷ 6,000 = 6.0). Another three-ton air conditioning unit requires only 4,300 watts to operate. It would have an EER of 8.4 (36,000 ÷ 4,300 = 8.4).

The unit with the higher EER (8.4) needs less energy to do the same cooling job, approximately 28.5% less energy.

An EER of 7.0 is the minimum acceptable for air conditioning in Texas—but if you want an energy efficient home you really want something better than that. An EER between 8.0 and 10.0 would be much better.



Selecting Air Cooling and Heating Equipment: Is There a Clear Choice?

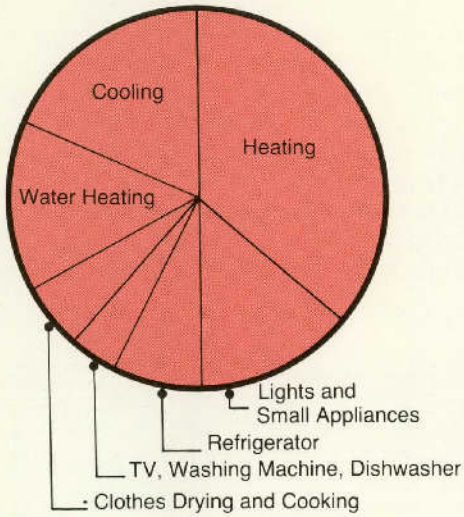
No, there isn't. Claims and counter-claims to the contrary, there is simply no short-cut or pat solution to choosing between gas/electric combination systems or electric heat pumps (which both heat and cool.) Either the heat pump or the gas/electric system may be the best buy depending on several factors, including the relative cost of natural gas and electricity in specific areas, the prevailing weather conditions and the individual requirements of different houses.

The best advice is to rely on a competent, respected builder or designer and consider the total year-round costs. Ask about the relative fuel costs, the experience of other homeowners in the vicinity, and the builder's recommendations based on specific housing designs. Realizing that the choice is contingent on so many variables should help you in sifting through advertising claims.

Distribution of energy uses

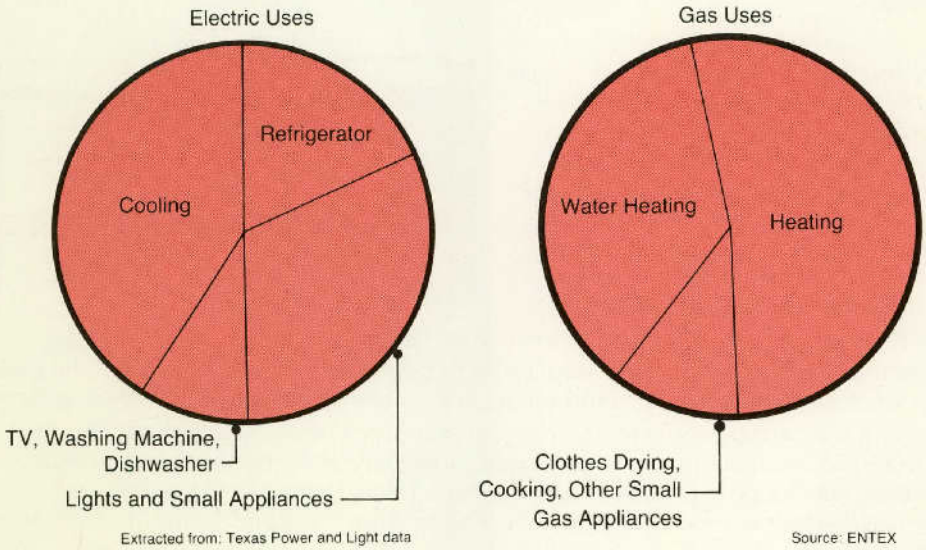
All Electric and Gas/Electric Homes

Average Electric Uses—All-Electric Home



Source: Texas Power and Light Co.

Average Gas and Electric Uses—Gas/Electric Home



Extracted from: Texas Power and Light data

Source: ENTEX

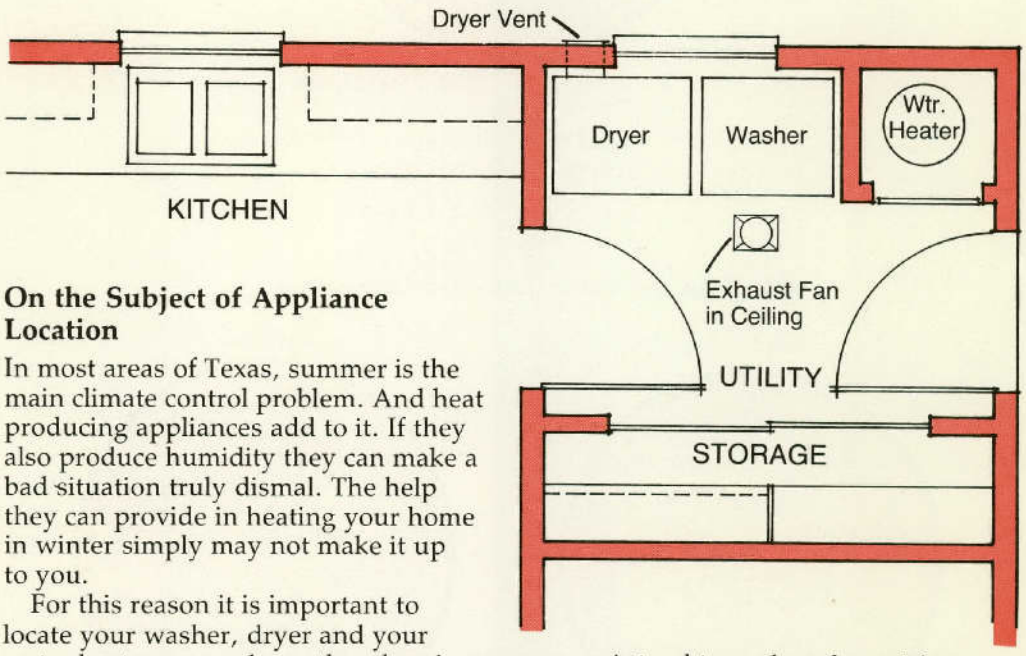
Energy Efficient Water Heating

Next to heating and air conditioning, the big users of energy in Texas homes are water heating and lights. In today's typical home, water heating accounts for approximately 17 percent of the total annual energy bill. This may sound high, but consider the ways hot water is used—showers and baths, shaving, washing clothes, dish washing, general cleaning and food preparation. Together, these operations require large quantities of hot water all year long.

What happens if you buy a new home which includes energy efficient features, but omits anything to conserve energy in the heating of water? Water heating then becomes a much larger percentage of your total energy bills. Perhaps 25% or even higher.

To avoid that, your builder should provide an efficient water heater. The hot water pipes throughout your house should be wrapped with insulation. Remember that if your house is being built with its hot water pipes in the slab, your only opportunity to insulate your hot water pipes will be lost once the concrete has been poured.

From an energy efficiency standpoint, proper location of your new home's water heater will be extremely important. It should be placed in relation to your bathroom and kitchen faucets so that the total length of the plumbing in your hot water system can be minimized. The greater the overall length of your hot water plumbing system, the more it will cost initially and the more water and energy will be wasted through the years.

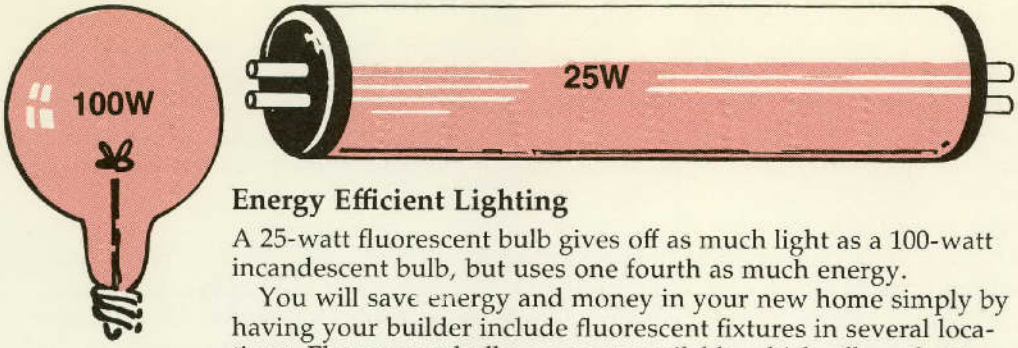


On the Subject of Appliance Location

In most areas of Texas, summer is the main climate control problem. And heat producing appliances add to it. If they also produce humidity they can make a bad situation truly dismal. The help they can provide in heating your home in winter simply may not make it up to you.

For this reason it is important to locate your washer, dryer and your water heater some place other than in an area you intend to cool; and consider venting their heat and humidity directly to the outside. Otherwise you will be using energy at cross purposes and your cooling bill will be a substantial disappointment.

Locating major appliances in an area you won't be cooling doesn't have to mean they will be in an area you leave unheated in winter. Since the heat and humidity they throw off can be a valuable asset for most Texas homes in the winter, you can arrange to keep that area heated, and be able to draw heat and humidity from it into your home.



Energy Efficient Lighting

A 25-watt fluorescent bulb gives off as much light as a 100-watt incandescent bulb, but uses one fourth as much energy.

You will save energy and money in your new home simply by having your builder include fluorescent fixtures in several locations. Fluorescent bulbs are now available which offer color tone comparable to incandescent lighting. Consider using fluorescent fixtures in kitchen and garage work areas, bathrooms and wherever fluorescent fixtures fit your decorating plans.

What Else Can You Do To Make Sure That Your New Home is Energy Efficient?

Outdoor Living Areas

You may want to consider limiting the square footage of your heated and cooled space by substituting outdoor living areas: porches, patios, decks, verandas, gazebos and breezeways. In many areas of Texas, a screened-in porch or patio can be used six to eight months a year. They cost less initially than enclosed living areas and the heating and cooling bills are . . . zero.

A Zone Defense

If you are going to air condition, you have at least two options other than whole-house central air. You can centrally air condition only part of the house without providing for even the occasional air conditioning of the remainder. Or, you can air condition the house using "zones" so that you can at any time air condition one or more portions of the whole house. Zones can also be used for heating.

As possibilities, you could zone separately the bedrooms of your home from the living and kitchen areas. Or you could zone a guest bedroom separately from the rest of the house.

Zoning can be very effective as an energy and money saver because it gives you control over the square footage you actually heat or cool, as well as the flexibility to heat or cool the whole house when desired.

If zoning appeals to you, you will need to make decisions fairly early during the construction of your new home. The equipment and installation requirements for your heating and cooling systems will need to be modified—and you should insulate and control air infiltration for the interior walls of your home between the zones. The size of zoned areas must be fairly substantial to provide a reasonable benefit.

The "Window Unit":
An Old Reliable Way of Zoning

Window air conditioners can be effectively used to provide cooling for one or more zones of your home. They can be mounted either in windows or during construction as permanent installations in the walls. As with central air conditioning, if you are buying a window unit, check the EER. Units with high EER's may cost more initially but the difference is often paid for in a single cooling season.

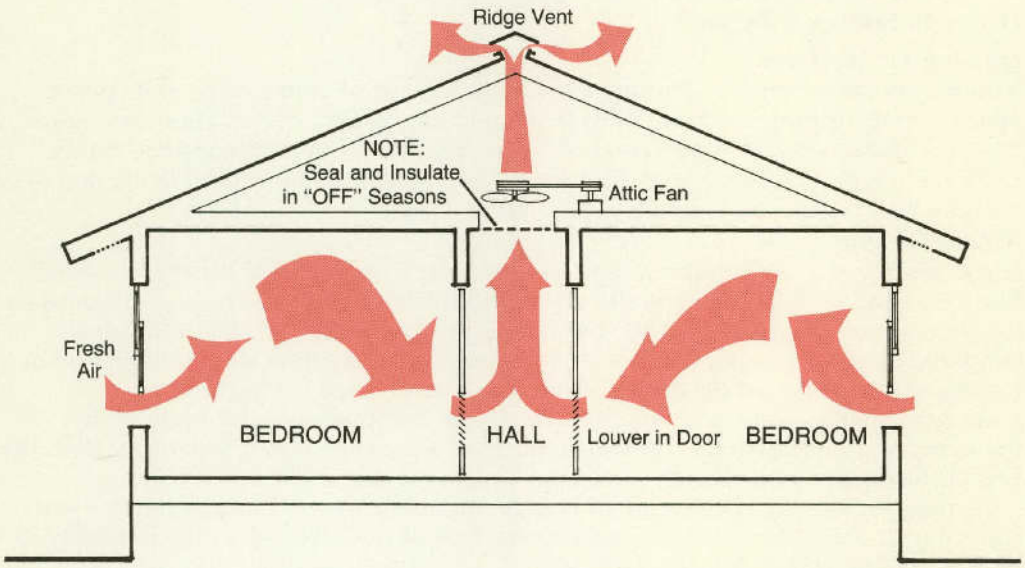
Evaporative Coolers for Low Humidity Areas

In areas of Texas where high humidity is not a problem, window-mounted evaporative coolers can be used effectively in zoned cooling, using much less energy than air conditioners. With special installation, these units can also be used with duct-work systems to provide whole-house cooling. Remember, though, evaporative and refrigerated systems work against one another and cannot be used in the same space.

Attic Fans Are Back

Another alternative to the high energy consumption of refrigerated air conditioning is the use of an attic fan to cool your home. Normally, a house holds heat so that a lag occurs between the time when the outside air cools after sunset on a summer night and the time when the interior of the home cools. An attic fan speeds up the cooling of the house by pulling air in through open windows, up through the attic and out.

In some areas of Texas, attic fans are making a comeback in new home construction—either as a supplement to or a replacement for air conditioning.



Your Fireplace: A Special Problem that Deserves Special Attention

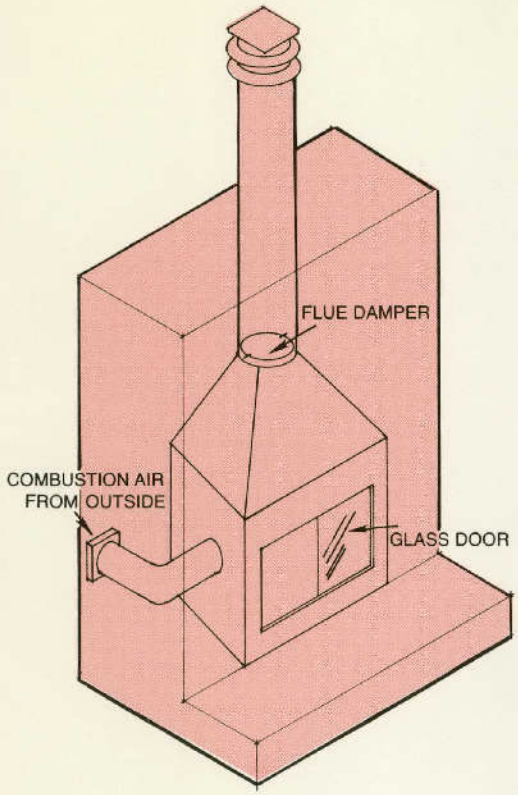
Any number of mistakes and omissions during construction can reduce the energy efficiency of a new home below its true potential. Many of these are minor. There are, however, a few errors so devastating that they negate the total energy efficiency potential of homes in which they occur.

Usually such errors are one-of-a-kind and unpredictable enough not to be mentioned here. But one of these errors occurs frequently and for that reason should be discussed. It is the fireplace constructed without a tight-fitting damper.

Fireplaces are used in many areas of Texas. They can be beautiful and they can add a great deal to the charm and the value of a home. But without a high quality damper, a fireplace can destroy the effectiveness of your heating and cooling systems—no matter how well built your home may otherwise be. Unless the damper is securely closed at all times when the fireplace is not in use, air you have paid to heat or cool

will be drawn continuously up the chimney. *The poor-fitting damper can actually waste more heat than a wide open window.*

In addition to a high quality damper, there are a number of other equipment options which can help you turn your fireplace into an energy asset:



- Ask your builder to include in your fireplace an operable outside air intake to the firebox. This vent will enable the fireplace to pull its combustion air from outside your home, instead of from your living area. Remember to close the outside air intake along with the damper for periods when the fireplace is not in use.
- Install on your fireplace a glass front to shut off most of its access to air from your living area. This will increase the draw of air from the outside vent. And the glass front will actually help the fireplace radiate heat into your home.
- Consider having your builder include air circulation features in your fireplace design to vent warm air around the firebox and into the room or, through ductwork, to the whole house.

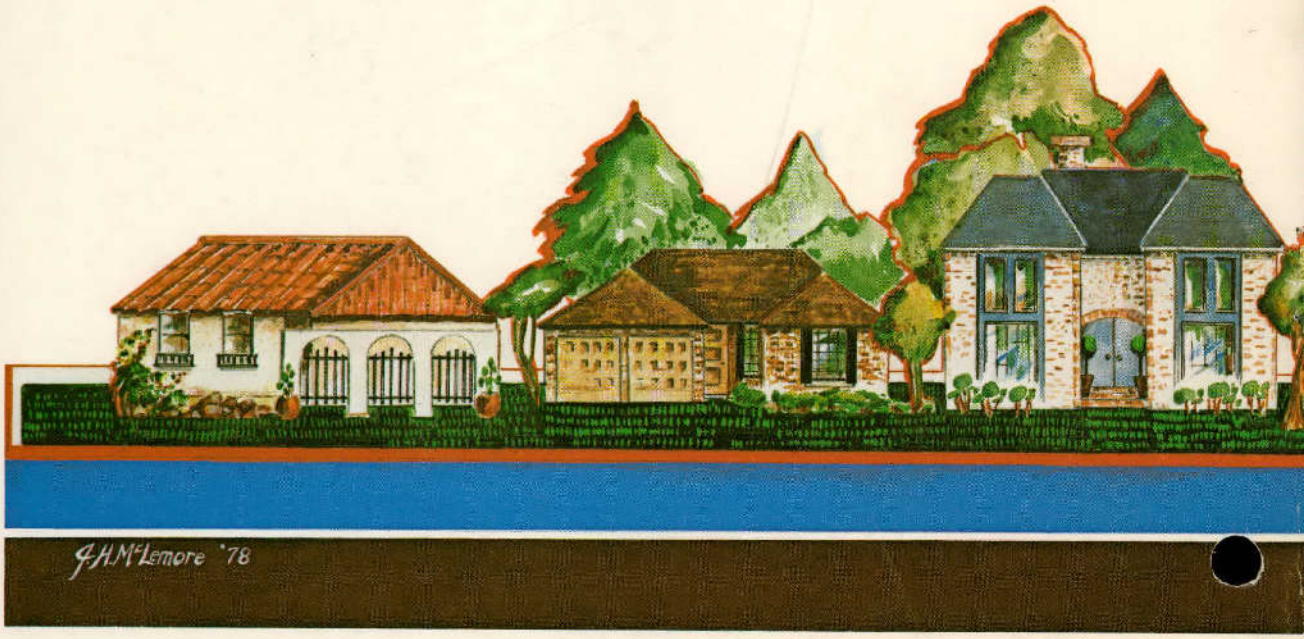
If you will consider fireplace efficiency an important factor during construction, or when analyzing a builder's finished house, you will have done a lot to control your utility bills for years to come.

Each Home is Unique

Your own needs, desires and priorities are critical factors in looking at your housing. Further, the climatic conditions, utility rate structures and construction approaches vary from place to place across the State of Texas.

To optimize your situation, you should seek the assistance of an energy conscious designer, architect or builder early in the game. You can discuss your needs, your likes and dislikes, your living habits as they relate to energy use, and your available resources. In return, you can gain information on expected costs and savings opportunities. Energy consciousness now may reap significant—and continuing—dividends as you occupy your home year after year.

If a home you are evaluating is still under construction, you may be able to influence such things as insulation R-values, weatherstripping and caulking applications, window locations, heating and cooling equipment size and performance efficiencies, and efficient fireplace design. The improved energy efficiency may add slightly to your home's initial cost, but the cost savings year after year (and the potential for added resale value as energy costs continue to rise) will be well worth the added investment.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