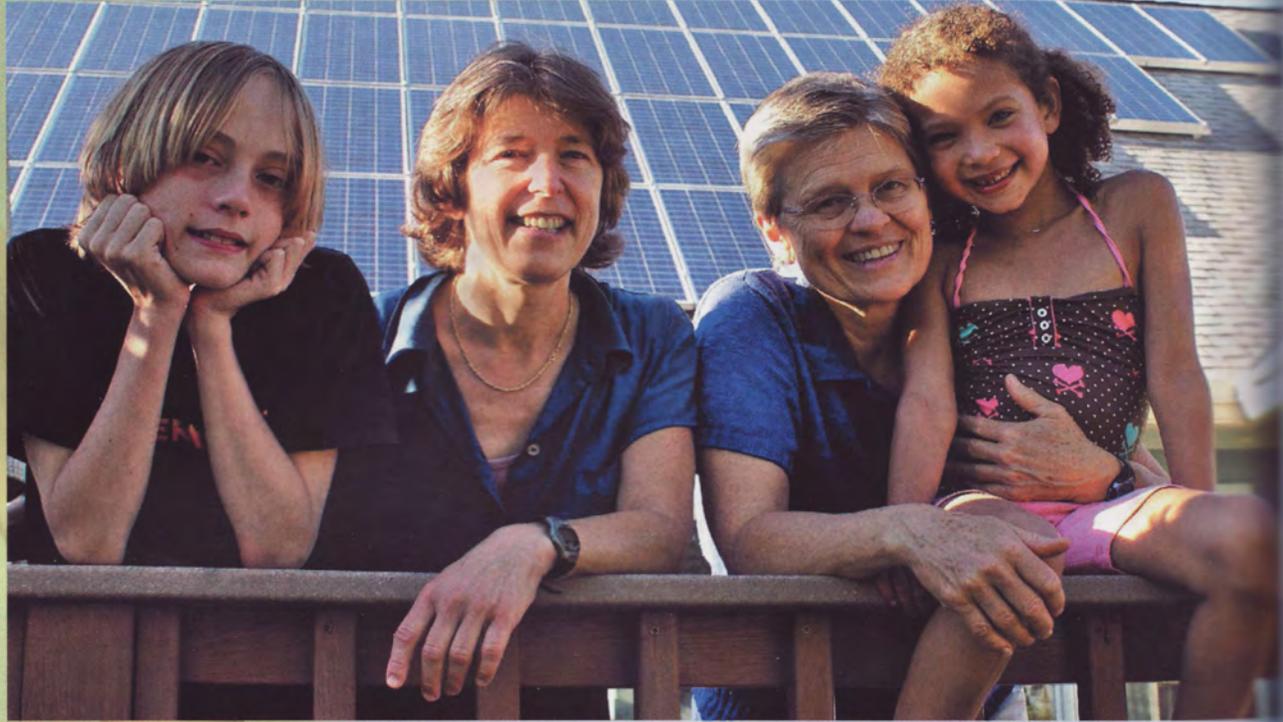
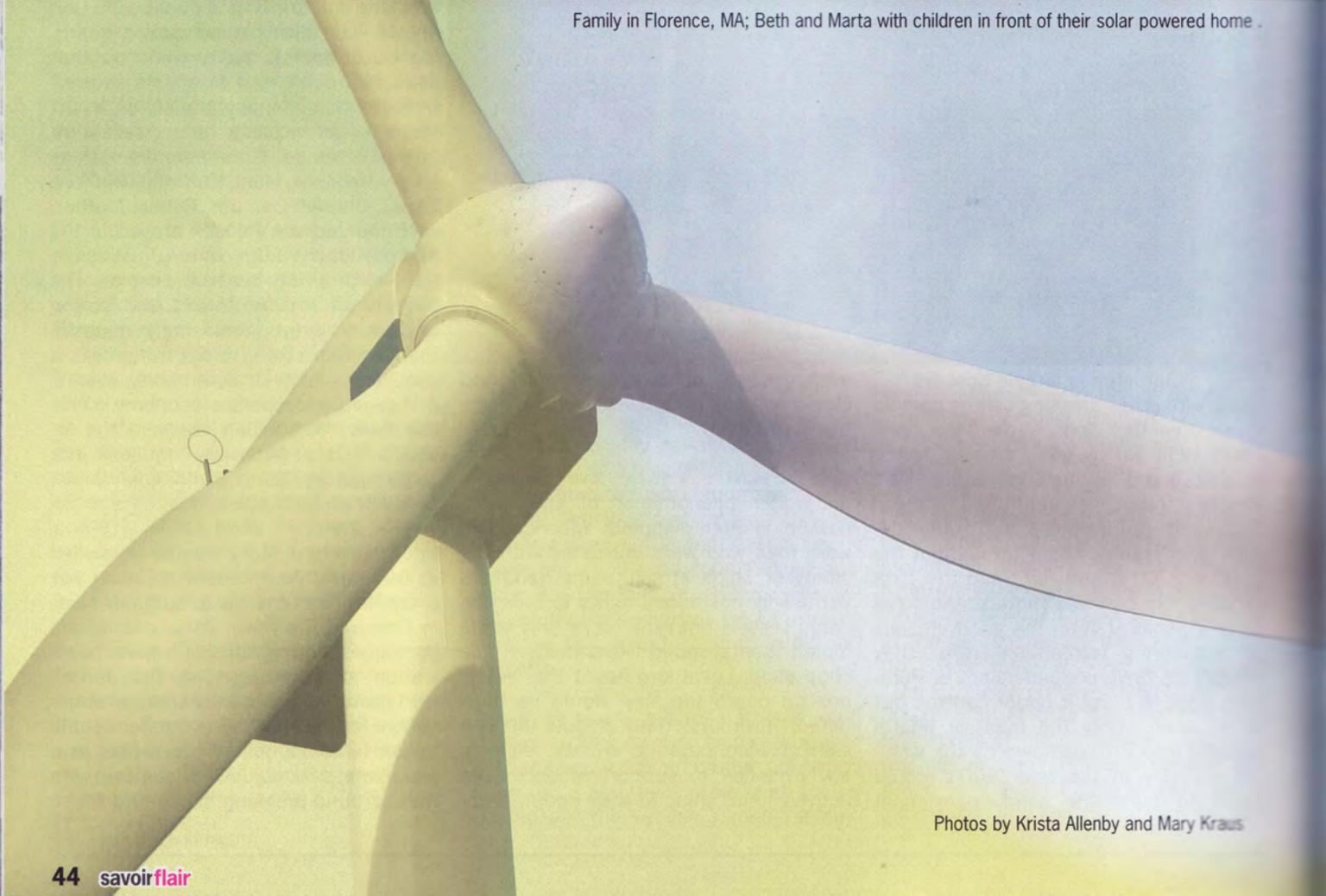


GREEN HOMES

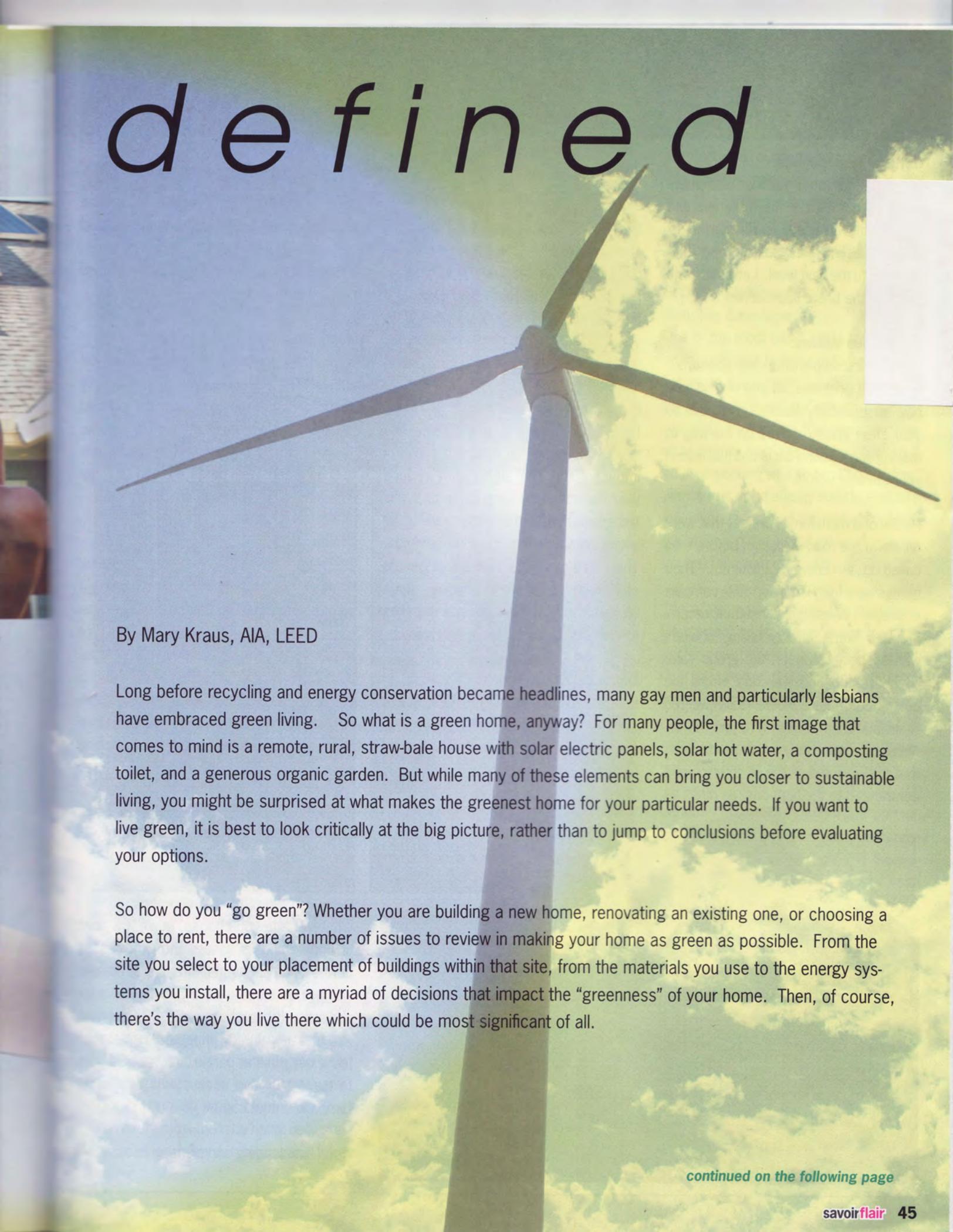


Family in Florence, MA; Beth and Marta with children in front of their solar powered home.



Photos by Krista Allenby and Mary Kraus

defined



By Mary Kraus, AIA, LEED

Long before recycling and energy conservation became headlines, many gay men and particularly lesbians have embraced green living. So what is a green home, anyway? For many people, the first image that comes to mind is a remote, rural, straw-bale house with solar electric panels, solar hot water, a composting toilet, and a generous organic garden. But while many of these elements can bring you closer to sustainable living, you might be surprised at what makes the greenest home for your particular needs. If you want to live green, it is best to look critically at the big picture, rather than to jump to conclusions before evaluating your options.

So how do you “go green”? Whether you are building a new home, renovating an existing one, or choosing a place to rent, there are a number of issues to review in making your home as green as possible. From the site you select to your placement of buildings within that site, from the materials you use to the energy systems you install, there are a myriad of decisions that impact the “greenness” of your home. Then, of course, there’s the way you live there which could be most significant of all.

continued on the following page

Green Homes Defined

General Approaches:

Perhaps the most familiar attributes of green homes are the materials and systems that are used. However, true sustainable design takes these components to take it to the next level. Let's start with some of the basic approaches.

Know Your Values:

The very first step is to be clear about your goals and priorities. If you understand how sustainability stacks up relative to your other goals, you are on the way to making some sound decisions that reflect your specific vision.

I know of a multi-family project that went far down the road of design before they called in an energy consultant. Their homes were fairly large and quite complex in shape. When the consultant recommended some energy-saving choices with associated costs, the group said: "Gee, it's too bad we can't afford the ecological features. We really wanted to include them, but they're just too expensive." What they didn't realize was that the size and shape of their homes contributed to the high cost as much as

the energy strategies. It was not clear to them that they were in effect making a choice between size and energy-efficiency, between aesthetics and ecological performance. It is important to be clear about your trade-offs, that the home you build (or renovate) represents your values—whatever they may be.

Pick Your Site Wisely:

From an environmental point of view, the site you choose can have the greatest impact. You can significantly reduce your car usage by living close to public transportation, within easy walking or biking distance to work and key services. This can also have a nice fringe benefit of keeping you in good physical shape - it's amazing what a difference it makes to walk half a mile to work every day.

Consider Renovation:

Renovation is a good way to make use of structures that already exist, rather than expending the energy and materials to build new. You can start with an energy

audit, and improve the energy performance of the building by reducing air leaks and upgrading insulation. You can even super-insulate and replace old windows with new high-performance ones.

Build Small:

The smaller you build, the less material you use, and the less energy you need to heat or cool your home—not to mention the reduced requirements for maintenance and repair. People often ask me how much more it costs to build green. Well, here's a green strategy that will reduce your construction cost.

Cluster to Save Land:

There is a lot to be gained by clustering homes closely together. Whether you build on rural land or in the suburbs, a village cluster of buildings means shorter distances for roads, paths, and utilities between homes. By leaving a good portion of the site unbuild, you also leave room for wildlife habitat, gardens and orchards. You can save even more resources by joining walls and attaching units. The shared walls will conserve heat, and you will use less siding. And contrary to popular thinking, well-designed clustered or attached buildings can actually offer more privacy than separate houses.

Develop Your Site Sensitively:

Whatever site you choose, make it a point to understand its assets and weaknesses before you plan. A full analysis of the site will include slopes, flora and fauna, solar access and prevailing winds. Build on areas that are already impacted, rather than the most pristine part of the lot. Be sure to leave sensitive ecosystems and fertile farmland untouched.

Good landscaping and planting choices will

Below: Building small in a clustered community



Green Homes Defined

comfortable outdoor micro-climates, like a warm sitting area exposed to the sun and sheltered from wind, or a cool summer dining spot under the shade of a large trellis, exposed to breezes.

A Tight, Well-Insulated Building Envelope:

One of the most basic steps towards an energy-efficient building is to have a well-insulated and air-tight building envelope. (By the way, “envelope” means the exterior walls, roof & floor that separate your cozy interior from the chilly outdoors.) If you are working with an existing building, you can set up an energy audit to evaluate insulation levels and air leakage. Both the audit and the insulation work may be covered through your utility.

There are many choices for insulation. Dense-packed cellulose, made from recycled newspaper, is one of my favorites - but you need to evaluate every situation for the most appropriate choice. Insulation is rated by “R-value”, which notes the resistance to heat flow through the material. The higher the R, the better.

Windows form a very important part of the building envelope. Because they cover a significant portion and have a relatively low R-value, a lot of your heat is lost there. So an upgrade to your windows has a proportionately large effect. For example, there are some very advanced windows, triple-glazed and with insulated fiberglass frames and sash, approximately R-5. Even a typical new R-3 window can be an improvement if you are renovating a building with old single-pane windows – though if you’re going to the trouble of replacing windows, you might as well go all the way.

continued on page 75



Top: Solar Panels South Facing, Bottom Right: Happy Family in Western MA in front of their Green Home. Bottom Left: Wind Turbines Producing Electric Power.

Take Advantage of Solar Orientation:

minimize your ecological impact over time. You can incorporate native plants, and ones that provide food or habitat for birds and other wildlife. You can also use edible landscaping, to provide you with tasty organic snacks just outside your door. If you plan small lawn areas, you can readily mow them by hand, reducing the pollution from a typical gas-fueled mower.

If you are building a new home, or even an addition, you have the chance to place buildings and plants carefully to take the best advantage of solar gain, cooling breezes, and shading. Orienting a long face of your building to the south, allowing passive solar gain to heat your home. Planting trees on the west side can help reduce summer overheating from the afternoon rays. You can also create

A lot of energy is lost through unintentional leaks.

Select Environmentally-Sound Materials:

Whether you are looking for flooring, siding or kitchen cabinetry, there are a number of questions to ask when choosing greener materials. What are the land use and pollution impacts caused by the extraction and/or manufacture of the material? How much energy did it take to manufacture and transport the material? What is the recycled content of the material? Is it a salvaged material? Is it locally or regionally produced? Is it healthful for the occupants?

Let's use flooring as an example. Some people favor bamboo flooring as a good ecological choice, because it is made from a quickly replenishing resource. However, it is imported from China, so requires a lot of energy for transporta-



tion. Many bamboo floors also off-gas formaldehyde, which can contribute to an unhealthy indoor environment. Personally, I think of local wood as one of our best regional options. There are a number of local sawmills that mill lumber from nearby forests. We even have certified sustainably harvested wood products available from Massachusetts Woodlands Cooperative. Another option would be re-using wood flooring removed from a demolition or renovation project.

Regarding material re-use, we are lucky to have our own regional store for re-

continued on the following page



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continued from page 75

used building products. The Re-Store in Springfield sells a vast array of quality used, salvaged and surplus materials – from plumbing fixtures to door hardware – at a significant discount to boot. And if you are renovating, you can donate items there rather than sending them to the landfill.

Choose Appropriate Systems and Equipment:

For health concerns, fuel-burning boilers or furnaces should be “sealed combustion”, which keeps combustion gases out of your home. Electric heat is generally considered a poor ecological choice, because of very poor overall efficiency, and in many areas, the use of nuclear fuel. But there is one electrically-based system that is so efficient that some people argue it is ecologically advantageous. This is the ground-source heat pump, which uses electricity to draw heat from the earth for heating (and cooling) buildings. As to whether these are better than an efficient gas system, I think the jury is still out and it probably depends on your particular location.



Probably the most exciting option is to reduce your heating needs to a minimum. If you super-insulate your home and build

continued on the following page

Green Homes Defined

it tightly, you can heat it comfortably with only a point-source heater, such as a pellet stove or small through-the-wall gas heater. The money you spend on the cozy building envelope lets you save on an expensive heat-distribution system. (The point source heater means no duct work or piping to distribute heat.)

Your choice of ventilation systems will also



be important for health and energy-efficiency. You can include a simple system that uses bathroom fans or range hoods to exhaust air from your home. Or you can use a “heat recovery ventilator,” which brings in clean air while recovering heat from the dirty air being exhausted.

As long as we’re talking about fresh indoor air, remember that detailing for good indoor health also includes a radon pre-mitigation system. In a nutshell, this involves a layer of clean stone under your basement slab, so that soil gases can be drawn out from below your house before they get in.

Use Efficient Appliances and Fixtures:

When it comes to lighting, you want to use efficient lights such as compact fluorescents, which draw about a quarter of the current of incandescents. New developments in LED lighting promise to bring energy use down even further. And don’t forget natural lighting, which saves energy while creating pleasant, cheerful interiors.

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continued from page 77

Appliances are another area in which you can save electricity. Residential refrigerators account for a large chunk of a household's energy use, so selecting an efficient one will make a big difference. Regarding washing machines, look not only at the energy use but at water extraction; there are some machines that spin so fast, the clothes come out relatively dry. This makes it easier on those of us who want to line-dry our clothes, reducing energy use if you put your clothes in a dryer. The EPA provides an "Energy Star" rating on most major home appliances, indicating efficient products. You can also find appliances that exceed these standards.

Be aware of "phantom loads". Many appliances, when plugged in but officially "off", still draw significant loads. A watt-meter can help you measure these. When appropriate, you can plug these items into a power-strip, which you can turn off between uses.

Conserve Water:

Low-flow plumbing fixtures include toilets, dishwashers, clothes washers, faucet aerators that reduce flow, and water-efficient shower heads, preferably with an on-off switch so you can stop the flow while you soap up. Of course, if you really want to save on water, composting toilets will help dramatically.

Then there is the issue of "gray water:" the soapy stuff that goes down the drain. In theory, you can use it to flush toilets or water some plants. While it may not be permitted yet in your locale, you might build your plumbing to allow easy separation later on - if and when it becomes legal.

As you conserve hot water, you are saving the fuel required to heat it. You can also take this another step by recovering heat from waste water. One clever plumbing

continued on the following page

Green Homes Defined

device uses the hot water that leaves the tub to heat incoming water going to the shower head.

Produce Your Own Power:

Once you have reduced your energy consumption as far as possible, how do you make up the difference? You can stop there then be satisfied that you have reduced your usage of non-renewable fuels. Or you can try to make up some or all of the balance by producing your own power. There is a growing interest in "net zero energy homes", which produce over the course of the year as much energy as they use for heating, hot water, electricity and cooling. Whether striving for this goal or not, you can install solar thermal collectors to produce hot water. You can also generate your own power using electricity-producing solar photovoltaic panels, which are most often installed on a south-facing roof. Other options include wind turbines and micro-hydro power, but these are more site-specific. There are currently significant rebates and/or tax incentives available in Massachusetts for such alternative energy systems. If you are on a large rural site, you might also be able to harvest renewable fuel from your own woodlot.

Optimize the Construction Process:

It's one thing to look at the product you're building. But how about the process of getting it built? There are a number of issues to think about during construction. For one, you want to protect trees and sensitive areas of your site - the compaction caused by vehicles and machinery can damage root systems and eventually kill trees. The management of construction waste is another important concern. You can set up waste separation on site, with collection points for various reusable or recyclable materials, including cardboard packaging. A way to reduce wood waste in the first place is to have your contractors do all their cutting in one centralized

continued on the following page



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continued from page 79

location: this way, they are likely to find that 3 foot piece they need, rather than cutting down a new full-length 2x4.

You will want to hire a contractor who is experienced with green construction. It is important to have a builder who understands the painstaking care required to achieve a tight, well-insulated building envelope. You also want someone who is willing to implement strategies to minimize construction waste.

HOW TO BE CLEVER ABOUT GREEN DESIGN:

Green design isn't just a collection of strategies to be randomly applied. You'll be most likely to succeed when you apply your environmental strategies in a way that responds both practically and imaginatively to the unique qualities of your project.

Choose Opportunities Appropriate to Your Situation:

Many people wish to have a green home, but we all have different circumstances. For example, a country dweller will have different opportunities for green living than someone living in town. On a rural site with open space, you are likely to have more flexibility in orienting a home for solar gain. You can also design your site for extensive food production, including a garden, edible landscaping and even an orchard. But you will undoubtedly drive more than your in-town counterparts, who can take advantage of public transportation.

Don't Overlook the Mundane:

It's easy to get excited about the ecological "bells and whistles" - photovoltaic cells, composting toilets, gray water systems. While these are great ideas to consider, your ecological budget may be best spent on more "mundane" innovations. Tighter construction, a well-insulated building en-

continued on the following page

Green Homes Defined

velope and efficient appliances don't make your green building look any different, but they can be very effective strategies for making your project more ecologically sound.

Get Good Bang for Your Buck:

Believe it or not, some ecological choices don't cost you anything - or may even save money. As mentioned above, small is both greener and cheaper. Similarly, it generally doesn't cost anything to orient your buildings to take advantage of solar heating, shading, and cooling breezes. It just takes good planning. There's also no added cost to strategically placing more of your windows on the south and fewer on the north, but it will help the energy performance of your building. Energy-efficient appliances and lighting don't necessarily cost more. Many utilities give rebates for installing these items.

Incorporate all the no-cost strategies available to you in the context of your overall project goals. It only makes sense.

Be Realistic:

Yes, I know, that did sound too good to be true, didn't it? The truth is, not all ecological choices are free. In fact, many will cost you money. It costs more to insulate well, to build tightly and detail carefully, to use high-performance windows. Solar photovoltaic panels, even after rebates, can typically add thousands to your bill. If you want to put your money where your mouth is, you will either need to pay more or forego some other amenities you thought you wanted. Maybe you can build a bit smaller, keep the building shape simpler, or reduce the size of your kitchen.

Do Now What You Can't Do Later:

Most of us cannot afford to build in all of the green features we ideally want, and will choose to defer some opportunities "for later." But some environmental opportuni-

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Green Homes Defined

continued from page 81

ties are really hard to come back to—for example, detailing your foundation for radon mitigation involves placing a layer of stone under the floor slab—not something you can easily change. Similarly, if you want highly insulated exterior walls, do it at the outset; adding insulation later will mean removing and re-installing siding. Although windows can be changed after the fact, that's a mighty expensive proposition; if you can afford the better windows early on, go for it.

Prepare for the Future:

While you build now what is impractical to change later, you can leave the door open for other green features in the future. For example, to allow for future solar hot water and photovoltaics, provide generous expanses of south-facing roof – uninterrupted by plumbing stacks.

Look at the Whole Picture:

I cannot emphasize enough that context is one of the most important aspects of sustainable design. It is important to look at the whole picture and understand the complete effect. For example, a smaller home is generally greener. But if you add an extra room for the purpose of having a home office, and this means you can work at home three days a week instead of commuting, then that extra square footage can actually decrease your ecological impact.

Green building is not just about objects, but about relationships. It's not just about solar cells and bamboo flooring, but about the layout of the entire house - and the connection of your home with the world outside.

Cohousing – Thinking Beyond Your Individual Home:

While there is a lot you can accomplish on the level of one home, you can have

Green Homes Defined

a greater green influence if you address the scale of several homes or a neighborhood. On this scale, you can bring more parameters into play - connection of homes, clustering to provide more open space, even sharing of resources once you and your neighbors move in.

One example of this is cohousing, a form of neighborhood that balances the privacy of the single-family home with the sense of community we generally lack in current subdivisions. These neighborhoods are resident-designed and managed, and typically include 20 to 30 homes. The homes are tightly clustered around a pedestrian environment, providing a safe place for children with a rich sense of neighborhood. Shared facilities include a common house, where neighbors can join each other for dinner a few times a week. These neighborhoods offer a number of green advantages, such as the clustering mentioned above. When you know your neighbors well, you can also carpool, share garden tools, and order local and organic produce in bulk. Cohousing neighborhoods can even make land available for a community-supported agriculture (CSA) organic farm. And many choose to incorporate a "home office building", so that residents can work a few steps from their home while sharing common office equipment and camaraderie.

Live Sustainably Within Your Home:

The construction of your home is only half of the picture. The other piece is how your everyday living contributes to sustainability. So you want to make sure your home supports you in this ongoing endeavor. For instance, it is important to include convenient facilities for recycling, such as bins built in to your kitchen base cabinets. If part of your plan includes bike commuting, make sure to include convenient and secure accommodations for your bike; if you have to haul it out of the basement every day, you are not as likely to use it. If you plan to cook lots of



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meals using local produce, make sure your kitchen supports you in this.

One of the most satisfying aspects of sustainable living is that one opportunity opens up another. On a personal note, I live in a cohousing community, which has allowed my household to get by with owning one car. Over the years, thanks to the generosity of our car-lending neighbors, we have saved enough money to install solar electric panels on our roof! Who says the average person can't afford photovoltaics?

As you embark on your green adventures, I hope you will create equally satisfying stories to tell. Just use your imagination, be sure to look carefully at your particular opportunities, make choices that are a good match for you—and enjoy! ▼

RESOURCES:

- Cohousing Association of the United States, www.cohousing.org
- Center for Ecological Technology, www.cetonline.org
- Northeast Sustainable Energy Association, www.nesea.org
- Massachusetts Woodlands Cooperative
- Environmental Building News: resources including on-line guide to green building materials & systems, www.buildinggreen.com

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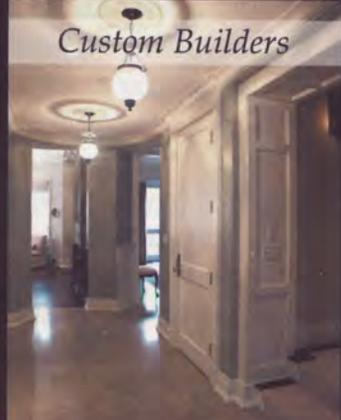
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