Chapter 1 Going Green

In This Chapter

- ▶ Discovering the reality of how buildings are built
- Asking the right questions before building a new home
- Realizing the benefits of building in a green way
- Considering design
- Mapping the steps to a green building

The way people construct their buildings is about to change radically. It *has* to. The majority of modern-day buildings waste energy, water, and resources beyond comprehension. It's not our fault, really. Most architects and builders are completely unaware of the impact buildings have on people's health and the environment.

Green building is a way of looking at buildings that allows people to be more responsible with energy and natural resources. Going green is usually the most logical and economical choice, whether you're building or remodeling your home. In the near future, all buildings will be green buildings, whether by preference or regulation — it's inevitable.

Because green building is a mystery to most people, various rumors, misconceptions, and misperceptions swirl around it. You've probably heard a range of odd and funny comments about green building. In this chapter, I dispel these myths and explore why your new home or remodel should incorporate the green building techniques outlined in this book. In addition, I cover the steps to building a green home, including how to select a proper building site. I conclude the chapter with a discussion on costs and the new mindset you'll need in building your green dream home.

The first green buildings

When do you think the first green building was built? Odds are, you're picturing something built in the past 50 years or so. What if I told you that the first truly green buildings were the stone dwellings of the Anasazi Indians from A.D. 1?

The Anasazi were a rich culture of farming people who lived in the Four Corners region of the United States (where Colorado, New Mexico, Arizona, and Utah meet) up until 1300, when drought forced them to migrate. The best examples of their buildings appeared around 700 and consisted of apartment-house-style villages. These villages, built at the tops of mesas, included multiple-room dwellings of beautiful stone masonry.

Why are the pueblos of the Anasazi considered to be green buildings?

- Understanding the sun and heating, the Anasazi oriented their dwellings to the light. These were textbook passive solar buildings featuring natural ventilation.
- Rainwater was captured and irrigated because water is a valuable resource.
- The Anasazi buildings predated electricity but were heated and cooled without heat or air-conditioning.
- Natural stone, mud, and wood were the only materials used.
- The buildings of the Anasazi were completely nontoxic and healthy.
- Centered around a village concept, the Anasazi buildings fostered interaction and a sense of community.

Many of the so-called "innovative" green features we marvel at today are actually ancient methods of building. Fresh air, passive solar orientation, passive cooling, and many other concepts have been in use for thousands of years.

For a more modern example of green building, you just need to look to the global energy crisis of the 1970s for some pioneering efforts in energy conservation. Arguably, the pioneering Willis Faber and Dumas Headquarters by architect Norman Foster could be considered the first modern green building. Built in 1977, the building features a grass roof, a naturally sunlit atrium, and mirrored windows used to reduce solar gain.

Why is this building considered to be a green one?

- The building is located in the center of the town of lpswich, centrally located for ease of access.
- The building features a landscaped roof garden.
- The glass curtain wall is tinted to counter solar gain and is suspended from a continuous clamping strip. The building's design exhibits a pioneering use of low energy consumption.
- An irregular shape of black glass creates a striking and natural form.
- The building is designed to encourage social contact. These social ideas shaped the arrangement of the plan.

Understanding Why Green Matters

Green building is the healthy, common-sense choice for a better life. In traditional construction, the quality of the indoor environment is often far more polluted than the outdoor one, because of the building materials we use, our inadequate lighting, and a variety of other variables.

Green buildings are sited, designed, constructed, and operated to enhance the well-being of their occupants, and to minimize negative impacts on the community and natural environment. Buildings consume 40 percent of the world's total energy, 25 percent of its wood harvest, and 16 percent of its water. Compared to traditional construction, a green-built home takes some of this pressure off the environment.



You're losing money on every green feature you *don't* include. Any time you build a new home or remodel an existing one, you have the opportunity to save money in the *operational* costs of your home. After all, you'll spend a great deal more money on the operation, maintenance, and utilities in your home than you ever spent on the initial construction costs.

A green building:

- Provides a healthier and more comfortable environment
- Incorporates energy- and water-efficient technologies
- Reduces construction and demolition waste
- Brings higher resale value
- Includes renewable energy technologies
- Improves indoor air quality and occupant satisfaction
- \checkmark Is easier to maintain and built to last

All these factors can save you money in both the construction and operation of your home — and they're all good reasons to go green with your building or remodeling project.

Looking at Cost in a New Way

The common perception is that a green building costs more than a traditionally built one. The fact is, with a clear construction budget, there is no reason you can't build a green building for the same price as, or less than, a traditional building. In the following sections, I break down the three major types of expense in every building project, and let you know where green building fits in.

Initial costs

The *initial cost* is the actual cost of the material or product — what you pay once to buy the material or product and install it in your home.

If you compare similar materials (a traditional one, and a green one), the costs often end up being the same. For example, a bamboo floor is installed exactly the same way as a traditional wood floor. The material costs are now the same, and the use of bamboo doesn't result in the clear-cutting of a forest. So bamboo is a better environmental choice, and it doesn't cost you any more at the outset than another type of wood floor would.

Although some green materials do cost more than their traditional counterparts, there are also many more green products whose costs are far *below* the standard. Advances in recycling, new materials, and better designs have allowed for a new generation of environmentally friendly products that are less costly to produce. Of course, green materials also have a very important long-term benefit of not destroying the planet's resources.

The trouble arises when you try to compare apples to oranges. For example, if you're comparing a building with solar panels to a traditional building without solar panels, of course the traditional building costs less. But this comparison focuses solely on the upfront cost of building and fails to take into account how the building with solar panels will *immediately* begin producing energy and eliminate your monthly electricity bill. The lifecycle cost of the solar building will be much less. This monthly benefit, called a *return on your investment*, pays for any additional upfront costs of purchasing the solar panels, in most cases within five to ten years.

Lifecycle costs

Lifecycle costs are the costs of a product or material over the product or material's entire life — not at the moment of purchase and installation.

Green products and systems pay for themselves at least ten times over the life of the building. This is true even if the features cost more at the outset (see the preceding section).

Homes are built to last for at least a century. In that time, the cost of heating, cooling, and maintenance will be far greater than the cost of construction. Turn your attention to these costs to discover the savings — they can be enormous.

For the items that may increase your initial costs during construction, be sure to calculate the return on investment — the period of time it takes to realize the savings for items such as solar panels or added insulation.

Maintenance costs

Many people overlook *maintenance costs*, the costs associated with maintaining the house. Seen as the *cost of owning a home*, these maintenance costs are often high. Some homeowners are unprepared for these expenses, so they ignore problems until serious damage occurs.

Green building encourages the use of durable and unfinished materials to save on the costs and effort of maintaining your home. From the expense of painting and staining, to the effort of changing light bulbs, you can save a lot by going green.

It Is Easy Being Green: Steps to a Green Building

Although every home project will be unique and different, the steps to planning a green building are similar. The following list shows what you need to consider in the early planning phases for a typical green building:

- 1. Decide whether you want to remodel or add on to your existing home, or build a new home (see Chapter 3).
- 2. Plan your financing; consider a green mortgage program (see Chapter 4).
- 3. Choose a site preferably in a dense area, with lots of sunlight (see Chapter 14).
- 4. Research the planning code requirements for height limits, setbacks, and allowable size (see Chapter 4).
- 5. Ask about priority permitting for a green building (see Chapter 4).
- 6. Have a survey prepared by a civil engineer (see Chapter 4).
- 7. Diagram the site for sunlight, wind, views, and features (see Chapter 14).
- 8. Research grants and incentives for green builders (see the appendix).
- 9. Interview and hire an architect (see Chapter 4).
- 10. Create the preliminary design (see Parts II, III, and IV).

- 11. Talk to your neighbors about your project before you begin (see Chapter 4).
- 12. Orient rooms based on the location of the sun (see Chapter 14).
- 13. Set priorities for the materials you use, giving preference to healthy, natural, and low-toxic finishes (see Chapters 5 and 6).
- 14. Consider exposing the structure to reduce your use of materials (see Chapter 7).
- 15. Dimension the building to match the unit of construction 16 inches, 24 inches, and so on (see Chapter 8).
- 16. Provide space for thicker walls to allow for more insulation (see Chapters 8, 9, and 10).
- 17. Choose a structural system based on local resources and know-how (see Chapters 8, 9, and 10).
- 18. Design the roof to allow for solar panels (see Chapter 11).
- 19. Design to allow for passive solar heating and cooling (see Chapter 12).
- 20. Allow space for water-recycling systems, such as graywater and water catchment (see Chapter 13).
- 21. Design the shape of the roof to accommodate rainwater catchment (see Chapter 13).
- 22. Design the roof to allow for a green roof (see Chapter 13).
- 23. Interview and select a contractor (see Chapter 4).
- 24. Obtain all required permits and approvals (see Chapter 4).
- 25. Prepare a plan for construction waste management (see Chapter 3).

Location, Location, Location: Choosing a Site for Your New Green Home

Although most homes sit on their lots arbitrarily facing the street, a green building turns toward the sun and wind to use these natural features to your advantage (see Chapter 14). Consider the following when shopping for a site for your new green home:

- Encourage in-fill development. An *in-fill development* is a project built on an existing building site, usually between other buildings. Building on an in-fill site is better than destroying a pristine natural lot.
- Minimize dependence on your car. Locate your new home close to public transportation or bicycle paths, or within walking distance of

shops and basic services. Include a home office in your design to reduce commuting; you'll reduce your stress and save on fuel costs.

Locate buildings to minimize environmental impact. Design the home to preserve open space and wildlife habitats. Avoid sensitive areas such as natural wetlands. Try to keep as many of the existing trees as possible.

Designing Your Way to a Better Green Home

The more time you spend in the initial planning phase, the more time and money you'll save during construction. Consider the following issues at the beginning of the design process:

- ✓ Go for a smaller home instead of a large one. Many people have a tendency to build the largest home they can afford, only to find the large home a waste of space and expensive to heat and cool. Consider doing more with less and making the house not so big. Create multipurpose spaces such as a home office that doubles as a guest room; they're much better uses of space.
- ✓ To save on construction costs, consider building more floors instead of a sprawling one-story home. Going up is usually cheaper than spreading out. A multistory home also reduces the impact on the landscape.
- Make the structure adaptable to other uses, and choose materials and components that can be reused or recycled. Avoid putting anything painted outside; it will have to be repainted every three to five years. Use unfinished, natural materials instead. (Refer to Chapter 5.)
- ✓ Consider an addition to your existing home instead of building new. Remodeling your home is a form of recycling. Before assuming you need to build something new, consider putting an addition on your home instead. Take the money you save and put it into more important things, like solar panels. (See Chapter 3 for a full discussion on remodeling versus building new.)
- ✓ Work with green professionals. Building or remodeling a green home is much easier when you work with sympathetic professionals. Choose people already familiar with green building practices. From green financing to green contractors, everyone on your team can find ways to protect the environment and save you money at the same time. (Chapter 4 outlines all the people you'll need on your team and tells you how to find them.)
- Make it easy to recycle. Early on, make provisions for storing recyclables. For example, install recycling bins in the kitchen, with an undersink bucket with a lid for compostable food waste. If you have it, you'll use it.

- Choose healthy and low-toxic materials. At the beginning of your design, commit to using only healthy materials in your new home. (Chapters 5 and 6 help you find these materials.)
- ✓ Select recycled and sustainably harvested products. In the early parts of design, you probably already have ideas for finishes. (For example, you may already know what kind of floor you want in your living room.) Chapter 7 helps you select recycled and sustainably harvested materials. Order samples early so you're ready to choose the right one.
- Minimize waste and speed up installation by designing around standard sizes. For example, design your bathroom to fit the tiles you're planning to install.
- If you're building out of wood, consider using optimum value engineering techniques. You'll use up to 55 percent less wood. (Chapter 8 explains the benefits of this practice.)
- Design for alternative construction techniques. Don't just assume you'll build your new house out of wood. Several alternative construction methods may be better choices. (Turn to Chapter 9 for an explanation of natural building methods; Chapter 10 includes discussion of manufactured building methods.)
- Design an energy-efficient building. Making an efficient building is the easiest thing you can do to save energy. Use high levels of insulation, high-performance windows, and tight construction. (Refer to Chapter 11 for more on all these options.)
- Design buildings to use renewable energy. Consider solar water heating and photovoltaics, or design the roof for future solar panel installation. (See Chapter 11 for more information.)
- Let the sun shine in. Daylighting (using natural sunlight to light a room) is an easy way to bring warmth into your home while reducing energy use. (Find ideas in Chapter 11.)
- ✓ Use the sun to heat and cool the building. Passive solar heating, daylighting, and natural cooling can be incorporated cost-effectively into most buildings. (I explore these in Chapter 11.)
- ✓ Consider a graywater system. You can save the soapy water that has been used for bathing, dishwashing, or clothes washing and reuse it later for flushing toilets or irrigating the garden. (You can read about the benefits in Chapter 13.)
- ✓ Use the rainwater. Clean water falls on your roof every time it rains. Collect this water and use it to flush your toilets or water your lawn. (I describe these systems in Chapter 13.)

- Design water-efficient, low-maintenance landscaping. Lawns require a great deal of maintenance, pesticides, and mowing. Avoid this high impact with native and natural landscaping. (Chapter 14 provides alternatives.)
- ✓ Avoid potential health hazards, including radon, mold, and pesticides. The issues of mold and radon are important concerns. Protect your home by designing to reduce their risk. Design insect-resistant detailing to reduce the use of pesticides. (See Chapter 14 for more information on all these topics.)

Following the Rules

You may assume that building codes would favor green materials, given their tendency toward less-toxic materials. In reality, building codes have little to say about the finishes or fixtures in a building. Generally, codes exist to protect the health, safety, and welfare of the inhabitants.

Bottom line: You should be able to use green finish materials as freely as traditional building materials. On the other hand, the walls, floors, or beams in a building impact the occupants' health, safety, and welfare, so they do fall into the purview of the local building code.

Ancient alternative materials such as straw bale or adobe are still not accepted by many building departments. Cost-saving measures such as the use of finger-jointed wood studs are also frowned upon by the local building inspectors. You'll have to check with your local building department before planning any construction project with these nontraditional methods.

Any wood intended for structural use must be inspected and grade stamped prior to use, or it will not comply with the building code. Ask the supplier for grade stamps — some suppliers provide this service for a reasonable fee. (*Note:* This rule does not apply to finish and nonstructural wood.)



Always check with your local jurisdiction before using any unusual materials.

A number of local governments have discovered the value in getting people to build green buildings. In addition to being a healthier way to build, green buildings reduce the strain on the local infrastructure. Cash-strapped governments can save considerable amounts of money simply by getting their residents to reduce their energy, water, and waste. Whether you live in these areas or not, visit the Web sites of the following agencies to download their free and incredibly useful green building guidelines and checklists:

- Alameda County (California) Waste Management Authority (ACWMA; www.stopwaste.org): ACWMA has been a pioneer in green building. Its free guides are so well done that the City of San Francisco adopted them for its own use.
- Chicago Department of the Environment (www.cityofchicago.org/ environment): Chicago has been striving to become the greenest city in the United States through visionary programs promoting green roofs and energy efficiency. Its green building checklists are a valuable tool.
- City of Seattle Green Building Program (www.seattle.gov/dpd/ GreenBuilding): Seattle is a visionary city in terms of promoting green building. Although its guides are written specifically for the unique climate of Washington, they're beautifully done and incredibly informative, no matter where you live.
- Scottsdale (Arizona) Green Building Program (www.scottsdaleaz. gov/greenbuilding): It comes as no surprise to find green building being discussed in the hot, dry climate of Arizona. The benefits of green building are even greater there. The drawings and checklists provided by the Scottsdale Green Building Program are a wonderful resource.
- RecycleWorks, San Mateo County, California (www.recycleworks. org): Located just south of San Francisco, San Mateo County is one of the most populated regions in the Bay Area. Its RecycleWorks program offers innovative programs and checklists to help people build green homes.

Picturing the Perfect Green Room



If you're starting on a journey, you need to know where you're going. In the following sections, I cover four common rooms (kitchen, bathroom, bedroom, and nursery) and show you how you can create the ideal green room — and home. The information shown in these diagrams is covered throughout the book, but here you can see an overview of what the perfect green room should look like — think of this section as a green road map.

The perfect green kitchen

On first glance, Figure 1-1 illustrates what looks like a typical kitchen, but a closer look reveals all the green opportunities that were capitalized on — opportunities you can capitalize on in your own kitchen.



Courtesy of GreenHomeGuide.com.

Fresh air is important throughout your home, but especially in the kitchen. Windows and skylights are the most energy-efficient way to vent cooking vapors from your kitchen. Vent your Energy Star–rated exhaust fan directly to the outside to remove smoke, gas, and odors (see Chapter 11).

Natural sunlight is free and offers the best quality of light you can find (see Chapters 11 and 13). Place the work and food preparation areas near windows and skylights so you won't need to use electric lighting, saving energy and money.

While you're cutting down on your lights, switch your bulbs to energy-saving compact fluorescent bulbs (see Chapter 11). Advancements in the bulbs now provide better color and light quality.

The appliances in your kitchen consume most of your home's energy. Replace old appliances with new, Energy Star–rated appliances (see Chapter 11). The money saved could pay for your new appliances in less than a year.

If your plumbing fixtures were installed before 1992, replace them with new low-flow fixtures (see Chapter 13). You'll get the same pressure with much

less water use. Fun options such as foot-pedal controls will reduce the amount of water you use in a simple way (see Chapter 13).

The perfect green bathroom

Figure 1-2 shows the ideal green bathroom.

Instead of vinyl flooring, buy natural linoleum (see Chapter 7). Made from sawdust and linseed oil, it's the healthy choice. Natural linoleum comes in a large selection of colors, and you can cut it into any pattern you desire.

Avoid cabinets using formaldehyde-based particle board. Select alternative materials such as bamboo, FSC-certified wood, and wheat straw panels (see Chapter 7).

Select a green countertop, such as recycled glass, salvaged stone, or paper resin materials (see Chapter 7). Wall tiles are available from recycled glass and ceramic sources (see Chapter 7).



Courtesy of GreenHomeGuide.com.

Without sufficient ventilation, the toxic substances in conventional caulking can have serious health impacts. Safer, green alternatives are now available (see Chapter 7).

Paint the walls with low- or zero-VOC paints (see Chapter 7). Open the window to allow fresh air into the bathroom.

Older toilets use as many as 5 gallons per flush. Replace old toilets with a dual-flush model (see Chapter 13). Consider a composting (waterless) toilet as the greenest choice (see Chapter 13).

Purchase nontoxic cleaning products, soaps, and lotions (see the "Green cleaning alternatives" sidebar in this chapter). Not only are they safer for you and your family, but they stop chemicals from washing down the drain and polluting the water supply.

The perfect green bedroom

Figure 1-3 shows the opportunities for greening your bedroom.



Figure 1-3: The perfect green bedroom.

Courtesy of GreenHomeGuide.com.

For many people, their bedroom doubles as a TV room, office, and reading room. Avoid sleeping problems by using your bedroom only for sleeping. Design the room specifically for that purpose with black-out curtains and operable windows for fresh air.

Insulate all the walls of the bedroom with formaldehyde-free insulation to block unwanted noise from disturbing you (see Chapters 11 and 12). Turn the thermostat down and use an extra blanket instead. A timed, programmable thermostat can warm up your room before you wake up (see Chapter 12).

Select a mattress and linens made of natural materials. You can find an incredible selection at stores like Gaiam (www.gaiam.com). Select nonvinyl carpeting (see Chapter 7) and low- or zero-VOC paints (see Chapters 3 and 7). Removing VOCs will help you sleep better.

Keep your electric clock away from your head. The electromagnetic field is known to disturb dream patterns.

The perfect green nursery

In Figure 1-4 you see how to make the perfect green nursery for your newborn baby.



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Green cleaning alternatives

Cleaning is often considered a healthy thing to do. After all, it feels kind of good and self-satisfying to remove all the inevitable dust, food crumbs, fallen hairs, and other gross remnants of daily life.

Ironically, people typically clean their homes with chemically intensive and potentially toxic cleaning materials. Did you ever wonder why you have to wear gloves (and sometimes even masks) to clean? The chemicals used to clean are adding to the already overloaded toxic soup in most indoor spaces.

The American Association of Poison Control Centers (www.aapcc.org) ranks household cleaners as the leading source for acute human exposure to toxic substances. In addition, these caustic cleaners, pesky pesticides, raucous removers, and other potent products with their toxic ingredients also damage our environment through their production, use, and disposal.

Fortunately, a number of commercially available healthy alternatives exist:

- Ecover (www.ecover.com): Established in 1980, Ecover is one of the global leaders in healthy cleaning products. Not only are the products healthier, but the company is incredibly dedicated to sustainable business. Their solar-powered factory features green building features such as passive solar and water-efficient methods.
- Seventh Generation (www.seventhgeneration.com): Named in deference to the Iroquois Great Law of Peace, "in our every deliberation we must consider the impact of our decisions on the next seven generations," Seventh Generation offers a full line of household cleaning products, including paper and baby products. Its Web site is an incredible resource for information on healthy living.

- Mrs. Meyers (www.mrsmeyers.com): With their striking graphics and packaging, Meyers's products are made with natural essential oils and are all biodegradable and phosphate-free.
- Method Home (www.methodhome.com): With their sensuous, almost sexual, bottles designed by Karim Rashid, Method Home has targeted its market quite differently. Selling on design and style, rather than simply on health, these gorgeous bottles are filled with all-natural ingredients.

Instead of purchasing new products, your kitchen offers a wide array of ingredients for naturally cleaning your home and office. Save some money and make batches of your own household cleaners. Eco-cleaning is easier than you may think. Most everything you need is already in your pantry. Basic products will tackle most of your cleaning and disinfecting needs, plus it will make your home smell fresh without the need for harsh perfumes or chemicals. Here are the basics you need:

- White vinegar: A natural disinfectant and stain remover, white vinegar also reduces mineral and lime deposits. Vinegar is a perfect substitute for ammonia-based cleaners. You can use white wine vinegar, but white distilled vinegar is cheaper. Don't use malt vinegar — unless you want your house to smell like a bar after a long night.
- Baking soda (also called bicarbonate of soda or sodium bicarbonate): Baking soda is the miracle cleaner. When mixed with water, it forms a paste that cuts through grease and dirt on almost any surface. In powder form, the abrasive texture can scrub out problem stains. Often vinegar and baking soda are mixed together for maximum cleaning strength.

(continued)

- Lemons: The citric acid in lemon juice makes it perfect for bleaching, disinfecting, deodorizing, or cutting grease.
- Olive oil: Olive oil is a wonderful alternative to furniture polish. Don't worry about using the extra-virgin type — the most basic, cheapest olive oil will do.

For general cleaning, try damp dusting; it ensures that dust isn't scattered around. For best results, soak your duster in two parts water, two parts vinegar, and two drops of lemon oil. Then wring out and store in a covered glass jar until you need it. **Remember:** Manufacturers can make almost any claim they want about their products. Buzz words like *biodegradable*, *all-natural*, *nontoxic*, *hypoallergenic*, and *fragrance-free* technically don't have to mean anything. Building health expert Debra Lynn Dadd (www.dldl23.com) writes, "In general, it is best to avoid using products that say 'Danger,' 'Poison,' or 'Warning,' on the label." Dadd continues, "I do all of my cleaning with a squirt bottle of 50-50 distilled white vinegar and water, liquid soap, and baking soda."

A newborn baby has not yet developed resistance to chemicals. Because babies can spend up to 18 hours a day in their nurseries, the finishes you select are even more important for their health.

Try to create a nontoxic nursery using zero-VOC paints (see Chapter 7). Pregnant women should avoid painting altogether — have someone else do it. Paint at least one month before the baby is due, and open the window to flush the room with fresh air.



A space heater will help the paint cure faster.

Avoid wall-to-wall carpeting, because it traps dust mites and allergens (see Chapter 7). A natural linoleum floor is the best choice, but wood works just as well (see Chapter 7). And be sure to clean the floor well.

In order to block and control the sunlight, use wooden shutters. Leave them unpainted, or use zero-VOC paints or stains (see Chapter 7). Aluminum miniblinds work just as well as wood and don't require paint.

Select naturally finished wood furniture with pure, organic cotton and wool linens (see Chapters 7 and 18). Avoid plastic toys; most are made in China and can contain traces of lead and other potent toxins. Cloth and wood toys are a better choice.

Clean your green nursery with natural or nontoxic cleaning products. You can find some homemade cleaners on the Cheat Sheet in the front of the book, and nontoxic cleaners in the "Green cleaning alternatives" sidebar in this chapter.

Part I: The Need for Green _____