

{ green home } 
healthy homes for a healthy environment

hiring a pro





green design

What is a Green Home?

It's an approach to home design and construction with the goal of not only making your house look better, but work better—for both you and the environment. Want a healthier home? Lower utility bills? Reduced maintenance? A cleaner planet? A green approach helps you realize a range of far-reaching benefits from a single smart design. With careful planning, you can create a home that combines beauty, efficiency, comfort and convenience with health and conservation.

why

Why Consider a Green Design?

SAVE MONEY

High-performance designs that save energy and water can reduce the day-to-day costs of living in your home. Often, the initial expense of professional design services can be quickly recouped with a multitude of benefits. For example, a skilled designer can help you better utilize space, sometimes reducing or even eliminating the need—and expense—of more square footage.

MAKE A HEALTHIER HOME

You can protect and enhance indoor air quality by selecting green building materials and finishes, and by using proper construction, ventilation and weatherproofing techniques. Health-conscious professionals can help you safely identify, anticipate and remedy any hazards you may encounter during your project.

REDUCE ECOLOGICAL IMPACT

Resource-efficient materials and designs lessen the depletion of our natural environment. A green designer or contractor can help you identify designs and products that will help your home perform better ecologically, as well as economically.

hiring a pro

A home is a significant investment costing hundreds of thousands of dollars. It makes sense to carefully consider not only your design, but the professionals who will execute it. In fact, who you hire plays a key role in the success of your project—especially with a green home.

Your architect, interior designer, or contractor may require special skills and experience, depending on the specific goals of your project. The ideal green professional offers direct experience with a project scope similar to the one you're considering, plus plenty of knowledge and enthusiasm for green concepts and practices. To increase the likelihood of your project's success, learn to ask the right questions, and research the abilities and approach of the professionals you're considering.

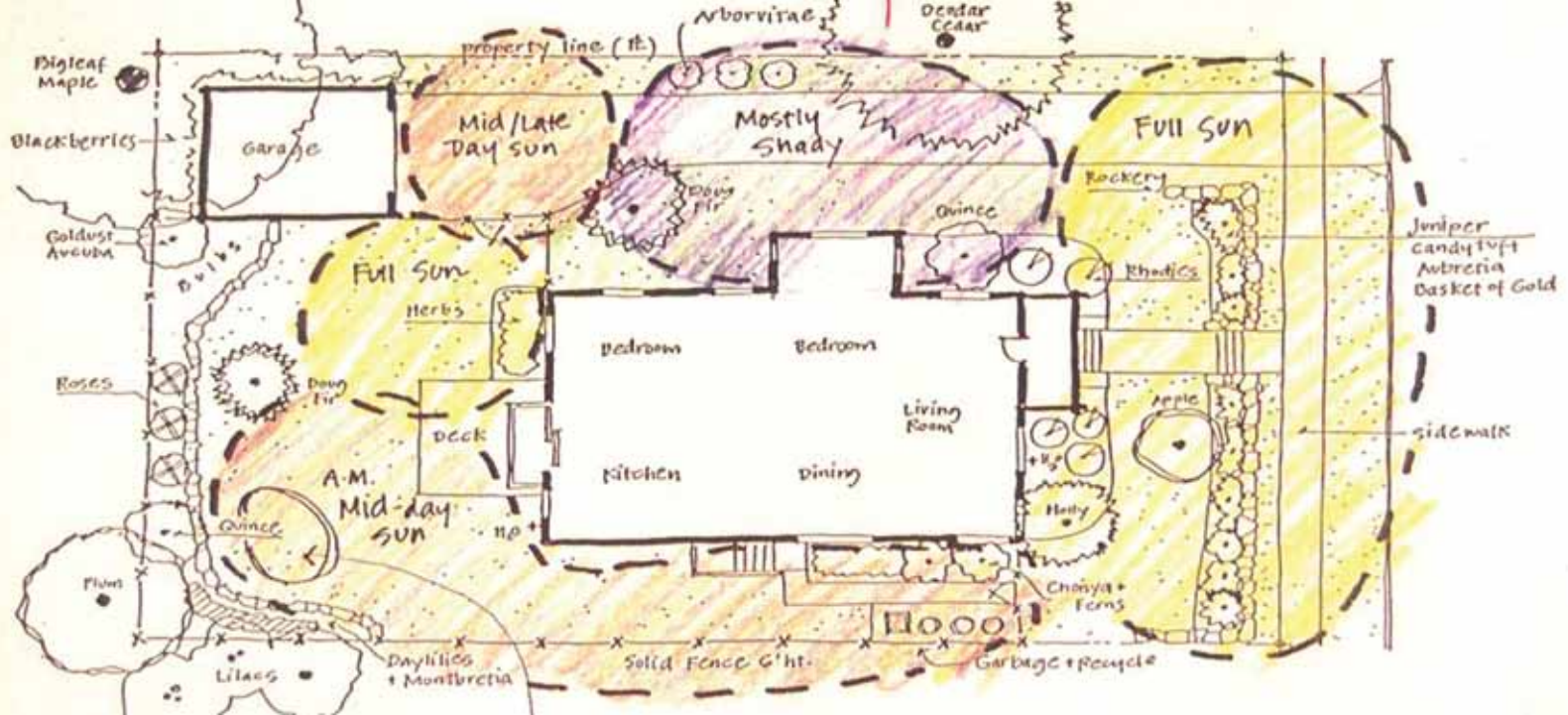
Cover sketch and right page model photo: DeForest Architects.



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rethink design

Looking for help on your specific project? Look to the Seattle Green Home guides. You'll find them online at www.seattle.gov/greenbuilding.



Green design and construction requires a new approach to the home improvement and homebuilding processes, with more up-front planning to take advantage of opportunities that might otherwise be missed with a conventional approach. This includes expanding your list of objectives as well as the way you compare the value of products and services—taking wide-angle and long-term views of decisions. It also means being willing to invest time and energy to find solutions that best fit your needs. Finally, a green project requires that health and safety become priorities. This advance planning will pay large dividends in terms of long-term satisfaction with your project and cost containment.

Be aware that your relationship with design and building professionals will differ in green projects, as well. Some designers and contractors are accustomed to relatively limited interaction with the client and others involved in the design and construction process. In order to capture every opportunity, the green design approach encourages more frequent conversation between the homeowner, architect, contractor, and occasionally specialists in renewable energy, human health, or engineering. Professionals involved in green projects must be open and willing to spend time on these conversations and incorporate new ideas. This guide is intended to help you create a more integrated design and construction process for your project, by helping you understand these important connection points.

Collaboration is key. If you're hiring out the design and construction, as most homeowners do, the ideal green project requires:

- a committed, educated and involved homeowner,
- design professionals with the skills and willingness to explore and capture your vision in a design,
- contractors with the experience and abilities to make that design a reality, and
- the ability for all three to work together as a team.

Once these elements are in place, you'll be well on your way to a successful green home!



Expand Your Definition of Cost

Focus on long-term savings, ease of maintenance and conservation. Initial price only gives a peephole view of the true cost of a product or design. A higher purchase price can mean a better deal in the long run. For example, you can actually reduce the cost of living in your home by choosing resource-efficient fixtures (lowering monthly utility bills) and durable materials (requiring less frequent replacement). A low purchase price may simply mean a good deal—or it may signify a lack of quality or durability, or that some environmental, health, or social costs are not reflected on the price tag. A “lifecycle” perspective on design, material and product choices will maximize your investment over time.

The cost of design and construction services can also be misleading if you only consider initial price. The collaborative nature of the green design approach can require more up-front time (which usually translates into billable hours). But this early planning stage can reap tremendous benefits later: design solutions that better meet your needs or reduce the project scope, fewer construction materials and expenses, and features that save energy, water, or maintenance.

Green building incentives also help reduce the up-front cost, and payback time, of green investments. Incentives are available at the federal, state and local level (including Seattle City Light and Seattle Public Utilities), and are as diverse as:

- federal income tax credits for home energy improvements
- state sales tax waivers for renewable energy systems
- cash rebates from utilities for high-efficiency appliances
- utility incentives for onsite renewable energy production, or for installing stormwater management systems such as rain gardens
- expedited and facilitated permitting for projects meeting green building standards

For a list of incentives that potentially apply to your project, visit www.seattle.gov/greenbuilding (click on *Resources, Incentives & Assistance*).

A project focused on efficiency can help pay for itself. Simply installing high-efficiency WaterSense labeled toilets can reduce water and sewer bills by 20%.





*Investing in conservation
yields dividends over time.*

*Energy- and water-wise
designs provide insurance*

*against rising energy and
water costs.*



Decide What You Want

Just thinking about a home project can elicit equal parts excitement and terror. Reduce the terror factor by allowing sufficient planning time. One year is usually ideal for preparing for a major project, although not always possible. Regardless of your timeline, the first step in the planning process involves defining your priorities and then considering all options carefully. For help in determining your project goals, refer to the following Seattle Green Home guides, available to you at no cost:

- Green Home Buyer's Guide
- Do-It-Yourself Home Energy Audit
- Kitchen
- Bath & Laundry
- Roofing
- Painting
- Lighting
- Managing Rainwater
- Landscape Materials
- Salvage & Reuse

To read or download, go to www.seattle.gov/greenbuilding and under *Tools*, click on *Green Home Guides*.

Determine Project Scope

As a general rule, extensive projects translate into expensive projects—both economically and ecologically. When pursuing new construction, a smaller home uses fewer resources both upfront and over time. When remodeling, if you stick with existing walls, cabinetry, plumbing and electrical layouts, you'll spend less. You'll also use fewer resources, and create less waste. Therefore, it's critical that you discuss your project's scope with your architect or interior designer. Make scope limitation a priority, and identify strategies for accomplishing an efficient use of space with minimal structural modification. Beyond the environmental and financial benefits, this approach also helps minimize disruption caused by a remodel—an especially pertinent concern when you're trying to live in a space under construction.

Photo top left: b9 Architects. Photo top right: DeForest Architects.

design + construction process

The first step in choosing professionals for your project? Learning how the process works. Design, engineering and construction professionals all have various associations that help explain their professions and certifications to identify qualified individuals. The American Institute of Architects, the American Society of Interior Designers, the American Society of Landscape Architects, and the various engineering societies all maintain information on their association websites describing their professions.

Knowing the steps in the design and construction process is a prerequisite to understanding how to best manage that process as a homeowner client. The green design process recognizes that although the steps are sequential, considerations must be made throughout the process that reference previous or subsequent steps in order to maximize opportunities and avoid pitfalls.

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| preliminary research | This is the dreaming and questioning stage of the project, and the stage at which you perform three tasks: (a) learning about green design and construction; (b) establishing and articulating your priorities for the project; and (c) conducting a thorough assessment of the current conditions of the site and/or home. See page 5 of this guide for more information. |
| professional selection | Selecting professionals with the skills to execute your design priorities is key to a successful project. This guide is intended to help you navigate the process of hiring the best professional for your project. |
| pre-design | During pre-design you and your design professional gather together all of the essential information on your project, including confirmation of your priorities, determination of the project's scope, and identification of opportunities and challenges. Existing conditions should be further studied and documented in diagrams, narrative and photographic form. Pre-design should result in a draft project scope, budget, and timeline. |
| permit pre-application | Seattle Department of Planning and Development outlines the permitting process on its website at www.seattle.gov/dpd/permits (click on <i>Process Overview</i>). Depending on the complexity of your project, the review process is more or less involved. Determining the process your project will require helps determine the project schedule. |
| conceptual design | In the concept design phase the designer analyzes the contextual information of the site or home and couples that information with the project objectives to create alternative schemes. These alternatives are presented to the client for dialogue and refinement. |
| schematic design | Based on your feedback during conceptual design, the designer will further explore one or more alternatives with the objective of finalizing a direction. It is important to involve your engineering professionals by this phase so that their work can be fully integrated into decisions regarding building form and configuration. Site plans, floor plans and elevations, and 3-D sketches or models help guide the process and can be used in consultation with your contractor to identify preliminary budget information. |
| design development | During design development the designer refines the schematic design, and digs into the task of integrating all aspects of the project, including site planning, architecture, landscape, and engineering, as appropriate. This phase should conclude with a project budget, floor and landscape plans, elevation and perspective drawings, and potentially a scale model of the project. |
| permitting + construction documents | Construction documents represent the project's final design, and are the marching orders for the contractor. Technical drawings, notes and specifications are provided at a level of detail to allow the contractor to complete the project. The documents should include a detailed description of the project's green design objectives. Your design professional will create a "permit set," a set of drawings submitted to the Department of Planning and Development for approval. |
| construction | The detailed plans become a reality during the construction phase. The design should anticipate potential challenges during the design build process, and provide ample guidance in the construction documents to help the contractor navigate those challenges. The construction process is a series of steps dictated by the scope of the project. The table on pages 15 and 16 of this guide lists the general sequence of construction activities in chronological order. |
| occupancy | Often, occupancy is seen as the end of the design process. In reality, this is where the "lessons learned" stage kicks in and is the opportunity to fine-tune the operation of any systems. Your agreement with the contractor should include a designated warranty period during which fixes can be made. Is the design performing as intended? Are energy and water bills in line with predictions? Is occupant health and comfort matching expectations? This information should be fed back to the design professional to help improve the design process. |
| maintenance | Certain green building certification programs require the provision of a homeowner's operations and maintenance binder to help ensure the home's features are properly cared for. The operations and maintenance phase of a building's life cycle should be taken into account and discussed during the early design phase of the project to ensure that maintenance objectives inform design decisions. |

do your homework

During your project's preparatory phase, you'll want to research the green building approaches you're considering applying, and do a thorough examination of the existing conditions of your home or building site. The home or site will invariably offer both opportunities to capture and challenges to address.

Research helps you ask the right questions of retailers, your designer and/or contractor—or avoid costly mistakes if you are doing some of the work yourself. Start early to find design ideas and businesses that carry the green products you like. Keep a file of contact names and businesses, as well as magazine and newspaper clippings, so you can share this information with your design professional or contractor. Knowing enough to discuss the pros and cons of a design strategy or material will increase your participation in the design, and enhance your ownership in both the process and final product.

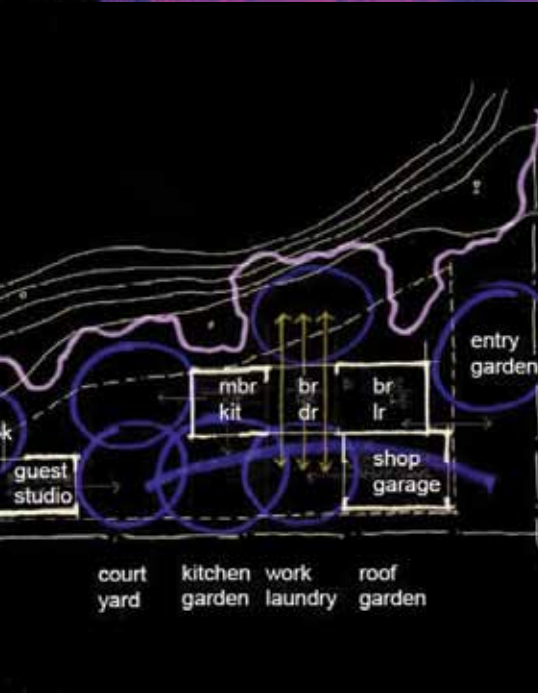
Professional Assessments

An important first step in a homebuilding or remodel project is to evaluate the current conditions of the site or home. Your design professional should conduct a thorough assessment of existing conditions. However, several assessment categories are complex enough to be worthy of considering hiring a specialist for a more in-depth assessment.

Home Energy Audits. A home energy audit is a systematic evaluation of a home's current state with respect to energy use, including air leaks, insulation levels, and heating and ventilation system efficiency. Home energy audits are usually performed by Home Performance Contractors. By employing a "building science" approach, Home Performance Contractors provide analysis, testing and services related to increasing a home's energy efficiency and durability. Problem spots are identified, and a report is issued to the homeowner, usually with suggested actions and estimated costs for improvements. Check with Seattle City Light to determine whether reduced-rate assessments are available. Income-qualified residents may be eligible for a free home energy audit through the Seattle Office of Housing. For more on home energy audits, tips on selecting a Home Performance Contractor, and City of Seattle incentives, visit www.seattle.gov/light/conserve/hea.

Home Health Assessments. Home health assessments take a variety of forms. The most recognized and standardized assessment is the walk-through evaluation by American Lung Association of Washington (ALAW). "Master Home Environmentalist" (MHE) volunteers using ALAW's Home Environmental Assessment List conduct a systematic review of a home's current state, pinpointing existing hazards. Seattle-area MHEs provide no-cost assessments on an as-available basis to homeowners seeking to identify and remedy indoor air quality issues in their homes. The MHE then helps the homeowner develop a prioritized list of actions to improve conditions. For more about the MHE and home health assessment programs, visit www.lungusa.org/associations/states/washington and click on *MHE*.

Asbestos Testing and Abatement. Unfortunately, asbestos is a common presence in existing homes. For tips on what to look for to determine whether your home may have asbestos-containing materials, visit the Puget Sound Clean Air Agency at www.pscleanair.org (click on *Regulated Activities*). If asbestos-containing materials are to be disturbed or removed, a certified abatement firm may be required.



Thermal images, top left: Fluke Corporation. Diagram, middle left and photo, bottom left: DeForest Architects.

Site Assessments. Your design professional should conduct a thorough assessment of the site, coupled with your priorities, to inform his or her design. However, more detailed assessments of certain site elements may be necessary. Landscape architects, soils engineers, solar experts or green building professionals may be useful in gathering detailed information such as site shading, prevailing winds and soil conditions. Certified arborists can evaluate trees for both safety and health, and for ensuring that trees do not block solar access they can also advise on tree protection during construction, urban wood salvage opportunities, and responsible wood waste recycling.

DIY Assessments

Energy and Health Evaluations. If you're unwilling or unable to spend the money on a professional energy assessment, the Seattle Green Home *Do-It-Yourself Home Energy Audit* guide is available for those interested in conducting their own audit. See *Resources* on page 20 for links to all of the Seattle Green Home guides. Similarly, it's possible to conduct a DIY home health assessment. The American Lung Association of Washington provides a do-it-yourself Home Environmental Assessment List in multiple languages. Visit www.lungusa.org and search for *Home Health Assessment* for more information.

Occupant Behavior Assessment. Occupant behavior is a major determinant of energy and water use. Analyze your energy and water use, as well as your waste generation, using the Seattle Home Resource Profile at www.seattle.gov/conserv/homeprofile. The Profile is available to all Seattle City Light and Seattle Public Utilities residential customers. Occupant activities also play a major role in maintaining a healthy indoor environment. Design approaches and technologies can help encourage conservation and health. For example, a convenient place to doff and store shoes near the front door will encourage a shoe-free household—a key healthy home strategy. But if you know you're not likely to become a shoe-free household, other design strategies (e.g., permanent walk-off mats at entryways) can help. Another example: occupancy sensors on lights and fans can help compensate for occupants unwilling to flip a switch when they leave a room. Being conscious of your resource consumption and healthy home behaviors can help your design professional suggest design approaches and technologies to help.

Good Neighbor Survey. Construction projects can be noisy and disruptive, and even exterior painting can affect neighbors. Keep the peace in your neighborhood by making sure your neighbors are up-to-date on your plans, especially any elements that may impact them during or after construction. Whether it's an addition that affects their view or access to sunlight in the yard, or lost privacy due to workers that may be in your back or side yards, discuss these issues with your neighbors well in advance. Find tips from the National Association of Home Builders for a neighbor-friendly project in the news release, "Homeowner Etiquette" at www.nahb.org (click on *Housing Topics*, then *Remodeling*, then *Thinking About Remodeling*).





*An evaluation of home sales
in Seattle between 2007
and 2009 showed that
environmentally certified
homes sell more quickly, and
for a premium, compared to
non-certified homes.*



green building certifications

A green project can baffle homeowners, architects and builders alike. With so many elements to consider, how to be sure you're not missing opportunities? Luckily, there are tools to help. Green building rating systems (also referred to as certification systems) provide a structure by which to both plan a green building project and verify its execution. Rating systems allow for a designer's creativity while simplifying the green design and construction process by providing practical design strategies, as well as materials and product suggestions. Rating systems also offer specific strategies to the contractor to protect health, reduce waste, and safeguard water quality and the building site.

A variety of rating systems are available, both locally and nationally. Some apply to both remodels and new construction, and while some cover the major aspects of green building, others focus on a narrower set of evaluative parameters (e.g., energy use and health). The table on the following page lists the commonly used systems. By offering a menu of options, rating systems provide flexibility to fit most any project.

Many green rating systems identify dozens of jobsite best practices related to waste reduction and recycling, healthy home construction, and water quality protection. In addition, your design professional can write requirements for such activities into the specifications for your project, making green practices part of the legal documentation for construction.

*Photo of rainwater cistern, top left: Martha Rose Construction.
Photo top right: JAS Design Build (photo © John Granen)*

rating systems

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| BUILT GREEN™ | <p>A program of the Master Builders Association of King and Snohomish Counties, BUILT GREEN covers all aspects of green building, including site and water quality protection, energy and water efficiency, healthy indoor environments, environmentally preferable products and materials, and waste minimization and recycling. Homes applying for certification can earn points for meeting credit requirements, culminating in an overall rating for the project.</p> <p>BUILT GREEN offers certifications for both new homes and remodels. Learn more at www.builtgreen.net.</p> |
| LEED® for Homes | <p>The US Green Building Council's LEED for Homes rating system covers the classic green building topics: access to transportation and amenities, site and stormwater issues, energy and water efficiency, green materials and products, and indoor environmental quality. It is a menu-based system, with a series of credits, worth a series of points, which the project can elect to pursue. The more points earned, the higher the rating for the project.</p> <p>LEED for Homes is only available for new construction homes. Learn more at www.usgbc.org.</p> |
| Living Building Challenge™ | <p>The International Living Future Institute's Living Building Challenge is similar to BUILT GREEN and LEED for Homes in that it covers multiple green building topics with a single certification. However, it departs from other rating systems by requiring that a building prove its environmental claims by submitting for certification after one full year of occupancy and by presenting the actual performance data on the building, rather than modeled or predicted performance. In addition, the Living Building Challenge sets a very high bar for performance (e.g., the building must produce annually as much energy as it consumes), and all elements of the standard must be fulfilled to earn the Living Building designation.</p> <p>Both remodels and new construction homes are eligible for Living Building certification. Learn more at www.ilbi.org/lbc.</p> |
| Net Zero Energy Building CertificationSM | <p>Net Zero Energy Certification utilizes a subset of the requirements in the Living Building Challenge to certify a building as energy self-sufficient. The Net Zero Energy standard requires that, on an annual basis, onsite renewable energy systems produce as much energy as the building consumes. In addition, the building must meet other Living Building Challenge performance benchmarks, such as being sited on previously developed land and employ design elements intended for education and inspiration.</p> <p>Net Zero Energy Building Certification applies to both new construction and existing buildings. Learn more at www.ilbi.org/lbc/netzero.</p> |
| ENERGY STAR® Homes | <p>ENERGY STAR Homes, developed by the US Environmental Protection Agency and the Department of Energy, is a labeling program focused on energy efficiency. ENERGY STAR Homes feature a variety of best-practice energy and durability enhancements, including high efficiency space heating, water heating and lighting systems, careful construction practices to minimize air leakage, proper ventilation, high performance windows and doors, and performance tested systems. An optional indoor air quality package can also be applied to ENERGY STAR Homes.</p> <p>The ENERGY STAR Home label is only available to new construction homes. Learn more at www.northwestenergystar.com.</p> |
| WaterSense® | <p>WaterSense, also developed by the US EPA, includes both product and whole home labeling programs focused on water efficiency. The WaterSense New Home Certification confers the WaterSense label on homes that follow water-conserving procedures for indoor fixtures and plumbing layouts, landscape design, and irrigation. Provision of a homeowner's manual is also required for certification.</p> <p>WaterSense is only available for new construction homes. Learn more at www.epa.gov/WaterSense (click on <i>New Homes</i>).</p> |
| Passive House | <p>Originating in Europe, Passive House (Passivhaus) is a stringent energy efficiency standard that utilizes super-insulation and heat recovery ventilation to dramatically reduce the space heating needs of a home—often by 90% or more. Passive House standards require detailed attention to air sealing and insulation techniques, and super-efficient windows and doors.</p> <p>Passive House is normally applied to new construction homes but can be used for major remodels. To learn more about Passive House, visit the Passive House Northwest website at www.phnw.org.</p> |

Design/build companies combine architectural and construction functions in one firm, helping coordinate the entire project. Each design/build firm should be evaluated on its merits; use the suggestions in both the design professional and contractor selection sections of this guide to help.



design professionals

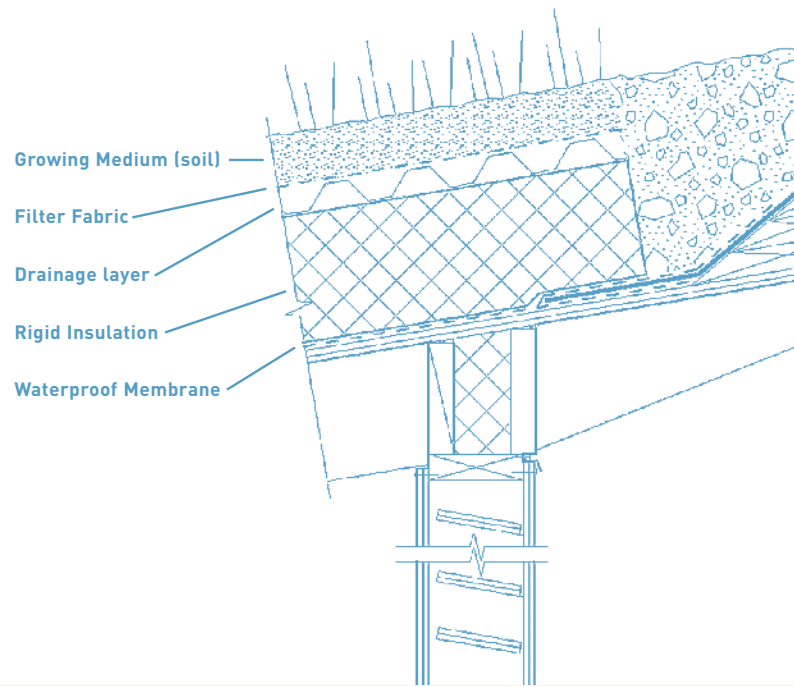
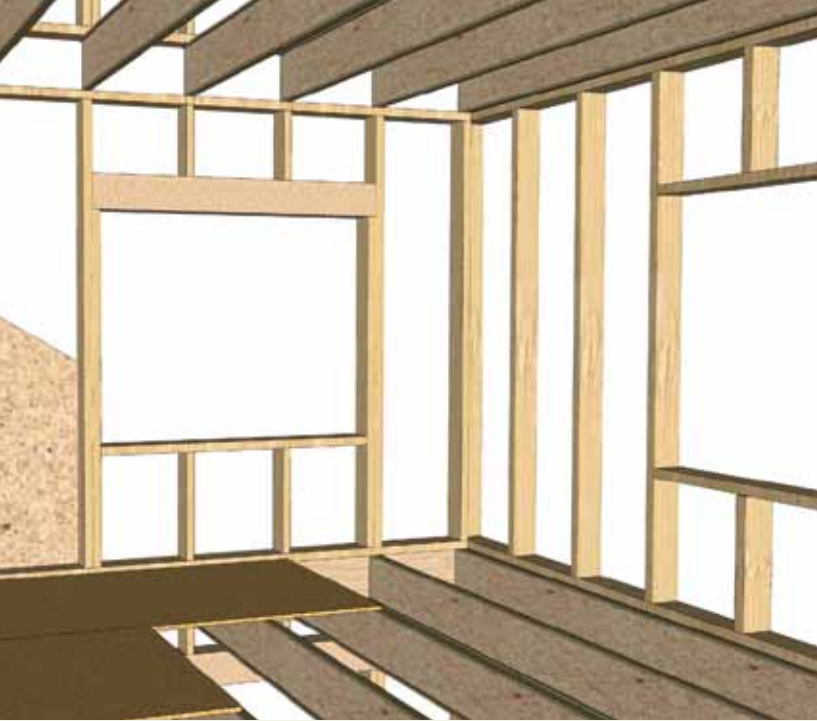
Architects and interior designers receive specialized training that gives them insight into building and space requirements, while landscape architects gain similar insights as they relate to the outdoor environment. Because of this, hiring a design professional can quickly pay for itself by avoiding costly construction mistakes or poorly conceived designs that won't function well over time.

First, find a pool of candidates. Start your search by surveying friends, family and coworkers with recent experience. Visit websites of local architects and designers, then narrow the field of potential designers to those who meet your personal criteria. Green design is a quickly evolving field. Not all designers are well versed in its various elements. One resource for finding local green architects, interior designers and contractors is the Northwest EcoBuilding Guild, an educational nonprofit promoting environmentally responsible building. To find a directory of EcoBuilding Guild members, go to www.ecobuilding.org and click on *Green Pages*. Keep in mind that inclusion in the Green Pages does not assure any level of expertise in green building. Verify for yourself if the professionals you're considering meet your requirements.

Once you tap into the local design community, you'll find a variety of firms with green reputations. Upon closer examination, you'll discover that some companies pick a particular specialty within the green building arena. Other firms take a more general approach, becoming well versed in multiple areas of green focus. The following table describes some of these specialties.




green design specialties

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| small home design | Many are questioning if bigger is truly better when it comes to housing. Smaller is inherently greener, in that it means fewer construction materials, and less space to heat and maintain. Money not spent on additional square footage can then be used for green upgrades and superior craftsmanship. If this is one of your goals, look for a designer experienced in making the most of smaller spaces. |
| healthy homes | Increased incidence of childhood asthma and allergies emphasizes the need for healthy indoor environments. Airtight houses save energy, but without proper ventilation and careful avoidance of toxic and irritating building materials, they can compromise indoor air quality. Designers well versed in healthy home practices can create efficient homes that also protect occupant health. The Healthy Home Builder training can help design and construction professionals understand these complex interactions. For information on the Healthy Home Builder training, visit www.ecobuilding.org (click on <i>Classes and Events</i> , then <i>Ongoing Classes and Events</i> .) |
| energy-efficient & solar design | Concerns about rising energy costs and global warming focus attention on home energy efficiency. Professionals skilled in energy efficient design can help you create a home less susceptible to volatility in energy prices. Some designers boast a sub-specialty in passive solar design. Passive solar design uses strategic window placement, shading, building massing and other strategies to take advantage of free energy from the sun and reduce your home's reliance on electricity and fossil fuel heat sources. |
| natural landscaping | Conventional landscapes use lots of water, produce large amounts of yard waste, and overuse chemicals that are bad for the environment and our families' health. A natural landscaping approach can save money and time, while protecting the health of people and the environment. A growing number of landscape architects and landscape companies are using natural landscaping practices. To learn more about natural lawn and garden care, go to www.seattle.gov/util and click on <i>Food & Yard</i> . |
| barrier-free design | Often called Universal Design, this field focuses on creating spaces that welcome users of all ages, sizes and abilities. It provides an additional green benefit of reducing the need for costly home modifications as occupant abilities change. Examples of Universal Design in action: lever handles, countertops of varying heights, adjustable showerheads and curb-free shower entries. The key is to elegantly integrate these elements. Professionals experienced in designing for those with limited mobility will likely be best at incorporating Universal Design seamlessly into your project. Go to www.aarp.org/home-garden/home-improvement for more on Universal Design. |
| salvaged materials | Salvaged materials offer one of the greenest material choices, since they extend the life of products already produced. Be aware however, that integrating salvaged items can turn the design process upside down. Found materials very often dictate a project's design—rather than the more customary process of choosing a design and then manipulating materials to fit. Some designers are more adept at this approach to design than others. For more information, refer to the Seattle Green Home <i>Salvage & Reuse</i> guide. |
| natural building | This green building sub-specialty prioritizes traditional and indigenous building practices. Examples of natural building techniques include straw bale, rammed earth, and cob (a mix of sand, clay and straw). Obtaining permits for these projects often requires careful interaction with permitting agencies. Designers experienced with natural building techniques can evaluate their applicability to your project. Other natural building techniques, such as plaster wall finishes, are more amenable to remodeling projects. |
| green building consultants | Depending on the level of green building expertise held by your architect or designer, it may be advisable to hire a separate green building consultant. Green building consultants often specialize in one or more green building rating systems (see page 7), and are generalists in many of the specialty fields listed in this table. Depending on qualifications, they may also serve as third-party green building certification verifiers on projects. Verification is required from programs like LEED and BUILT GREEN to ensure the building truly has the features represented by credits claimed in the system. |



green engineering specialties

Depending on a project's scope, various types of engineering expertise may be required to supplement the skills of your design professional. The following table lists some green concepts to consider when selecting an engineering professional for your green project.

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| <p>mechanical</p>  | <p>Projects with ambitious energy efficiency objectives or complex solar or ventilation strategies may require mechanical engineering expertise to develop a well functioning design. For example, a home pursuing Passive House certification or aiming for net zero energy use may require energy calculations to determine the size of the home's renewable energy system. Green building techniques such as natural ventilation, heat recovery ventilation, hydronic heating systems, solar thermal hot water, advanced heat pump technologies, and high-efficiency air filtration may be unfamiliar to typical HVAC contractors, plumbers and engineers. Look for mechanical firms that view the house as a system, recognizing the interaction between energy efficiency, indoor air quality, and moisture management and durability.</p> |
| <p>structural</p>  | <p>It is the structural engineer's stamp on a permit set of drawings that shows that the architect's design meets building code criteria for load, shear, and other physical stresses. Certain green building techniques, like Advanced Framing (see the Seattle <i>Client Assistance Memo</i> #341 at www.seattle.gov/dpd/cams), call for changes to conventional structural approaches to building. While advanced framing is well established in the building code, other approaches (e.g., using salvaged materials for structural purposes; or using pin foundations) are less clear or unspecified. An engineering firm with experience in the building approach you're considering will help reduce the likelihood of challenges during the permitting phase.</p> |
| <p>civil and soils</p>  | <p>For projects involving low impact development strategies, such as rain gardens or porous concrete, civil engineering expertise may be in order. Some civil engineering and landscape architecture firms have built a reputation for keeping up to date on best practices for "green infrastructure" approaches. Examination of a site's soils and hydrology is needed to determine the optimal strategy for managing stormwater onsite. Learn more about residential scale green stormwater infrastructure techniques by reading the Seattle Green Home <i>Managing Rainwater</i> guide. Geotechnical surveys may also be needed when employing innovative foundation techniques, such as pin foundations.</p> |

Top left, image of advanced framing: David Vandervort Architects. Top right diagram of green roof: Robert Harrison Architects.

selecting a design professional

When evaluating your design candidates, state your green goals and priorities up front, then gauge reactions. Your ideas should generate a positive, if not enthusiastic, response. Of course, realism counts, too, but the design professional should take your concepts seriously, and show an eagerness to help execute them. Hesitation or doubt on a candidate's part indicates that your priorities are in conflict—which ultimately could result in a rocky working relationship.

Evaluate Education and Experience

Schooling, and more importantly, direct green design experience is key to identifying a designer that can meet your needs. As you interview prospective designers, consider the following:

- **Training.** Ask about specific green building training (see page 10 for examples of specialties, or use the priorities you've identified for your project), including continuing education through design organizations.
- **Certifications and Accreditations.** A variety of green building certifications exist (see the *Resources* at the end of this guide), many of which offer exams and certifications to signify proficiency in various knowledge areas. These include LEED professional accreditation, and a variety of specific topic area certifications (e.g., Certified Aging in Place Specialists) and general green building certifications (e.g., Sustainable Building Advisor Certification).
- **Research.** Green building is a rapidly evolving field. Look for green design books, product information, or sample materials in the office. Inquire about subscriptions to green design journals or online environmental design and construction resources. Request a tour of the designer's green materials in his or her sample library. The designer should be able to produce multiple examples of low-toxic, recycled-content, locally produced or otherwise green products.
- **Applied Knowledge.** Look for direct experience in the green building areas most important to you. Can the candidate identify past projects with clients who had priorities similar to your own? Ask for—and check up on—references from these projects.
- **Contract Documents.** Ask to see *specifications*, or *specs*, from previous jobs that incorporate green principles. Specifications are a legal contract with the builder that spells out the marching orders for everyone involved in building or remodeling a house, down to which paint to use and how it is applied. Architects usually have general specifications that they customize for each job. Examples of green specs include construction recycling and reuse, indoor air quality assurance during construction, requirements that the owner must personally approve any materials substitutions, and specifications for green materials and products.

Identify Green Business Practices

The most experienced green design professionals employ green principles in their office too. Look for green building materials, and energy- and water-efficiency features. Office practices should include recycling, double-sided copying, and reusable kitchenware. An added bonus is encouragement of alternative transportation (such as showers and storage for bicycle commuters or reimbursement for bus-riding employees).

Respect the Social Element

The interpersonal element is frequently underestimated, to disastrous results. Do you like the design professional as a person? Do you communicate well, and feel heard when you voice concerns or ideas? This doesn't mean you have to be best friends; in fact maintaining a businesslike relationship is advisable. But you should sense a mutual respect.



Interview at least three professionals, check references and visit completed projects. Take notes when interviewing prospective design professionals. This will help you compare skills and services and make an informed decision.





contractors

A contractor takes your design and turns it into reality. General contractors oversee the overall construction process for a project, and can have crews of varying size and abilities to carry out the work. To do business in Washington State, a contractor must be licensed, bonded, and insured. Realize however, that there are no proficiency exams for general contractor licensure in our state. Therefore, it's even more important to carefully review and select the right contractor for your project.

Where needed, the general contractors will hire subcontractors, or subs. These tradespersons specialize in the various tasks needed to complete a homebuilding or home improvement project. Framing, plumbing, electrical, drywall and painting are typical subcontracted jobs.

Green construction requires the right experienced general contractor and subs for your job. As with design professionals and engineers, contractors vary dramatically in their skills and experience around greener approaches to their trades.

Like locating a design professional, begin your contractor search by identifying prospective candidates. You can certainly take the friends-, family- and coworkers-referral route here, too. Also consider design/build firms that provide both design and construction services.

If you're working with a design professional, ask for a shortlist of preferred contractors. This can make the contractor search process much easier, especially if your project is similar to others the designer has completed. The more experience your design professional possesses with green design, the more likely their preferred contractors also have experience with green construction practices. Regardless of such a referral, it's always wise to evaluate contractors on their own merits.

In your quest for a qualified green contractor, you can also take advantage of two local resources. The first is the BUILT GREEN member list at www.builtgreen.net. Another option is the Northwest EcoBuilding Guild member publication, the *Green Pages*: www.ecobuilding.org. Note that neither BUILT GREEN nor the EcoBuilding Guild require a proficiency test to become a member; however, program membership indicates some level of green building interest.





general contractor specialties

construction recycling & reuse



Construction can generate tremendous amounts of waste. Contractors can reduce waste through salvage and reuse, and by maximizing recycling, to keep useful materials out of the landfill. Ask your candidate contractors for recycling rates on previous projects, whether those projects used source-separated (materials separated on site and brought to different recycling centers) or commingled (brought to a single recycling center for later separation) recycling. While commingled recycling is less work on the front end, source-separation results in higher recycling rates once at the recycling facility. Also ask whether the contractor has earned points in BUILT GREEN or LEED for Homes related to construction waste prevention and recycling. For more on building salvage and deconstruction, refer to the Seattle Green Home *Salvage & Reuse* guide. For more on recycling construction and demolition waste, including a Construction & Recycling Directory, refer to the King County Construction & Demolition Recycling webpage at: <http://your.kingcounty.gov/solidwaste/greenbuilding/construction-demolition.asp>.

healthy home construction



Any new construction project can pose various hazards; remodeling projects pose special hazards—from lead paint dust to asbestos exposure. In fact, home improvement contractors must now be “Lead Safe Certified,” according to EPA regulations. (Go to www.epa.gov/lead for resources on reducing lead exposure and to learn about contractor certification.) Special management procedures are required for asbestos containing materials (visit www.pscleanair.org and click on *Regulated Activities* for more information). Minimize overall construction hazards with special precautions, and ensure that areas under construction remain contained and separated from occupied spaces. Prevent future problems by keeping materials dry and protected prior to installation. Also choose construction materials such as adhesives, glues, and finishes that affect air quality the least. Look for contractors who have completed the Healthy Home Training for Building Professionals, a seven-week course sponsored by BUILT GREEN, the Northwest EcoBuilding Guild, and the American Lung Association.

water-quality protection



Projects involving a home’s exterior or grounds can negatively affect water quality during construction by allowing silt and contaminants to wash into our urban creeks, lakes, and Puget Sound. Seattle maintains strict code requirements for protecting water quality during construction; you and your contractor can learn more by visiting www.seattle.gov/dpd/Codes/StormwaterCode. Other strategies for protecting water quality include proper handling of paints and finishes, using nontoxic concrete form-release compounds, biodiesel (a plant-based alternative to petroleum diesel) in earth-moving equipment and diesel trucks, and substituting hazardous substances and cleaners with low- or non-toxic alternatives.

subcontractors

Depending on the scope and complexity of the job, general contractors work with a team of “subs,” or subcontractors, to get the job done. Here is a list of subcontractor trades, presented in the approximate sequence encountered on a project, and the potential green building-related activities in which they should have experience or expertise. Please note that this list is intended to be expansive (although not exhaustive)—and by no means does a green building project need to engage all of the following trades to be successful. If your general contractor will be performing any of the activities listed, he or she should be similarly knowledgeable. Ask specific questions prior to the start of your project to get a good feel for the knowledge level of each subcontractor and their ability to meet your green priorities.

demolition & deconstruction



Demolition contractors should be able to display their deconstruction and salvage experience and high recycling rates on projects. Deconstruction is an alternative to conventional demolition, involving the careful dismantling of existing building elements with the intent of maximizing the amount of reusable material salvaged. Deconstruction requires special skills and tools, and can impact a project’s schedule. The City of Seattle offers a residential deconstruction permitting process that allows early access to a site for deconstruction. Learn more at www.seattle.gov/dpd/permits (click on *Permit Types*, then *Demolition*). Several of the used building materials retailers in the Seattle area offer deconstruction services. Find salvage companies by searching the Northwest Building Salvage Network membership at www.nbsnonline.org.

Demolition contractors should also be able to show evidence of their EPA Lead Safe Certification and exhibit knowledge identifying and managing materials potentially containing asbestos.

concrete formwork



For footings, foundations and slab-on-grade construction, look for firms that reduce waste by using reusable formwork and capturing pour waste for recycling, and have experience pouring concrete containing fly ash or blast furnace slag. In addition, experience laying slab-on-grade foundations with enhanced insulation under the slab, or utilizing Insulated Concrete Forms, is also desirable.

For driveways and parking areas, concrete contractors should be familiar with porous concrete mixes and installation.

framing



Framing contractors should demonstrate knowledge of Advanced Framing techniques, including practices to reduce “thermal bridging” (areas of heat loss in wall, floor and roof assemblies). Framers should also demonstrate the use of strategies such as cut packs to minimize wood waste, and an understanding of best practices for recycling wood waste.

roofing



Roofing contractors should have experience with the roofing type you’ve specified for your project. This is especially true of innovative roofing approaches, such as green roofs or rainwater harvest systems. They should also have waste management and recycling experience (e.g., asphalt shingle recycling) if removal of an existing roof is part of your project. See the Seattle Green Home *Roofing* guide for more on the roofing aspect of a project.

plumbing



If you’re considering rainwater harvest, gray water reuse, or solar hot water, look for plumbing contractors with a demonstrated history of installing these systems. Stubbing in pipes for these purposes even if plans or dollars don’t allow it to happen now can save substantial money and mess down the road. Water conservation is a key aspect of a green project; look for professionals who are EPA WaterSense partners. Learn more at www.epa.gov/watersense. Ask your plumber about water-wise fixtures and appliances, efficient plumbing system layouts, and the appropriate use of instantaneous water heaters, recirculation systems and heat pump water heaters.

Look for plumbers aware of the energy implications of plumbing penetrations and tub and shower installations, with demonstrated skills with respect to air sealing and insulating these areas.

electrical



Look for experience installing solar electric (photovoltaic) systems—or contract with a separate renewable energy contractor for that part of the job. Seek out electricians with an understanding of ENERGY STAR labeled products. Also look for knowledge of “smart metering” and home energy tracking and management systems. Electrical chases, outlets and boxes can be major culprits for air leakage from a home. Look for an electrician familiar with keeping these penetrations as airtight as possible.

heating/ventilation



HVAC contractors should be aware of your energy conservation and air quality goals from the outset. Look for contractors with experience installing ducts within the home's heated space, air sealing and insulating ductwork in unheated spaces, ductless heating systems, and heat recovery ventilation. Contractors should use low-toxic mastic sealants. If the contractor suggests using duct tape, choose a different contractor.

insulation



Insulation contractors often overlook (or consider it another sub's job) critical air sealing activities required prior to insulating. Look for contractors experienced in both air sealing and insulating, or closely coordinate the two subs to ensure proper sequencing and execution. Look for insulation contractors' understanding not only of the insulating value of different insulation types, but each type's impact on reducing air infiltration, and the different installation techniques required of different insulations. Home Performance Contractors (see *Professional Assessments*, page 5) are trained to understand the interconnectivity of insulation, air sealing and moisture issues.

Also look for an understanding of the recycled content of insulation types, and the presence or absence of greenhouse gases, brominated fire retardants and other chemicals of concern in certain insulation products.

drywall



Depending on your home's air sealing technique, drywall is a critical juncture between conditioned and unconditioned space. Look for drywall contractors experienced in the Airtight Drywall Approach, which helps keep conditioned air where you want it—inside. Drywall and mudding operations are dusty business; look for firms that know the value of isolating construction activities to avoid contamination of the rest of the house, including the ventilation and heating system. Also look for firms that minimize drywall waste and recycle what's left.

painting



Look for painters that use low-toxic, low-VOC paints and finishes, and for contractors up to date on their EPA Lead Safe Certification. See the Seattle Green Home *Painting* guide for more on paints, finishes, and selecting painting contractors.

flooring and carpeting



Hardwood flooring installers and refinishers should exhibit knowledge of responsibly harvested wood sources (e.g., Forest Stewardship Council, or FSC, certification), low- and nontoxic floor finishes, and the indoor air quality benefits of installing prefinished flooring rather than finishing onsite.

Carpet installers should demonstrate knowledge of alternatives to adhesive installation of flooring, be able to enumerate the benefits of carpet tiles over broadloom, and describe the Carpet and Rug Institute's Green Label program.

cabinetry & finish carpentry



Cabinetry installers should have experience with low-toxic and nontoxic finishes, recycled content countertop materials, responsibly harvested wood products, and formaldehyde free cabinetry components. See the Seattle Green Home *Kitchen* guide for more on selecting greener cabinetry. Finish carpenters should be able to describe the benefits of using sustainable harvest wood products, recycled content composite wood materials, and the indoor air quality hazards associated with formaldehyde emissions from composite wood products.

landscape irrigation



Landscapes often consume 50% of a home's annual water use. Aim for a water-wise landscape that requires no permanent irrigation, but if this is not possible, contract with an irrigation professional with EPA WaterSense certification. Ask about local incentives for irrigation water conservation. Visit www.savingwater.org for information on water conservation, indoors and out.



choosing a contractor

When evaluating your prospective contractors, determine if their abilities mesh with your project. As with design professionals, always ask for references from previous jobs that match the scope and/or priorities of your project and follow up with these references to determine previous clients' satisfaction levels with the contractor's work. In addition to evaluating a prospective contractor's skill sets, examine the contractor's business practices and interpersonal skills.

Evaluate Education and Experience

Determining a candidate's schooling, qualifications, and real-life green building experience is key to the successful realization of your project.

- **Applied Knowledge.** Ask for examples of previous projects featuring elements in your design. Ask specific questions related to your design, such as "Have you done a project that used low-toxic finishes and paints?" or "Have you worked on a job that used Advanced Framing techniques?" or "Can you show me an example of a project that successfully achieved a green building certification (see page 7)?" If the contractor answers affirmatively, ask for details and references for the specific job.
- **Certifications and Accreditations.** Look for certifications showing proficiency in health and environmental topics. As with design professionals, the Sustainable Building Advisor Certification (see *Resources* on page 20) is a reputable credential to look for.
- **Training.** Ask if the contractor has completed the *Healthy Home Training for Building Professionals*, a seven-week course that covers an array of issues critical to healthy, energy efficient home construction, from moisture and ventilation to materials selection.

Identify Green Business Practices

Does the contractor walk the talk? Look for office operations emphasizing energy efficiency, recycling and waste prevention. Do work trucks use biodiesel, or does the firm purchase green power or carbon offsets? Environmentally responsible work practices go hand-in-hand with green remodeling services and show that the firm's philosophy is in alignment with their building practices.

Respect the Social Element

Does the contractor listen to your questions and concerns? Are responses solution-oriented, rather than simply claiming something can't be done? Many contractors are wary of new materials and methods, fearful of callbacks or the failure of a building element that isn't time-tested. A contractor should be able to raise concerns in a way that seeks mutually acceptable resolution. If communication is difficult or one-sided up front, expect challenges down the road. Open communication and a can-do approach, on the other hand, are very good signs.

Contractors skilled at reuse and recycling can divert up to 95% of construction waste from the landfill. When removal of existing structures is involved, ensure your contractor salvages and/or deconstructs for material reuse.



bringing it all together

Once you've selected your contractor, maintain close communication throughout the project's duration. The most successful green home projects include an actively involved homeowner—one who is willing to make a personal trip to get the desired material or product if timing is tight and the crew is short.

Sit down with your design professional and contractor and map out a comprehensive project schedule—focusing not only on due dates and budget, but cross-referencing activities on the schedule with your green building design elements and project goals. Note when subcontractors will be involved, and make sure there is a clear understanding between you and your contractor regarding who will convey the project's green building requirements to the subs. Mapping out the schedule is a great way to identify potential snags beforehand, and identify strategies for addressing them. For a truly integrated project, consider holding a kickoff meeting with your design professional, the contractor and as many subs as practicable at the beginning of the project, to review the green building goals, align the team to those objectives, and answer any questions or reservations that may be voiced.

Diligence is needed to ensure your green design goals remain on track during the construction process. Common areas of derailment are listed in the troubleshooting table on the following page. Some additional considerations:

- Your contract documents are legal papers, and your contractor is obligated to follow the construction details and materials specifications presented in the construction set. Refer frequently back to the drawings and specifications, and contact your architect if questions arise.
- Carefully consider any modifications to your project's architectural plans. What may seem like a simple change can result in a cascade effect, amplifying the cost of the decision and potentially creating unintended consequences. Maintain consistent communication with your designer during construction, and run changes by him or her to determine the implications of your decisions.
- Showing respect and appreciation to contractors is an important part of maintaining a good working relationship. Don't hesitate to say "thank you!" for a job well done, or bring coffee or pizza to workers burning the midnight oil on your project. Throughout the project, take pictures of the job before the walls go up, to document electrical and plumbing layouts, and ensure work matches plans. These photos will come in handy when memories fade or the house sells.

Take a final walk-through with the architect or designer prior to project sign-off—or final contractor payment—to identify last-minute issues before the contractor has packed up and left. With creativity, diligence and good humor, you can ensure that your green project is an experience to remember—for good!



troubleshooting

All projects risk departing from your environmental and health goals throughout the process. The following is a list of common challenges arising during the construction process on a green project, and advice on how to keep the project on track.

| TOPIC | COMMON ISSUES | POTENTIAL SOLUTIONS |
|--------------------|--|---|
| recycling | Difficulty finding facilities to accept specific construction or demolition waste. | Survey your project at the beginning to create a comprehensive list of materials for recycling. Then use the King County <i>Construction Recycling Directory</i> to identify potential facilities. Call facilities to confirm they will accept residential construction and demolition waste, and what testing requirements may need to be met prior to accepting the materials. You'll find the latest directory, along with plenty of good information on construction and demolition waste prevention and recycling on the King County GreenTools website at http://your.kingcounty.gov/solidwaste/greenbuilding . |
| recycling | Contamination of recyclables, resulting in rejected materials at the recycling facility. | Recyclable materials can quickly turn into trash if contaminated by dirt, water, or other materials. Establishing a comprehensive recycling strategy, by (a) assessing the materials that can be recycled and how and where to recycle them; (b) setting up dedicated space for collection and storage of recyclables; and (c) making sure your contractor educates staff and subs about the strategy, will help ensure your recycling rates are top-notch. Additionally, <i>source-separated</i> recycling (where individual recyclable materials are kept separate at the jobsite) usually results in higher recycling rates than <i>commingled</i> recycling (which places all materials in a single bin for later separation at a recovery facility). |
| indoor air quality | Contamination of home by toxins and dust from demolition and construction activities. | In existing homes, especially those built before 1980, lead and asbestos are serious concerns. Precautions should be taken to identify existing lead and asbestos contamination in the home and to properly isolate or remediate any sources that are found. Make sure your contractors are Lead Safe Certified Firms. Visit www.epa.gov/lead for more information. Homeowners should review EPA information on lead prior to embarking on any home improvement project. For asbestos, see the Puget Sound Clean Air Agency's information at www.pscleanair.org . Even in new construction and homes free of lead and asbestos, care should be taken to isolate the ventilation system from construction dust contamination. Thoroughly tape all ductwork, and consider power vacuuming the system prior to occupying the space. |
| indoor air quality | Substitution of low-VOC and low-toxic products with conventional products. | Contractors or subs, in the rush to complete a project, may grab an adhesive, caulk, paint or other product off the shelf that doesn't meet the indoor air quality goals of your project. Be sure your contractor and all subs are given exact product names well in advance, especially for those products that may require special ordering. |
| energy efficiency | Framers, plumbers, drywall installers, and insulation contractors unintentionally compromising the home's air sealing and insulation. | Prior to the beginning of construction, have your contractor review the ENERGY STAR Thermal Bypass Checklist to identify common mistakes in home construction that reduce a home's energy efficiency. Download the checklist by visiting www.energystar.gov and entering <i>Thermal Bypass Inspection Checklist</i> into the search field. Have your plans specify air-sealing techniques and specific insulation approaches. For example, specify airtight electrical boxes and have your electrician bid on the project knowing these specifications. |
| water quality | Contractor, concrete formwork, roofers, landscape professionals disturbing the site, leaving soils or materials prone to erosion, or using materials that are damaging to water quality. | Along with following best management practices for stormwater protection outlined in the Stormwater Code, follow the construction-phase practices identified in the Salmon Safe Residential Development Standards. Review the standards at www.salmonsafe.org/getcertified/residential-development . |



This brochure is a product of the City of Seattle's City Green Building program. Visit us at www.seattle.gov/greenbuilding.

resources

Print

- *Your Green Home* by Alex Wilson (Mother Earth News, 2006). Overview of green building, with a primary focus on energy efficiency and health.
- *The Northwest Green Home Primer* by Kathleen O'Brien and Kathleen Smith (Timber Press, 2008). Includes tips, checklists, and resources for green home planning, construction, remodeling, and maintenance.
- *Green Remodeling: Changing the World One Room at a Time* by David Johnston and Kim Master (New Society Publishers, 2004). A comprehensive introduction to green remodeling room by room, with an emphasis on materials selection and use.

Online

- Seattle Green Home Guides at www.seattle.gov/greenbuilding (under *Tools*, click on *Green Home Guides*).
- U.S. Green Building Council's (USGBC) Green Home Guide at www.greenhomeguide.com includes ideas, advice and connections to professionals for remodeling projects; see LEED for Homes information for new homes at www.usgbc.org/homes.
- REGREEN, the residential remodeling program created by USGBC and American Society of Interior Designers (ASID) at www.regreenprogram.org is an online platform with case studies and interactive search tools.
- Find resources to help with the building process at the National Association of Home Builders website, including tips on hiring professionals at www.nahb.org (click on *Housing Topics*, then *Green Building, Remodeling and Development*). Also see www.nahbgreen.org.
- The Northwest EcoBuilding Guild at www.ecobuilding.org is a resource for green building professionals, education, and events.
- The BUILT GREEN program site at www.builtgreen.net offers its remodeler and single-family new construction checklists, virtual tours of BUILT GREEN homes, a member list, and more.

Professional Certifications

- National Sustainable Building Advisor Certification. This nine-month intensive training program introduces students to the concepts underpinning green building for both commercial and residential buildings: www.sba institute.org.
- REGREEN Trained Professionals, from the ASID and the USGBC. www.regreenprogram.org (click on *Education*). REGREEN professionals receive 19 hours of training on green remodeling and home performance topics.
- NAHB Certified Green Professional, from the National Association of Home Builders. www.nahbgreen.org (click on *Education*). This industry certification includes training on green materials and methods, green marketing, and a code of ethics.
- LEED Accredited Professional (AP), from the USGBC www.usgbc.org. (click on *LEED*, then *LEED Professional Credentials*). LEED AP status is earned by a professional showing experience on a LEED project and passing an exam.
- Accredited Contractors and Certified Professionals from Building Performance Institute. www.bpi.org. These building science-focused designations help identify professionals with training in energy conservation and durability.
- Lead Safe Certification from EPA. www.epa.gov/lead (click on *Lead Safe Certification Program*).





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Want to learn more? Visit www.seattle.gov/greenbuilding.

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