

# Residential Green Building Guide:

*A Web Source Book for  
The Pacific Northwest and Alaska*





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# I. Introduction to Green Building

## Purpose of this Guide

The purpose of the Residential Green Building Guide is to provide a resource to homeowners and contractors in the Pacific Northwest and Alaska who are interested in constructing and/or renovating their homes to be more environmentally friendly. It is intended as a place to start and cannot answer all questions, but describes the resources that we are aware of to find more information. The Guide contains listings for information on green construction and renovation, where and how to find green products, and serves those in Washington, Oregon, Idaho, and Alaska. This Guide features organizations that are governmental or not-for-profit corporations. The Guide focuses solely on construction and renovation products and does not discuss maintenance or operation of products.

The non-EPA websites provided in this Guide contain additional information that may be useful or interesting and is consistent with the Guide's intended purpose. However, the EPA cannot attest to the accuracy of information provided by the non-EPA websites. Providing references to non-EPA websites does not constitute an endorsement by EPA or any of its employees of the sponsors of the site or the information or products presented on the site. Also, be aware that the privacy protection provided on the EPA.gov domain may not be available on non-EPA websites.

## About the Guide

This Guide is set up in paragraph form; it is not meant to be exhaustive on the topics, but will give the reader resources and ideas to find more information. Readers will find each resource option indented with a title followed by either a website or search terms and a description of the resource or product. While the EPA cannot promote or endorse specific companies, services, or products, we can and have described the options currently available to facilitate your search for specific products or companies. The Guide does, however, endorse EPA and other federal programs such as Energy Star for Homes and Indoor airPLUS for New Homes.

The Guide presents environmentally preferable options, but readers should think about life cycle considerations such as the durability of products, the length of time before replacement is required, and the environmental impact of the transportation of products, which includes distance from manufacturer when selecting materials to purchase for their home. The Guide gives a range of product options and does not distinguish cost as a factor. Although some environmental construction materials and products mentioned in this Guide have a high cost up front, they may have lower operating costs or last longer. Some are more expensive because of environmental considerations, and it is up to the reader to weigh these factors.

It is important that readers of the Guide understand that there are always alternatives and trade-offs to be made when selecting products or materials. While one product, material, or technology may be more environmentally friendly in one way, it may be lacking in another. This Guide will provide ideas and examples that will help the reader make decisions that are right for you.

The Guide is up to date although some references may have changed after publication. Readers are encouraged to do further research on specific topics of their interest to be sure they have the most accurate information. We expect to periodically update the Guide, and encourage readers to submit appropriate updates as technology and information become more widely available.

## Buildings and the Environment

In 2002, buildings accounted for nearly 40% of total U.S. energy consumption. Residential buildings accounted for 54.6% of that total. U.S. buildings are responsible for 38.1% of the nation's carbon dioxide emissions, 20.8% of which is emitted from the residential sector. Building occupants use 12.2% of the total water consumed in the U.S. per day, 74.4% of which is used for residential needs. Building-related construction and demolition debris totals approximately 136 million tons per year, 43% of which is generated from residential sources.

*Facts from EPA:*

<http://www.epa.gov/greenbuilding/pubs/gbstats.pdf>

## Why Build Green Homes

The built environment has a vast impact on the natural environment, human health, and the economy. By adopting green building strategies, we can maximize both economic and environmental performance. Green construction methods can be integrated into buildings at any stage, from design and construction, to renovation and deconstruction. However, the most significant benefits can be obtained if those involved in the design and construction of the building work together from the earliest stages of a building project. It is imperative that the construction and design industry adopt green building practices given we live in a world of finite resources. Potential benefits of green building can include but are not limited to:

### **Environmental benefits**

- Enhance and protect biodiversity and ecosystems
- Improve air and water quality
- Reduce waste streams
- Conserve and restore natural resources

### **Economic benefits**

- Reduce operating costs
- Create, expand, and shape markets for green product and services
- Improve occupant productivity
- Optimize life-cycle economic performance

### **Social benefits**

- Enhance occupant comfort and health
- Heighten aesthetic qualities
- Minimize strain on local infrastructure
- Improve overall quality of life

## II. Site Considerations

When choosing a location to build your home, there are some factors homeowners should consider to avoid development of inappropriate sites and to reduce the environmental impact at the building site. Smart Growth covers a range of development and conservation strategies that help protect the natural environment and make communities more attractive, economically stronger, and more socially diverse. The EPA Smart Growth program helps communities improve their development practices and get the type of development they want. Visit [http://www.epa.gov/smartgrowth/about\\_sg.htm](http://www.epa.gov/smartgrowth/about_sg.htm) for more information on Smart Growth.

Low Impact Development (LID) is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID can be applied to new development, redevelopment, or as retrofits to existing development. LID has been adapted to a range of land uses from high density ultra-urban settings to low density development. Visit <http://www.epa.gov/owow/nps/lid> for more information on Low Impact Development.

### Location

Homeowners can proactively minimize their home's impact on the natural environment when they choose an appropriate location to build. Buyers should consider the following factors when they seek to purchase land to construct a new home.

**Endangered or Threatened Habitat/Species:** Homes should not be sited where endangered species or threatened habitat is located. If you suspect that there is or might be endangered or threatened habitat/species on your property, contact your state and local municipality for more information.

**Alaska**—Dept. of Fish & Game

[http://www.adfg.state.ak.us/special/esa/esa\\_home.php](http://www.adfg.state.ak.us/special/esa/esa_home.php)

**Idaho**—Governor's Office of Species Conservation

[http://species.idaho.gov/thr\\_endgr.html](http://species.idaho.gov/thr_endgr.html)

**Oregon**—Dept. of Fish & Wildlife

[http://www.dfw.state.or.us/wildlife/diversity/species/threatened\\_endangered\\_species.asp](http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_species.asp)

**Washington**—Dept. of Fish & Wildlife

<http://www.wdfw.wa.gov/wildlife/management/endangered.html>

**Flood lines:** Homeowners should avoid constructing their homes at elevations lower than 5 feet above the 100-year flood plain to avoid flooding. To find flood maps in your area, contact the Federal Emergency Management Agency (FEMA) Map Assistance Center at 1-877-FEMA-MAP to find the local "Map Repository" or order maps from their website (<http://www.fema.gov/hazard/flood/index.shtm>).

**Infrastructure:** When possible, it is recommended that new homes be constructed where connection to local infrastructure (sewer, water, etc.) is possible or already present.

**Legacy Landscaping:** If building on a lot that has existing trees and shrubbery, talk to the architect and/or construction company about which trees might be kept. This is an easy way to increase property value and shade the home in the summer, improving energy efficiency.

**Previous use:** When possible, homeowners should consider constructing new homes on previously developed land. By leaving virgin lands untouched, impact on the environment is minimized. Home sites with higher development densities often require less transportation and already have local infrastructure. Brownfields are another option to consider. Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Visit <http://www.epa.gov/brownfields/> for more information on brownfields.

**Transportation:** Green builders recommend situating new homes within close proximity to public transportation, jobs, retail, and services; by doing so, residents will reduce their need to travel, reduce traffic, and minimize air pollution.

**Wetlands:** In general it is recommended that homes not be built within 100 feet of any wetland. These aquatic habitats and their adjacent upland buffers are vital to ecosystem function, biological diversity, and storm water management.

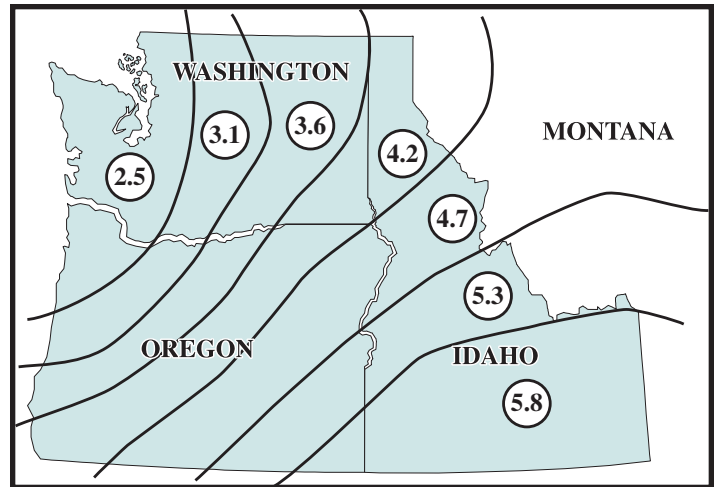
### Size

Smaller homes have a reduced impact on the environment and require fewer resources during construction and development. Constructing a home to suit your needs without adding additional unused rooms will reduce the impact your home has on the environment.

**Energy Efficiency:** Smaller homes have less surface area from which they can lose heat to the outside. In smaller homes, the distance heat must travel from the furnace to rooms is minimized, which reduces heat loss from ducts, and there is less overall space to heat and cool (see the **Heating and Cooling** section of this Guide for more information). Smaller dwellings are more energy efficient overall.

## Building Orientation

Proper orientation of your home is necessary to maximize solar energy. In green building, solar energy can be used to heat and light your home and generate electricity on-site using photovoltaic panels. In general, the long axis of your home should be oriented east to west to maximize solar heating in winter and daylighting opportunities. For more information on passive solar heating, daylighting, and photovoltaics, see Heating & Cooling, Lighting, and Alternative Energy Resources. Building orientation is also important for ventilation and cooling. Understanding local wind patterns is important for maximizing natural ventilation and cooling and generating electricity on-site using wind turbines. For more information, see **Heating & Cooling, Alternative Energy Resources, and Landscaping.**



Based on an illustration by Christopher Gutsche, EcoSmith Architecture & Consulting, based on data from the Renewable Northwest Project (1999). Appeared in the book **The Northwest Green Home Primer** by Kathleen O'Brien and Kathleen Smith.

## III. Reduce, Reuse, Recycle

When the opportunity exists, it is environmentally preferable to reduce consumption, reuse and recycle, and only dispose of materials once their usable life has concluded. Using the resources here, consumers can learn how to reduce construction and demolition debris, donate goods and materials for reuse, as well as where to find reused goods and materials.

### Construction and Demolition

Construction and Demolition (C&D) debris accounts for a significant amount of residential and commercial solid waste generated in the United States. C&D debris and waste reduction plans are typically set up before construction begins. Please use the resources listed here to find further information on debris reduction for your project.

#### Reducing Construction and Demolition Materials

**Website:** <http://epa.gov/epawaste/conservation/rrr/imr/cdm/reducing>

**Description:** Outlines the benefits of reducing the amount of construction and demolition materials disposed of in landfills or combustion facilities.

#### Construction Recycling

**Website:** <http://your.kingcounty.gov/solidwaste/green-building/constructionrecycling/index.asp>

**Description:** Here you will find assistance with construction and demolition projects and tools for recycling specifications and a directory for King County construction recyclers.

#### Construction Salvage and Recycling Toolkit

**Website:** <http://www.oregonmetro.gov/index.cfm/go/by.web/id=24684>

**Description:** This website offers practical tools for contractors and builders in regards to recycling and reusing construction material. Also, there is a recycling directory that offers over 100 recycling facility locations.

#### Lifecycle Building Design

**Search Term:** Lifecycle building design, designing to reduce waste

**Description:** Designing buildings to take their full lifecycle into consideration can reduce construction and demolition debris. Houses should be designed to anticipate and facilitate future changes and eventual disassembly to reuse and recycle materials. This can dramatically reduce renovation costs and time as well as save resource. Examples of lifecycle building include movable walls, centralized wiring and data cables, and nail-free paneling.

#### Lifecycle Building

**Website:** <http://lifecyclebuilding.org/resources.php>

**Description:** This site provides case studies and the latest ideas on designing buildings and components and systems for adaptability and disassembly. The project is a partnership of the EPA, American Institute of Architects, and the Building Reuse Association.

#### FreeCycle

**Web Site:** <http://www.freecycle.org>

**Description:** A grassroots non-profit movement of people who give and get materials, including building materials, for free in their own towns. A local volunteer moderates each local group and membership is free.

## Deconstruction

Some building materials reuse center or demolition contractors offer deconstruction, the careful removal of materials for reuse, as an alternative to demolition. Deconstruction has the advantage of maximizing reuse and recycling of unwanted replacement for demolition or to be performed before the building is demolished mechanically. See the resources below to find a service provider in your area.

## Donating and Reusing Goods and Materials

Reused goods and materials are available throughout the Pacific Northwest in local reuse shops or through reuse vendors. The resources listed below will help homeowners find reused materials for their projects as well as offer information on donation locations where homeowners can take their previously used goods and materials for resale. For interior upgrades, let the architect know that reuse is a priority. Many designers can update an interior look using an approach that keeps the fundamental structure intact, minimizing waste. Visit your local reuse outlet to consider reusing 'retro' fixtures and other materials for updates.

### Architectural Salvage

**Search Terms:** architectural salvage Pacific Northwest

**Description:** At architectural salvage centers, homeowners can find recovered building materials and home furnishings such as doors, tiles, flooring, bathroom and light fixtures, furniture, or structural materials to fit their needs, budget, or home style.

### 2Good2Toss

**Website:** <http://www.2good2toss.com>

**Description:** Here you can sell or buy reusable building materials online in the Washington area.

## The Forest Products Laboratory – Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies, 2004

**Website:** [http://www.fpl.fs.fed.us/documnts/fplgr/fpl\\_gtr150.pdf](http://www.fpl.fs.fed.us/documnts/fplgr/fpl_gtr150.pdf)

**Description:** This directory lists companies involved in wood-framed building deconstruction and dismantling and reused building materials. It emphasizes companies that use, resell, or remanufacture salvaged wood. Consumers can use the directory to find salvaged wood for architectural items and flooring, construction and framing, or to find deconstruction services.

### ReDo

**Website:** <http://www.redo.org/FindReuse.html>

**Description:** This directory lists reuse centers in each of the US states as well as DC, Guam, Puerto Rico, and the US Virgin Islands.

### Building Materials Reuse Association

**Website:** <http://www.bmra.org/>

**Description:** The Building Materials Reuse Association is a non-profit educational organization whose mission is to facilitate building deconstruction and building materials recovery.

### Reuse Centers

**Search Terms:** reuse center Pacific Northwest

**Description:** Materials found at reuse centers are often over-stock from contractors and other home improvement stores or are refurbished materials from deconstructed area homes.

## IV. Exterior Building Materials

The exterior of a home is in direct contact with the natural world; from the earth beneath its foundation to the sun and the sky and every form of precipitation that strike its roof and siding. When looking to minimize a home's impact on the surrounding environment, one should consider the materials that go into the construction of the home. The resources cited below give information about environmentally preferred materials and techniques for the construction and renovation of a home's exterior. Many of these materials can be found in reuse centers throughout the Pacific Northwest. Please visit the Reuse section of this guide for more information on salvaged materials.

### Color

The exterior color of a house can affect the home's overall heat retention. Using a lighter color with a higher albedo, or the ability to reflect light, reduces the heat-island effect, a phenomenon where homes and other buildings absorb the sun's light leading to an "island" of increased heat. This can minimize the energy needed to cool a home during the heat of the summer. For infor-

mation about eco-friendly paints and stains, please see the **Coatings** section.

### Decking

Untreated natural wood can rot and become infested with pests, but pressure-treated lumber can be harmful to the environment and your family. Certain species of wood are naturally rot-resistant, such as mahogany, cedar, juniper, cypress, and highly durable tropical woods like ipe. Cost effective alternatives to wood exist and should be considered for all outdoor wood uses. Use the resources below to find decking material for your home.

### Certified Wood

(see the complete section on page 6, **Siding Options**)

### Composite Wood/Recycled Plastic

**Search Terms:** composite wood, recycled plastic, engineered wood, composite lumber, engineered lumber

**Description:** Ideal for decking and railings, composite wood looks like real wood. Made out of reclaimed saw-



dust and plastic, these products are more durable than wood, requiring little maintenance and lower long-term cost, and are environmentally responsible.

#### **EPA Pesticides – Chromated Copper Arsenate (CCA)**

**Website:** <http://www.epa.gov/oppad001/reregistration/cca/alternativestocca.htm>

**Description:** General information about pressure treated wood, some alternatives to CCA, the risks of using treated products, and consumer safety reports.

#### **Healthy Buildings Network – A Guide to Plastic Lumber**

**Website:** [http://www.healthybuilding.net/pdf/gtpl/guide\\_to\\_plastic\\_lumber.pdf](http://www.healthybuilding.net/pdf/gtpl/guide_to_plastic_lumber.pdf)

**Description:** This document ranks composite lumber on a scale environmental preferably, from high to low. They use the rating criteria based on materials used, recycled content, end-of-life recyclability, and structural lumber to evaluate different types of plastic lumber. Additionally, this website offers a number of decking materials and companies that provide them.

#### **California Integrated Waste Management Board– Recycled Plastic Lumber**

**Website:** <http://www.ciwmb.ca.gov/plastic/recycled/lumber/>

**Description:** This website offers a myriad of information regarding alternatives to wood decking: including costs, benefits, options/types, uses, and materials used.

## **Foundation**

Before pouring a foundation, homeowners can explore the use of eco-friendly options, such as: low-impact “pin” foundation, concrete with recycled flyash content. You can also minimize health concerns by ensuring that their foundation is laid with drainage and radon resistant features. Talk to your contractor about ideas that can be incorporated in the construction of the home.

#### **Energy and Environmental Building Association (EEBA) – Foundations**

**Website:** <http://www.eeba.org/resources/consumer/new/foundations.htm>

**Description:** The links promoted by EEBA give general foundation information, tips on how to avoid mold and moisture, and insulation technologies.

#### **Pin Foundation**

A pin foundation is an environmentally friendly alternative to excavation. It involves pouring concrete into custom designed forms that create the foundation for the home. Then, steel rods/pins ranging in size from 5-9 feet are driven through both sides of the concrete to secure it to the ground. This alternative offers a number of benefits such as the preservation of topsoil, which eliminates runoff and minimizes drainage issues. For more information, see <http://www.djc.com/news/enviro/11123741.html>.

## **Insulated Concrete Forms (ICFs)**

ICFs are rigid foam made for concrete walls. They act to hold the structure of the concrete during the hardening phase, and are left on to act as an insulator. This can reduce heating and cooling costs and works better when other green building technologies are also applied. Additionally, it acts as a sound insulator. More information available at <http://www.toolbase.org/technology-inventory/walls/insulating-concrete-forms>.

## **Flyash**

The use of flyash, a coal-fired power plant waste product, in concrete diverts waste from disposal while saving virgin materials from the production lines. Using 15 to 50% flyash in cement can increase the strength, water resistance, and durability of the concrete. For more information on the use of flyash in concrete, visit EPA’s Coal Combustion Products Partnership (C2P2) website at <http://www.epa.gov/epaoswer/osw/conserves/c2p2>.

#### **A Sourcebook for Green and Sustainable Building – Flyash Concrete**

**Website:** <http://www.greenbuilder.com/sourcebook/Flyash.html>

**Description:** This website describes the history and uses of flyash – from the origin of flyash to how it saves the environment and how the public feels about its use. At the bottom of the page, contractors and suppliers from throughout the country are listed.

## **Drainage**

Proper drainage of home foundations is vital to the prevention of mold, mildew, rot, and foundation decay. To achieve effective rainwater drainage, an integrated moisture control strategy is required, including management of water drainage from the roof, exterior walls, and foundation. Good details on how to do this in various climates and construction types are available in the EEBA guides at <http://www.eeba.org/resources>.

Many contractors use damp proofing techniques to reduce moisture from entering the home. Damp proofing can be effective when applied as part of an integrated moisture control strategy. Furthermore, in very wet environments, waterproofing may be required. However, waterproofing is considered unnecessary and expensive for most home sites. Refer to the **Indoor Environment** section of this Guide for more information on mold prevention.

#### **Rubber or Cement-Based Damp Proofing**

**Search Terms:** damp proofing

**Description:** These products protect your foundations from water invasion by applying negative hydrostatic pressure to the outer foundation walls. Because they are made from rubber or cement, they do not leach harmful chemicals into the soil and ground water.

## **Radon Resistance**

Radon resistance is an important consideration during the foundation phase of a construction project. Radon resistant construction should be considered when building a home. Please see the **Indoor Environment** section of this Guide for more information.

## Roofing

There are many environmental issues to consider when replacing or constructing a new roof including energy efficiency, heat island reduction, rainwater runoff, use of recycled content materials, mold and moisture prevention, and durability. A number of options deal with one or more of these issues. Use the information and resources below to help you choose the right materials for your home.

### Energy and Environmental Building Association (EEBA) - Roofs

**Website:** <http://www.eeba.org/resources/professional/new/roofs.htm>

**Description:** EEBA offers links to information about roof construction, insulation, and the use of radiant barriers to reduce heat loss and air conditioning loads.

### Clay

**Search Terms:** clay roofing, clay tiles

**Description:** Clay tiles are a good choice in cold climates because they do not absorb water easily. Clay is also durable, and fire-resistant, but it is heavy. Rafters may need reinforcement before the tiles can be installed.

### Concrete Tiles

**Search Terms:** concrete roof tiles, concrete roofing

**Description:** Concrete roof tiles get harder with age and often require little maintenance. They are durable, fire-resistant, and pose no human health effects. The tiles are heavy and may require rafter reinforcement.

### Green Roof

**Search Terms:** green roof, vegetated roof

**Description:** Ideal in any climate, green, or vegetated, roofs bring nature from the ground to the rooftop. They retain storm water, reduce heat island effect, and mitigate air pollution. Green roofs can be heavy because of their components (insulation, soil, vegetation, etc.) and require structural reinforcements to support the increased load. Green roofs have been used on residential buildings in Germany and other European countries for over 5 decades.

### Metal

**Search Terms:** metal roofing, metal roof tiles

**Description:** Metal roofing works well in cold climates because snow tends to slide off reducing the development of ice dams. These roofs cannot hold much heat and therefore radiate less into the attic space. They are fireproof, lightweight, and long lasting.

### Photovoltaic Shingles

**Search Terms:** photovoltaic shingles

**Description:** These shingles can be used in combination with slate or asphalt shingles to bring energy generation capability to southern-exposure roofs with access to sunlight.

### Recycled Plastic/Rubber

**Search Terms:** recycled plastic roofing, recycled plastic roof tiles

**Description:** Plastic or rubber shingles can be made from recycled tires or plastic and they are recyclable at the end of their life. Long-term UV effects are unknown, but these tiles are sound and hail proof.

### Recycled Asphalt Shingles

**Search Terms:** recycled asphalt roof shingles, recycled asphalt roofing

**Description:** By using recycled materials in their production, these shingles reduce the use of raw materials and keep used shingles from entering the waste stream. They have similar UV and durability properties to conventional asphalt shingles.

### Slate

**Search Terms:** slate roofing, slate roof tiles

**Description:** Slate roofs are durable and fire-resistant, and the tiles can be reused or reclaimed. This material is heavy and may require rafter reinforcement.

## Siding Options

The materials used on the exterior of the home – wood, aluminum, brick, etc. – can all have an effect on the environment. The information and resources below are provided to help sort through the options you have for your home.

### Certified Wood

For the homeowner that does not want to use reclaimed wood and wants the look and feel of real wood, certified wood proves to be an option. Certifying organizations, such as the Forest Stewardship Council and others, certify companies and forest managers for investing in environmentally sound management and harvesting practices.

### Forest Stewardship Council (FSC) – Designing and Building with FSC

**Website:** [http://www.fscus.org/green\\_building/designing\\_building.php](http://www.fscus.org/green_building/designing_building.php)

**Description:** This resource was designed by FSC in partnership with Forest Products Solutions for architects and other building professionals. It offers readers a single source to learn about, build, and account for the use of FSC-certified products. It is available for download at the website listed here.

### Rainforest Alliance – SmartWood Program

**Website:** <http://www.rainforest-alliance.org/programs/forestry/smartwood/>

**Description:** The SmartWood Program is accredited by the Forest Stewardship Council, contains a plethora of information regarding forest management. From their website, consumers can find certified products and companies around the globe as well as certified reused, reclaimed, recycled, and salvaged wood products.

### Wood Alternatives

There are many wood siding alternatives for the home. The information and resources below have been provided to help you make the right siding choices for your home.

### Brick and Stone

**Search Terms:** brick exteriors, brick siding, stone exteriors

**Description:** Brick and stone exteriors offer fire resistance. Molded cementitious stone, a less expensive alternative, offers similar benefits without the need for quarrying natural stone. See the **Reuse** section of this Guide for information on reclaimed stone.

### **Fiber Cement Siding**

**Search Terms:** fiber cement siding

**Description:** Fiber cement siding is made from cement, sand, cellulose, silica, and other additives. The finished product is durable, flame, weather, pest, and rot resistant. It can be painted any color, but can be heavy to install.

### **Metal Siding**

**Search Terms:** metal siding, aluminum siding, steel siding

**Description:** Steel or aluminum siding offer increased energy efficiency, fire resistance, and protection in colder climates.

### **Papercrete**

**Search Terms:** papercrete, fibrous cement

**Description:** Made with Portland cement, sand, and recycled paper or cardboard, this substance looks like stucco or clapboard wood siding. It won't twist, warp, burn, or melt and holds paint well and resists pests. It can be found as siding planks or in brick form.

### **Stucco**

**Search Terms:** stucco, stucco exteriors

**Description:** Genuine stucco is effective in wet areas – the cement mixture absorbs water, but it dries easily leaving the main structure dry. Stucco needs a heavy and solid background to give it strength.

## **V. Interior Building Materials**

While a home's exterior materials interact directly with the natural environment, the interior materials are in direct contact with home dwellers. The resources below explore sources and alternatives to conventional interior building materials. Many of these materials can be found in reuse centers throughout the Pacific Northwest. Please visit the **Reduce, Reuse, Recycle** section of this Guide for more information on salvaged materials.

### **Floors**

For those who enjoy the look of hardwood, eco-friendly options include cork and bamboo – two fast growing materials that can be made to look like traditional hardwood floors. Reclaimed wood is another option available. Recycled glass, rubber, natural linoleum, and stone are materials that homeowners can also look into. Use the following links to find the flooring that is right for you.

#### **Carpet**

For more information on carpets, please see **Carpet** in the **Furnishings** section of this Guide.

#### **Hard and Soft Flooring**

Hardwood has been the leader in flooring for centuries because of its look, feel, and durability. While the use of wood flooring is still common, it has come under scrutiny because of harvesting practices and deforestation. There are many wood or wood-like options available for eco-conscious homeowners. Use the information below to learn more.

#### **Cork**

**Search Terms:** cork floors

**Description:** Harvested from the bark of a cork oak tree, cork floors are naturally insulative and resist mold, mildew, rot, and insects. Typically, cork floors have a vinyl or water-based coating that makes them easy to clean. They are also often sold in tile form for easy installation.

#### **Bamboo**

**Search Terms:** bamboo floors

**Description:** Bamboo floors look almost exactly like traditional hardwood, yet are harder and more durable. Bamboo is a fast growing grass that is golden in color but also comes in other shades. These floors are often

sold as pre-finished planks and can be installed like conventional hardwood floors.

#### **Reclaimed Wood**

**Search Terms:** reclaimed wood, reused wood

**Description:** There are a number of local resale shops where consumers can purchase vintage and reclaimed wood for flooring and other housing needs. See the **Reuse** section of this Guide for more information on reclaimed and reused wood.

#### **Natural Linoleum**

**Search Terms:** natural linoleum, marmoleum

**Description:** Made with natural raw materials such as linseed oil, pine resins, and cork, natural linoleum is durable and environmentally responsible throughout its life – its production produces little to no scraps, it has a long life-span, and theoretically it could be composted after use.

#### **Recycled Glass**

**Search Terms:** recycled glass flooring

**Description:** Recycled glass can be found in the form of tiles, mosaics, and terrazzo. Usually made from 100% post-consumer waste, recycled glass surfaces save glass from going to disposal.

#### **Recycled Rubber**

**Search Terms:** residential recycled rubber floors, residential rubber floors

**Description:** Made from recycled tire rubber, these floors are extremely durable, fire, weather, and sound proof. The tiles or sheets are produced through low-energy and emissions procedures making them a green alternative to traditional rubber floors.

#### **Stone**

**Search Terms:** eco-friendly stone floors, stone flooring, reclaimed stone

**Description:** Natural stone, if quarried locally, can be extremely durable and environmentally friendly. Tile options include limestone, slate, and sandstone. Reclaimed stone floors can be found and are another environmentally friendly flooring option. See the **Reduce, Reuse, Recycle** section of this Guide for information on reclaimed stone.

## VI. Coatings

Coatings are used throughout the house – paints, stains, varnishes, wallpapers, etc. Using the resources below, you can find environmentally preferable coatings for your home.

### Paints and Primers

Paints and primers may contain volatile organic compounds (VOCs), some of which can be toxic, are flammable, and may contain heavy metals that are toxic to humans, animals, and the environment. When using these products, it is important for handlers to always read the labels and conform to safety and disposal guidelines. The resources listed below provide both the environmental concerns and environmentally friendly options for both inside and outside your home.

When purchasing and disposing of paint, consumers should consider reducing, reusing, and recycling.

- **Reduce**

Because paint can't always be disposed of easily, it is better to not over-buy. Before you purchase paint for a home project, get a paint quantity estimate by referring to an online paint calculator or discussing your needs with a painting professional at your local paint shop. This will not only save you from storing unused paints, but it will save money as well.

- **Reuse**

Cans of reused paints and primers can sometimes be found at local reuse centers. See the **Reduce, Reuse, Recycle** section of this Guide for more information on reused paints in your area.

- **Recycle**

Leftover paint should be disposed of properly. Check to see if recycling facilities are available in your area. Also check if local reuse centers will accept leftover paints.

### Zero/Low VOC Paints

Zero and low VOC paint contains very low levels of VOCs. This paint is a better alternative to most paints for respiration reasons. However, it can be relatively expensive per can.

### Latex/Water-Based Paint

Latex and water-based paints have a water base while alkyd paints have an oil base. In general, water-based paints produce less VOCs than solvent-based paints (alkyd), but may produce them over a longer period of time. Note that latex paints are not made with natural rubber – the term “latex” is a misnomer and therefore will not aggravate consumers with latex allergies. Latex paint is readily available; visit your local hardware store or anywhere paint can be purchased.

### Lead-Based Paint

Lead is a highly toxic metal that was used for many years in products found in and around the home, including paint. Exposure to deteriorating lead-based paint, lead contaminated dust (particularly from renovations), and lead-contaminated residential soil may cause a

range of health effects for young children such as behavioral problems, learning disabilities, seizures, and death. Children under 6 and pregnant women are especially susceptible to lead risks. If you're planning to renovate your pre-1978 home, take necessary precautions before you or your contractor begin working. For more information on lead-safe renovation, please visit [http://www.epa.gov/region1/eco/ne\\_lead/keep\\_it\\_clean.html#lrt](http://www.epa.gov/region1/eco/ne_lead/keep_it_clean.html#lrt).

If you're planning to buy a pre-1978 home, be aware that the seller must disclose to you all information he/she has about the property related to lead-based paint, so as a buyer, you are aware of your lead risks prior to sale. As a buyer, you also will have an opportunity to pay for a risk assessor or lead inspector to assess/inspect the property for lead risks prior to your buying. For more information on the Federal Lead Disclosure Rule, please visit <http://www.epa.gov/region1/enforcement/lead-paint/index.html>.

### Volatile Organic Compounds (VOC)

VOCs are organic (carbon containing) chemicals that evaporate readily at room temperature. Some associate them with strong odors, but they may not have an odor. Regardless, exposure to some VOCs can be harmful to human health and may cause eye, nose, and throat irritation, headaches, and nausea. Chronic exposure to these chemicals has been linked to cancer, liver and kidney damage, and can harm the central nervous system. By making informed coating choices, consumers can avoid or reduce their exposure to VOCs.

Consumers can avoid or reduce their exposure to VOCs by using good practices while applying coatings to interior spaces. Good practices include:

- Ventilation of indoor spaces to remove any VOCs to the outside;
- Application of coatings before installation of materials that may absorb or trap the VOCs and emit them at a later time (such as carpet, padding, fabric wall covering, acoustic tiles, and upholstered furniture);
- Reading and following all instructions to reduce the risk of exposure to chemicals;
- Consideration of when people (workers or occupants) will be in the home; and
- Evaluation of the coating that you choose.

For more information see Healthy Indoor Painting Practices at <http://www.epa.gov/opptintr/exposure/docs/inpaint5.pdf> and Painting and IAQ – Addressing Indoor Environmental Concerns During Remodeling at <http://www.epa.gov/iaq/homes/hip-painting.html>.

## Wallpaper

Traditional wallpaper is often made with synthetic non-permeable substances. Alternatives made from natural fibers such as wood pulp, cotton, silk, etc. are available for purchase and may reduce health and environmental concerns. Consumers can also look for low-VOC wallpaper adhesives to further enhance indoor air quality. Some wallpaper has been linked to mold issues. For more information on wallpaper and mold, see the **Indoor Environment** section of this Guide.

### **Dextrine/Starch-based Wallpaper Adhesives**

**Search Terms:** starch based adhesives

**Description:** These adhesives are made from roots

of tubers such as maize, potatoes, wheat, rice, and tapioca. They are often cold or hot water soluble. Although used for envelope sealing, they can also be used for hanging wallpaper.

### **Natural Fiber Wallpaper**

**Search Terms:** natural fiber wallpaper, natural fiber wallcoverings

**Description:** Natural fiber wall coverings are often made from wood pulp and other recycled and reclaimed materials such as gypsum, latex, and cellulose or cotton and silk. These wallpapers/wallcoverings pose no health threats and are environmentally friendly.

## VII. Heating and Cooling

Home heating and cooling account for roughly 56%, the largest portion, of household energy costs. Updating and periodic maintenance of heating and cooling equipment can save homeowners money and energy. Additionally, insulation, windows, thermostats, and other appliances are other areas a homeowner can improve upon to decrease energy consumption and costs.

### **US Department of Energy – Energy Savers, Space Heating and Cooling**

**Website:** [http://www.energysavers.gov/your\\_home/space\\_heating\\_cooling/index.cfm/mytopic=12300](http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12300)

**Description:** This site describes the heating and cooling systems and provides a myriad of information on heating, cooling, heat pumps, replacement, and supporting equipment and has links to tips that will improve the efficiency of each element.

### **US Department of Energy – Energy Savers, Energy Audits**

**Website:** [http://www.energysavers.gov/your\\_home/energy\\_audits/index.cfm/mytopic=11160](http://www.energysavers.gov/your_home/energy_audits/index.cfm/mytopic=11160)

**Description:** The purpose of this website is to allow homeowners to determine which part of their home uses the most energy by encouraging an energy audit either done by the homeowner or a professional auditor. This information is then used to plan energy efficiency upgrades.

## **Heating, Ventilating, and Air Conditioning (HVAC) Systems**

Some tips to remember when choosing an HVAC System:

- Bigger is not always better.
- Locating your furnace in the center of your home reduces duct length, which improves efficiency.
- Efficient ventilation systems reduce moisture buildup while allowing fresh-air to enter the home.

### **Energy and Environmental Building Association (EEBA) – General HVAC**

**Website:** [http://www.eeba.org/resources/consumer/existing/hvac\\_general.htm](http://www.eeba.org/resources/consumer/existing/hvac_general.htm)

**Description:** Information about energy-efficient home heating and cooling strategies, maintenance checklists, system selection, and much more.

### **Energy Star – Duct Sealing**

**Website:** [http://www.energystar.gov/index.cfm?c=home\\_improvement.hm\\_improvement\\_ducts](http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts)

**Description:** Duct sealing and maintenance is just as important as the maintenance of the furnace itself. Without well-sealed ducts and maintained ducts, heated and cooled air cannot make it from the furnace into the rooms of the house. At this website, readers can find fact sheets and other important duct information. A benefit from regular duct maintenance is that well designed and properly sealed ducts can make your home more comfortable, energy efficient, and safer.

### **Heating and Cooling Calculators**

**Website:** <http://www.greenerchoices.org/globalwarmingathome.cfm?page=Toolkit#Heatingandcoolingcalculators>

**Description:** This website provides resources on HVAC systems and calculates potential cost savings for homeowners using a variety of methods.

## **Heating**

Heating homes during the colder months can be quite costly. Most homes are equipped with gas or oil furnaces or boilers that generate heat for the entire home by burning fuel. Some homes have electric heat, which produces heat directly from electricity, but can be inefficient and expensive. Wood is a reliable source of heat and is less expensive than oil and gas, but releases unsafe emissions. To reduce cost and conserve resources, homeowners should consider their options before choosing a heating system for their home.

- **Size**

A system that is too large will only work at peak efficiency part of the time. Choose a properly sized furnace that will effectively heat your home without wasting energy and money by having your contractor perform a Manual J Residential Load Calculation to give an estimate of heat loss in the home.

- **Fuel**

There are several conventional and alternative fuel options for homeowners. See the **Alternative Fuels** section of this Guide for more information. If possible, choose a renewable fuel option like solar power, geothermal energy, or wood pellets to heat your home.

- **Efficiency**

Heating systems that are more efficient will save both money and environmental resources.

- **Durability**

Choose a heating system with a long life span.

### **Energy Star – Heat and Cool Efficiently**

**Website:** [http://www.energystar.gov/index.cfm?c=heat\\_cool.pr\\_hvac](http://www.energystar.gov/index.cfm?c=heat_cool.pr_hvac)

**Description:** General information about HVAC systems and maintenance, including links to further information about particular home heating and cooling systems.

### **US DOE – Heat Pump Fact Sheets**

**Website:** <http://www1.eere.energy.gov/femp/pdfs/hp.pdf>

**Description:** At this website, consumers will find information on how to buy a residential energy-efficient heat pump, and cost effectiveness examples. While this fact sheet was developed for a federal audience, it provides excellent information for homeowners on purchasing an energy efficient heat pump.

### **Ventilation**

Ventilation is extremely important to achieve good indoor air quality. Ventilation systems bring in and circulate fresh air, reducing moisture buildup and removing odors or pollutants generated from indoor sources.

### **US DOE – Ventilation Strategies for Homes**

**Website:** [http://www.energysavers.gov/your\\_home/insulation\\_airsealing/index.cfm/mytopic=11830](http://www.energysavers.gov/your_home/insulation_airsealing/index.cfm/mytopic=11830)

**Description:** Air-sealing techniques are essential when it comes to attaining energy-efficiency. This website highlights some important features of ventilation and provides strategies that will improve ventilation.

### **Air Conditioning**

Air conditioning does more than just cool the air. It also removes moisture and humidity from the inside air. Rocky Mountain Institute estimated that during summer months, 50% of all energy used in the US is for air conditioning purposes. There are three types of conventional air conditioners: room units, central air conditioners, and electric heat pumps.

During construction or renovation, homeowners should consider incorporating the following to reduce the need for air conditioners in the home:

- Natural shade;
- Natural ventilation;
- Thermal mass;
- Fans.

But, if air conditioning is needed, there are some energy efficient options for you to select:

### **Energy Star – Central Air Conditioning**

**Website:** [http://www.energystar.gov/index.cfm?c=roomac.pr\\_room\\_ac](http://www.energystar.gov/index.cfm?c=roomac.pr_room_ac)

**Description:** Energy Star labeled central air conditioning units use 10% less than conventional models. Find links to products and stores offering energy-efficient products and general information on air conditioners.

### **Thermostats**

By regulating your thermostat closely or installing programmable thermostats, homeowners can reduce their heating and cooling costs with little effort. Thermostats come in variety of styles, but consumers should avoid purchasing those containing mercury because of its toxicity to the environment and human health. As many states are banning the sale of mercury products, mercury-free alternatives have become available and readers should consider that information when planning to purchase a new thermostat for their home.

### **Energy Star – Programmable Thermostats**

**Website:** [http://www.energystar.gov/index.cfm?c=thermostats.pr\\_thermostats](http://www.energystar.gov/index.cfm?c=thermostats.pr_thermostats)

**Description:** Programmable thermostats and savings associated with these thermostats are provided here. Using the “Find a Store” link to the right, consumers can find out where they can purchase Energy Star products in their area.

### **Zoning**

**Search Terms:** thermostat zoning, home zoning

**Description:** By zoning your home, you can group rooms that have similar heating and cooling needs and link each group to a single thermostat. If used in conjunction with programmable thermostats, a zoning system will automatically adjust room temperatures based upon occupancy and activity levels.

### **Water Heaters**

Water heaters can account for up to 14% of your utility bill and is the third largest energy expense in the home. Homeowners can reduce their water heating bills by using these four easy tips:

- Use less hot water.
- Turn down the water heater thermostat.
- Insulate your water heater, hot, and cold water pipes.
- Upgrade your water heater.

Also, by installing low-flow showerheads and faucets (see the **Plumbing** section of this Guide), consumers can minimize hot water usage in the home and reduce the total water used.

### **Energy and Environmental Building Association (EEBA) – Water Heating**

**Website:** [http://www.eeba.org/resources/consumer/new/water\\_heating.htm](http://www.eeba.org/resources/consumer/new/water_heating.htm)

**Description:** Energy-efficient strategies for heating water in the home.

### **Heat Pump Water Heaters**

**Search Terms:** heat pump water heaters

**Description:** When electricity is the only source of energy, heat pumps are the most economical water heating system. They pump heat from air into water and often have backup systems for when demand outruns supply. Pumps use one-third to one-half as much electricity as a conventional electric water heater.

### **Indirect Fired Hot Water Heater**

**Search Terms:** combined water heaters, combined water and heat

**Description:** In indirect hot water and heat systems, water is heated as a separate zone off of the furnace or boiler. There is no burner on the water heater, and the system reuses heat waste from the furnace or boiler to heat water for tap use. The hot water is stored in an insulated storage tank and is always ready for use – keep the boiler from having to turn on frequently.

### **Solar Hot Water**

**Search Terms:** solar hot water, solar water heating

**Description:** Solar water heaters use the sun's energy to heat water by passing water through solar collectors. The hot water is stored in a tank similar to that of conventional systems. Solar water heaters can be used in all climates, but back up systems are often recommended, if not required by your building code.

### **Storage Water Heaters**

**Search Terms:** storage water heaters

**Description:** Storage water heaters have a ready supply of hot water at all times, but when hot water is not being used heat is lost through the walls of the tank. These losses can account for 10-20% of household annual water heating costs. More efficient models are available, such as those that have higher levels of insulation around the tank to reduce standby loss.

### **Tankless Water Heaters**

**Search Terms:** tankless water heaters

**Description:** These water heaters heat water only when a hot faucet is turned on, thus reducing losses during stand-by. Tankless water heaters reduce energy consumption by 20-30% and often have longer life-spans than storage water heater models and use considerably less water than do conventional hot water tanks.

### **US Department of Energy – Energy Savers, Water Heating**

**Website:** [http://www.energysavers.gov/your\\_home/water\\_heating/index.cfm/mytopic=12760](http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=12760)

**Description:** Here, consumers can find additional tips on how to reduce hot water usage in the home and save money on water heating bills as well as learn about solar water heaters.

## **Insulation**

Insulation reduces heat transfer through walls, ceilings, and floors. The “R-value” associated with insulation refers to its effectiveness in blocking the transfer of heat – the higher the R-value, the more effective the insulation. Traditionally, homeowners have used conventional fiberglass as insulation, but more environmentally friendly and healthy options are now available.

### **Cellulose Insulation**

**Search Terms:** cellulose insulation

**Description:** Cellulose insulation is made from recycled newspapers and is often treated with borate for added fire and pest proofing. It can be applied as insulation almost anywhere in the home, but it shouldn't be installed in wet months and should be tested for moisture before installing drywall.

### **Cotton**

**Search Terms:** cotton insulation

**Description:** Cotton insulation is typically made from recycled cotton and other natural fibers that would other-

wise be disposed. It is often treated for fire-resistance, but lacks toxic and carcinogenic chemicals found in conventional insulation.

### **Recycled Content, Formaldehyde-free Fiberglass**

**Search Terms:** recycled fiberglass insulation

**Description:** This fiberglass insulation consists of recycled materials. While it provides similar insulation properties to conventional fiberglass, the recycled content version can add LEED Energy & Atmosphere or Materials & Resources credits to your construction project.

### **Spray-foam**

**Search Terms:** spray-foam insulation

**Description:** This insulation is growing in popularity because of its ability to block all creases and a professional should install crevices during expansion. Be sure to avoid CFC (chlorofluorocarbon) and HCFC (hydrochlorofluorocarbon) versions because of their ozone depleting properties.

### **US Department of Energy's Insulation Fact Sheet**

**Website:** [www.ornl.gov/sci/roofs+walls/insulation/ins\\_01.html](http://www.ornl.gov/sci/roofs+walls/insulation/ins_01.html)

**Description:** This website discusses insulation basics. Using the link “R-value Recommendations” ([www.ornl.gov/sci/roofs+walls/insulation/ins\\_16.html](http://www.ornl.gov/sci/roofs+walls/insulation/ins_16.html)), find out what level of insulation is necessary based upon zip code and furnace type.

### **US Department of Energy – Energy Savers, Insulation**

**Website:** [http://www.energysavers.gov/your\\_home/insulation\\_airsealing/index.cfm/mytopic=11320](http://www.energysavers.gov/your_home/insulation_airsealing/index.cfm/mytopic=11320)

**Description:** Information on how insulation works, adding it to an existing home, selecting insulation for new construction, where to insulate, types of insulation, and how to make insulation more effective with air sealing and moisture control.

## **Windows**

Windows not only add to the aesthetics of a home, but they also account for heat gain in the summer and heat loss in the winter. By choosing the right windows for your home and climate, homeowners can save on cooling and heating costs. The resources below provide readers with energy saving tips and information on the latest window technologies.

### **Energy and Environmental Building Association (EEBA) – Windows and Doors**

**Website:** [http://www.eeba.org/resources/consumer/new/windows\\_doors.htm](http://www.eeba.org/resources/consumer/new/windows_doors.htm)

**Description:** General information regarding windows and doors, window selection, window terminology, and high-performance windows.

### **Energy Star – Residential Windows, Doors, and Skylights**

**Website:** [http://www.energystar.gov/index.cfm?c=windows\\_doors.pr\\_windows](http://www.energystar.gov/index.cfm?c=windows_doors.pr_windows)

**Description:** Basic information about window replacement and window technology. Learn how to purchase efficient windows using the “Buy with Confidence” link ([www.energystar.gov/index.cfm?c=windows\\_doors.pr\\_ind\\_tested](http://www.energystar.gov/index.cfm?c=windows_doors.pr_ind_tested)).

## Energy Star – Climate Zones

**Website:** [http://www.energystar.gov/index.cfm?c=windows\\_doors.pr\\_crit\\_windows](http://www.energystar.gov/index.cfm?c=windows_doors.pr_crit_windows)

**Description:** Energy Star criteria for windows, doors, and skylights in different areas of the country.

## US Department of Energy – Energy Savers, Windows

**Website:** [http://www.energysavers.gov/your\\_home/windows\\_doors\\_skylights/index.cfm/mytopic=13330](http://www.energysavers.gov/your_home/windows_doors_skylights/index.cfm/mytopic=13330)

**Description:** Tips for selecting new energy efficient windows and improving the energy efficiency of existing windows.

## Window Technologies

The resources below will help you choose the right window options for your home.

### Multiple Paned Windows

**Search Terms:** double-paned windows

**Description:** Typically, the more panes your windows have, the better they will be at insulating your home. Replacing single-paned windows with double-paned windows throughout the home can save up to 15% on heating costs and add to the value of your home.

### Gas-Filled Windows

**Search Terms:** argon-filled windows, krypton-filled windows, gas-filled windows

**Description:** The space between panes in multi-paned windows can be filled with inert gases such as argon or krypton which slows heat transport from the inside to the outside. When gas is added to these windows, their insulation qualities are increased.

### Historic Window Repair

**Search Terms:** historic window repair, historic window rehabilitation

**Description:** Homeowners with historic or old double-hung sash windows might consider window refurbishment and rehabilitation instead of replacement. Window repair companies claim that they can make your historic windows as airtight and energy efficient as newer models. Using the search terms above, you can find information on window repair in your area.

### Low-Emissivity (Low-E) Windows

**Search Terms:** Low-E Glazing, Low-E Windows, Low-Emissivity Glazing, And Low-Emissivity Windows

**Description:** Low-E windows have a glazed metal or plastic coating that reduces heat transfer and lowers the window's U-factor. U-factor is a measure of how well a product prevents heat from escaping. Low-E windows typically cost 10-15% more than conventional windows, but can reduce heat loss by 30-50%.

### Superwindows

**Search Terms:** superwindows

**Description:** Superwindows have plastic sheets suspended between panes in multi-paned windows making them triple or quadruple glazed windows and reducing the U-factor to 0.15-0.30. They also minimize UV rays that can fade home furnishings.

## Local Energy Efficiency Programs

### Alaska

Alaska Housing Financing Corporation – Incentives and AK Warm Certifiers

<http://www.ahfc.state.ak.us/energy/energy.cfm>

[http://www.ahfc.state.ak.us/home/energy\\_rater\\_guide.cfm](http://www.ahfc.state.ak.us/home/energy_rater_guide.cfm)

### Idaho

Idaho Power – Residential Energy Efficiency

<http://www.idahopower.com/EnergyEfficiency/Residential/default.cfm?tab=Residential>

<http://www.idahopower.com/EnergyEfficiency/Residential/Programs/HeatingCooling/default.cfm>

### Oregon

Portland General Electric – Residential Energy Savings

[http://www.portlandgeneral.com/home/energy\\_savings/default.aspx](http://www.portlandgeneral.com/home/energy_savings/default.aspx)

### Washington

Puget Sound Energy – Energy Advisors

<http://www.pse.com/solutions/foryourhome/Pages/energyAdvisors.aspx>

Seattle City Light – Residential Conservation Programs & Services

<http://www.seattle.gov/light/conserves/resident/>

Energy Star – Home Performance

**Website:** <http://www.energytrust.org/residential/existing-homes/hpwes.html>

**Description:** Under this program, local contractors will visit your home to assess your energy consumption and recommend improvements (insulation, lighting, heating/cooling equipment, thermostats, windows, etc.) that could save homeowners up to 30% in energy costs/year.

Database of State Incentives for Renewable & Efficiency

**Website:** <http://www.dsireusa.org/>

**Description:** This website is home to a comprehensive list that details incentives and policies for energy efficiency state by state.

US Department of Energy – Weatherization Assistance Program

**Website:** [http://apps1.eere.energy.gov/weatherization/state\\_activities.cfm](http://apps1.eere.energy.gov/weatherization/state_activities.cfm)

**Description:** At this website, homeowners can find fact sheets about weatherization.



## VIII. Lighting

Home lighting can account for 5-10% of energy usage, on average. There are ample opportunities to save energy through lighting alone. Bulb and appliance choices, lighting and window locations, light timing devices throughout a home, and making sure to turn the lights off if you are not using them can significantly reduce energy use. There are many options with home lighting and the resources listed below will help you explore several options.

### Efficiency and Placement

Energy-efficient light bulbs like compact fluorescent have been cited to use up to 2/3 less energy and last 6-10 times longer than conventional bulbs. Homeowners that change five light bulbs in their home to more efficient options can save up to \$60 in energy costs per year and reduce greenhouse gas emissions from local power sources. Making these changes not only saves you money and time, but reduces air pollution as well.

When renovating or building a new home, it is important to consider location when planning lighting strategy. Rather than lighting entire rooms, homeowners should think about where lighting will most likely be needed and where artificial light is necessary. By maintaining light in specific areas, homeowners will save energy and money.

#### Energy Star –

##### Compact Fluorescent Light Bulbs (CFL)

**Website:** [http://www.energystar.gov/index.cfm?c=cfls.pr\\_cfls](http://www.energystar.gov/index.cfm?c=cfls.pr_cfls)

**Description:** When a conventional incandescent 100W light bulb is replaced with a 32W CFL, homeowners can save up to \$30 over the life of the new bulb. This website discusses CFLs, energy efficiency, and why consumers should make the change.

##### Energy Star Light Buyers Guide

**Website:** [http://www.energystar.gov/index.cfm?c=buyers\\_guide.pr\\_lighting\\_guide](http://www.energystar.gov/index.cfm?c=buyers_guide.pr_lighting_guide)

**Description:** This website is a great tool for homeowners looking to learn more about energy-efficient lighting options. Filled with detailed information, readers will easily find everything they're looking for to make simple lighting changes in their home. Energy Star examines bulbs, fixtures, and ceiling fans in this user-friendly web guide.

### National Lighting Product Information Program (NLPIP)

**Website:** <http://www.lrc.rpi.edu/programs/nlPIP/index.asp>

**Description:** NLPIP helps lighting professionals, contractors, designers, building managers, homeowners, and other consumers find and effectively use efficient, quality products that meet their lighting needs. With the support of government agencies, public benefit organizations, and electric utilities, NLPIP disseminates objective, accurate, timely, manufacturer-specific information about energy-efficient lighting products."

### Daylighting

**Search Terms:** daylighting, skylights, solar tubes

**Description:** Daylighting is the use of natural light in place of bulbs and fixtures. Through skylights and window placement, homeowners can bring enough natural light into a room that the lights need only be used after sundown. Daylighting not only saves energy by reducing bulb usage, it also saves on heating costs in the winter and can benefit human health.

### DOE Building Technologies Program: Daylighting

**Website:** [http://www.energysavers.gov/your\\_home/lighting\\_daylighting/index.cfm/mytopic=12290](http://www.energysavers.gov/your_home/lighting_daylighting/index.cfm/mytopic=12290)

**Description:** This website discusses the daylighting concept and why it is beneficial in many homes. Here, readers can also learn about design their home for daylighting.

## IX. Plumbing

According to the World Health Organization, of all water on earth, 97.5% is salt water, and of the remaining 2.5% fresh water, some 70% is frozen in the polar icecaps. The other 30% is mostly present as soil moisture or lies in underground aquifers. In the end, less than 1% of the world's fresh water (or about 0.007% of all water on earth) is readily accessible for direct human uses. The resources given here provide readers with the information needed to renovate and construct homes that conserve and protect water. Source: [http://www.who.int/docstore/water\\_sanitation\\_health/vector/water\\_resources.htm](http://www.who.int/docstore/water_sanitation_health/vector/water_resources.htm)

### Fixtures

Because less than 1% of the earth's water supply is usable for human activity, consideration of your home's water usage is important when planning to renovate or build a new home. Homeowners should consider the following upgrades when exploring how to minimize their home's water usage:

- Low flow toilets, sinks, dishwashers, and washing machines
- Shower head and sink aerators
- Running only full dishwashers and cleaning only full loads of laundry
- Minimizing lawn maintenance

For more ways to save water in your home, please visit <http://www.epa.gov/owm/water-efficiency/>.

### **EPA's WaterSense Program**

**Website:** <http://www.epa.gov/watersense>

**Description:** Program helps consumers identify water efficient products while ensuring performance. Current programs include high efficiency faucets and toilets, flushing urinals, landscape irrigation services, and weather/sensor based irrigation controls.

#### **Alliance for Water Efficiency**

**Website:** <http://www.allianceforwaterefficiency.org>

**Description:** The Resource Library has a Residential Water Efficiency section that provides resources on indoor and outdoor fixtures and appliances.

#### **Low Flow Toilets**

**Search Terms:** low flow toilets

**Description:** Low flow toilets use less water than standard toilets per flush.

#### **Waterless Urinals**

**Search Terms:** waterless urinals

**Description:** Waterless urinals do not use water at all, leading to an overall 100% water savings. They require little maintenance and are comparable in cost to conventional urinals.

#### **Composting Toilets**

**Search Terms:** composting toilets

**Description:** Composting toilets often use little to no water. Through a combination of evaporation and natural decomposition, they convert human waste into useful fertilizer. Composting toilets are optimal in areas without septic systems or access to plumbing.

### **Energy Star – Appliances**

**Website:** [http://www.energystar.gov/index.cfm?c=appliances.pr\\_appliances](http://www.energystar.gov/index.cfm?c=appliances.pr_appliances)

**Description:** At this website, readers can find links to Energy Star certified clothes washers and dishwashers. These appliances not only save on electricity, but they also have reduced water consumption and may be eligible for utility rebates in your area.

### **Piping**

Although a drinking water source may be clean, residents need to consider the age and quality of infrastructure bringing water to their tap. Through corrosion and leaching, lead and other contaminants can find their way into drinking water. The resources listed below give renovation and construction suggestions that can minimize this risk.

#### **Healthy Building Network – PVC-Free Alternatives**

**Website:** <http://www.healthybuilding.net/pvc/alternatives.html>

**Description:** The Healthy Building Network is developing a series of tools to help you find PVC free building materials for your projects.

#### **US EPA – Lead in Drinking Water**

**Website:** <http://www.epa.gov/safewater/lead/index.html>

**Description:** This website provides fact sheets explaining why lead might be a problem and how it can be reduced. There are links to regulatory information and local drinking water quality reports.

## **X. Furnishings**

There are many furnishing options when constructing or renovating your home. New and reused furnishings, as well as those constructed from refurbished, sustainable, and/or durable materials are available to consumers. The resources listed here suggest 'green' furnishing options those homeowners can consider.

### **Carpet**

**Search Terms:** environmental carpet, environmental rugs

**Description:** Consumers should consider choosing carpets made from natural materials like wool and cotton or those made with recycled content. Note: carpet dyes, glues, fire retardants, and backing materials can be made with and often off-gas chemicals.

#### **The Carpet and Rug Institute (CRI) – Green Label**

**Website:** [http://www.carpet-rug.com/drill\\_down\\_2.cfm?page=8&sub=3](http://www.carpet-rug.com/drill_down_2.cfm?page=8&sub=3)

**Description:** The Carpet and Rug Institute's Green Label Plus is built upon their original Green Label and is used on carpets and rugs that meet indoor air quality criteria having low emissions. This label can be found on carpets in a showroom, and many of the "labeled" carpets are listed at this website.

### **Carpet Pads or Cushions**

**Search Terms:** environmental carpet pads, environmental carpet cushions

**Description:** Conventional carpet padding is often made with plastic or synthetic rubber and contains petroleum products. At end use, these pads are not recycled and are not biodegradable. Consumers can consider carpet pads with recycled content, minimal petroleum content, or low-VOC emissions.

#### **Carpet and Rug Institute (CRI) – Green Label**

**Website:** <http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/cushion.cfm>

**Description:** The Carpet and Rug Institute also labels carpet cushions. On this website, consumers can find "labeled" products that have been tested for and meet CRI's criteria.

## Materials

When furnishing a renovation or newly constructed home, look for products that are made with recycled or refurbished materials, free from harmful and toxic chemicals, and those that will not require quick replacement. By choosing environmentally preferable products, homeowners reduce the amount of waste to be disposed and can keep their home free from toxins.

Things to look for when purchasing furnishings for your home:

- **Chemical Free**  
These products generally have lower VOC emissions, and are not made with or require adhesives that contain formaldehyde and other carcinogens that may cause harm to homeowners and their families.

- **Durability**  
The need to replace is reduced when consumers purchase products that hold up to normal wear and tear. This keeps materials out of the waste stream and reduces production of new products that use virgin materials.
- **Locally-Made**  
Furnishings that are made locally not only support the local economy, but expend lower pollution because they tend to use local materials and minimize pollution caused by shipping (of raw materials and of product-to-market).
- **Recycled Content**  
By purchasing products that have recycled content or are refurbished, consumers reduce strain on the waste stream and put materials to use when they are still viable.
- **Recyclability**  
If the item is easy to disassemble, it will be easier to recycle when its useful life is done. Furniture that is owner-assembled or made of a single material has a higher rate of recycling potential.

## XI. Indoor Environment

It is imperative to maintain a high standard of indoor quality within the home. Americans on average spend up to 90% of their time indoors. Indoor pollution sources that release gases or particles into the air are the primary cause of indoor air quality problems in homes. Inadequate ventilation and poorly maintained ventilation filters can increase indoor pollution levels. High temperature and humidity levels can also increase concentrations of some pollutants.

The information presented below does not cover every indoor air related issue; rather it provides readers with information and tools to further their understanding of indoor environmental quality. For more information visit <http://www.epa.gov/iaq/homes>.

### Indoor Air Quality for New Homes

EPA has also developed specifications to recognize homes equipped with a comprehensive set of indoor air quality (IAQ) measures. Homes that comply with these specifications can use the "Indoor Air Package" as a complementary label to Energy Star for homes. As a prerequisite for this label, a home must first be Energy Star qualified. These specifications are being released as a pilot program to only a limited number of markets identified by EPA to allow for a comprehensive evaluation of the pilot program and to make refinements to the specifications. Visit <http://www.energy-star.gov/homes> to view the draft specifications.

The following IAQ specifications address moisture control, pest control, radon, HVAC, combustion systems, building materials, and commissioning.

### Indoor airPLUS

Comparative risk studies performed by EPA and its Science Advisory Board have ranked indoor air pollution among the top five environmental risks to public health. Indoor air pollutants can both cause asthma and make existing asthma symptoms worse, among other health problems. Children may be especially vulnerable to these health effects. EPA estimates that indoor air levels of many pollutants may be 2-5 times, and occasionally more than 100 times, higher than outdoor levels. These levels are of particular concern because it is estimated that most people spend as much as 90% of their time indoors. Visit (<http://www.epa.gov/indoorairplus/>) for more information on indoor air quality.

### Indoor Air Quality for Existing Homes

For existing homes, a number of actions can be taken to improve IAQ. Visit the following links to find more information:

- Home Improvements with Energy Star (including Home Performance with Energy Star) [www.energystar.gov/index.cfm?c=home\\_improvement.hm\\_improvement\\_index](http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index)
- Remodeling your home? Have you considered Indoor Air Quality? **Disclaimer:** The information provided in these pages is based upon current scientific and technical understanding of the issues presented. Following the advice given will not necessarily provide complete protection in all situations or against all health hazards that may be caused by indoor air pollution and other indoor environmental contaminants. Mention of any trade names or commercial products does not constitute endorsement or recommendation for use. [www.epa.gov/iaq/homes/hip-front.html](http://www.epa.gov/iaq/homes/hip-front.html)

## Mold

Indoor mold is most often found on bathroom tile, basement walls, areas around windows where moisture condenses, and near leaky sinks. Uncontrolled humidity or water leaks lead to mold growth, particularly in hot, humid climates. During renovations or construction, there are steps homeowners can take to reduce the risk of mold – please use the resources below to learn more about what you can do to minimize the chance of mold growth in your home.

To reduce mold in your home:

- Clean up all spills within 48 hours
- Keep humidity low
- Insulate cold water pipes
- Install fans in kitchens and bathrooms

For more mold control tips, please visit [www.epa.gov/mold/preventionandcontrol.html](http://www.epa.gov/mold/preventionandcontrol.html).

### **Asthma Regional Council of New England – READ THIS before you Design, Build, or Renovate!**

**Website:** <http://www.asthmaregionalcouncil.org/about/documents/READTHIS6.07.04.pdf>

**Description:** This document covers a variety of construction and renovation topics, including pest management and moisture control and gives homeowners tips on how to reduce the impact of home pollutants on persons with asthma.

### **EEBA – Mold Issues**

**Website:** <http://www.eeba.org/resources/consumer/mold.htm>

**Description:** Homeowners can find links to a number of mold-related websites – why it grows, where it grows, how it spreads, and how it can be prevented.

## Radon

Radon is a radioactive, colorless, odorless gas occurring naturally in rock, soil, and well water and is linked to approximately 21,000 lung cancer deaths in the United States per year. Homeowners are typically exposed to radon through gas diffusing through the foundations of their homes.

There are easy and inexpensive techniques that reduce the exposure to radon, whether constructing a new home or reducing the level of radon in an existing home. To find out how to detect and fix radon for your home, visit [www.epa.gov/radon/radontest.html](http://www.epa.gov/radon/radontest.html) for more information.

### **Energy and Environmental Building Association (EEBA) – Radon Issues**

**Website:** <http://www.eeba.org/resources/consumer/radon.htm>

**Description:** Here, like other EEBA resources, consumers can find links to further information, fact sheets, construction guides, and radon exposure zones.

### **National Radon Proficiency Program (NRPP)**

**Website:** [www.radongas.org](http://www.radongas.org)

**Description:** NRPP is a nationally recognized certification program for radon professionals. From this site consumers can find a checklist for radon testing and how to find a radon professional. Other radon links are available as well.

### **US EPA Radon Resistant New Construction (RRNC)**

**Website:** <http://www.epa.gov/radon/construc.html>

**Description:** Information on why homeowners should build radon-resistant and how to do so. There are links, diagrams, and contact information that consumers will find helpful during construction or renovation of their home.

## XII. Landscaping

Homeowners seeking to incorporate 'green' aspects into their home can easily find landscaping techniques that will reduce the impact of their home on the natural environment. Whether renovating, constructing, or just fixing up your yard, this topic is applicable to almost every homeowner. Some things to try when landscaping are:

- Minimizing the use of pesticides and other chemicals
- Reducing paved areas
- Reducing lawn size
- Using native vegetation

Please refer to the following links to find more on green landscaping techniques that are right for your home.

### **US EPA – Green Landscaping with Native Plants**

**Website:** [http://www.epa.gov/glnpo/greenacres/wildones/wo\\_2004b.pdf](http://www.epa.gov/glnpo/greenacres/wildones/wo_2004b.pdf)

**Description:** This document was created by EPA Region 5 – the Great Lakes Region, but it is applicable to green landscaping anywhere. It discusses the history of the landscape and how homeowners can use sustain-

able techniques to achieve natural landscapes. Woodlands, prairies, wetlands, invasive species, and wildlife are all topics covered here.

### **Beneficial Landscaping in the Pacific Northwest and Alaska**

**Website:** <http://yosemite.epa.gov/R10/ECOCOMM.NSF/webpage/Beneficial+Landscaping+Resources+in+the+Northwest+and+Alaska>

**Description:** Beneficial landscaping is a suite of landscaping practices that yield environmental, economic, and aesthetic benefits. These practices include:

- Using native plants and appropriate non-natives for landscaping
- Minimizing clearing and construction's adverse effects on natural habitat
- Implementing water-efficient practices and plantings
- Using shade trees, wind breaks, natural hedgerows, buffers and screens; and preventing pollution of air, water, and land by decreasing or eliminating use of chemicals and power lawn maintenance equipment, reducing runoff, and recycling green waste

## Composting

Yard trimmings and food residuals together constitute 24 percent of the U.S. municipal solid waste stream. That's a lot of waste to send to landfills when it could become useful and environmentally beneficial compost instead! For more information and tips on composting visit the website, <http://www.epa.gov/epawaste/conserve/rrr/composting/index.htm>.

## Integrated Pest Management (IPM)

**Search Terms:** integrated pest management

**Description:** Integrated Pest Management is the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to people, property, and the environment. For more information on controlling pests on your property, use the resources below and speak to your landscaping professional.

### US EPA – Pesticides and Food:

#### What “Integrated Pest Management” Means

**Website:** <http://www.epa.gov/pesticides/food/ipm.htm>

**Description:** By using trapping devices and regularly inspecting your plants, you can keep pest damage to a minimum in your garden without spraying harmful chemicals. This website leads readers to additional information and discusses the basics of IPM.

## Irrigation

Irrigation can be reduced when landscapes are designed to include native species. Because these plants are accustomed to the local environment, they thrive with little maintenance – reducing stress on local water supplies and the environment. When native species are not available, or cannot be included in your designs, please use the following tips when irrigating:

- Position sprinklers so that they only water vegetation and not driveways, sidewalks, and the street
- Skip watering on weeks where there has been rain
- Use rain barrels to collect water for irrigation
- Water lawns and gardens in the morning to reduce evaporation
- Water slowly to avoid run-off

## Rain Barrels

**Search Terms:** rain barrels, rain catchment

**Description:** Rainwater is naturally soft and does not contain minerals, chlorine, fluoride, and other chemicals. Plants tend to respond well to watering with this water. By collecting rain, homeowners can save money on water used for irrigation. Systems range from simple, such as plain buckets, to advanced with cisterns, pumps, and flow controls. If the catch bucket you use does not have a lid, consider mosquito control methods, such as adding goldfish to eat mosquito larvae. The fish will need an air pump to get oxygen, but provide a ‘low tech’ way to minimize spread of mosquito-borne disease. Be careful that they don't make their way into the watering can!

## Water Saving Tips for your Lawn and Garden

**Website:** [http://www.cmhc.ca/en/co/maho/la/la\\_006.cfm](http://www.cmhc.ca/en/co/maho/la/la_006.cfm)

**Description:** Although a Canadian publication, these tips can be applied to lawns and gardens throughout

the United States. This website offers basic information about lawn and garden irrigation – when to water, how to water – as well as some more advanced suggestions including rain barrels and tips on aeration.

## Natural Shade

By providing your home with well-located natural shade, homeowners can save up to 30% on air conditioning costs and 20-50% of the energy used to heat a home. Also, the USDA Forest Service estimates that healthy, mature trees well planted on a house lot can add an average of 10% to the property value.

### Washington State Department of Natural Resources

**Website:** <http://www.dnr.wa.gov/wcfc/>

**Description:** The Washington Department of Natural Resources' website provides links on various topics related to shading.

## Specialized Techniques

Advanced gardeners might try applying Greenscapes, organic gardening techniques, or Xeriscaping to their property. The information below will guide homeowners in their landscaping decisions.

### Greenscapes

**Search Terms:** greenscapes

**Description:** Greenscape ideas are typically used on commercial property and large scale landscaping, but the techniques offer homeowners some ideas for environmentally responsible landscaping. One Greenscapes idea is to purchasing hoses, tubing, trickle irrigation systems, and lawn edging made from recovered plastic and old tires.

Visit [www.epa.gov/epaoswer/non-hw/green/index.htm](http://www.epa.gov/epaoswer/non-hw/green/index.htm) for more information on Greenscapes.

### US EPA – “Greenscaping” Your Lawn and Garden

**Website:** <http://www.epa.gov/epaoswer/non-hw/green/pubs/home-gs.pdf>

**Description:** This general guidance on Greenscaping discusses why it's beneficial to the environment and how homeowners can incorporate it into their yards. Composting is also discussed.

## Organic Gardening

**Search Terms:** organic gardening, green gardening

**Description:** Organic Gardening is the practice of maintaining a garden or lawn without the use of pesticides and herbicides. By using alternative maintenance practices, homeowners can successfully garden while reducing their exposure to potentially harmful chemicals.

### Organic Lawn Care FAQ

**Website:** <http://faq.gardenweb.com/faq/lists/organic/2004020829016580.html>

**Description:** This website focuses on organic lawn care. Information on organic and natural fertilizers, composting, and pest and weed management can be found here.

## Xeriscaping

**Search Terms:** xeriscaping, xeriscapes

**Description:** Xeriscaping is a general term that refers to landscaping techniques known for water conservation and environmental protection. Using specific designs and planning, plant choice, and irrigation/maintenance techniques homeowners can apply xeriscaping to their property.

## Xeriscaping – Establishing a Waste Efficient Landscape

**Website:** <http://www.ciwmb.ca.gov/organics/Xeriscaping/>

**Description:** This resource was prepared by the State of California and discusses some xeriscaping basics – like what it is and why homeowners should consider it – as well as information on landscape design, plant choice, soil preparation, and irrigation systems.

## XIII. Stormwater Management

Runoff from land and impervious areas such as paved streets, driveways, and rooftops during rainfall and snow events often contain pollutants that could adversely affect water quality. Homeowners can manage stormwater on their property by minimizing paved areas, capturing rainwater, and consciously preventing stormwater contamination during construction.

Visit [http://cfpub.epa.gov/npdes/home.cfm?program\\_id=6](http://cfpub.epa.gov/npdes/home.cfm?program_id=6) for information on EPA's stormwater program.

### Erosion and Sediment Control

Erosion and sedimentation is harmful to the environment and can disturb local wildlife habitats. During construction, the land is disturbed and often there are piles of dirt, steep slopes, and natural habitats that need protection. The resources found below discuss the harms of erosion and sedimentation while giving homeowners management strategies for use during construction and renovation.

#### US EPA – Does Your Site Need a Stormwater Permit?

**Website:** [http://www.epa.gov/npdes/pubs/sw\\_cgp\\_brochure.pdf](http://www.epa.gov/npdes/pubs/sw_cgp_brochure.pdf)

**Description:** This website outlines the National Pollution Discharge Elimination System (NPDES) permitting system and advises homeowners about scenarios when their contractor may need to get a storm water permit from EPA or the state.

#### US EPA – Innovative Uses of Compost

**Website:** <http://www.epa.gov/epaoswer/non-hw/compost/erosion.pdf>

**Description:** This document discusses the use of compost during and after construction for erosion control, turf remediation, and landscaping. Compost can be generated from the trees and brush on site during the clearing, stumping, or grubbing processes.

#### US EPA – Stormwater and the Construction Industry

**Website:** <http://www.epa.gov/npdes/pubs/posterside1.pdf>

**Description:** This document provides suggestions for controlling stormwater and erosion during construction.

### Surface Water Management

When surface water is appropriately managed, pollution from stormwater can be greatly reduced. Through minimizing impervious surfaces and incorporating rain gardens and collection systems, homeowners can control surface water on their property.

#### US EPA – Solution to Pollution

**Website:** [http://www.epa.gov/npdes/pubs/solution\\_to\\_pollution.pdf](http://www.epa.gov/npdes/pubs/solution_to_pollution.pdf)

**Description:** This brochure discusses stormwater pollution and why healthy household habits can benefit the natural environment. Look here for information on vehicles and garages, lawns and gardens, home repair and improvement, pet care, swimming pools and spas, and septic system use and maintenance.

#### US EPA – Ten Things you can do to Prevent Stormwater Runoff Pollution

**Website:** [http://www.epa.gov/npdes/pubs/nps\\_month\\_bookmark.pdf](http://www.epa.gov/npdes/pubs/nps_month_bookmark.pdf)

**Description:** Here homeowners can find 10 easy ways to reduce stormwater pollution.

#### Seattle Public Utilities' Natural Drainage Systems

**Website:** [http://www.seattle.gov/util/About\\_SPU/Drainage\\_&\\_Sewer\\_System/Natural\\_Drainage\\_Systems/Natural\\_Drainage\\_Overview/index.asp](http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Natural_Drainage_Systems/Natural_Drainage_Overview/index.asp)

**Description:** Natural drainage systems are an innovative alternative to traditional stormwater management systems. Find information here on the benefits of vegetated swales, stormwater cascades, and small wetland ponds along with case studies of projects where these techniques have been implemented.

### Pavement

Paved and other impervious surfaces, such as roofs, do not permit precipitation to infiltrate into the ground. By minimizing these surfaces by landscaping or other methods, homeowners reduce the impact of stormwater pollution. Use the resources here to make environmentally friendly pavement/landscaping choices for your home.

#### Recycled Tire Paving

**Search Terms:** tire sidewalks, recycled tire paving

**Description:** This paving material can be made from 100% recycled rubber. It is gaining popularity in the US and is being used predominantly for sidewalks. This pavement is porous, durable, can withstand tree root growth, and does not become slippery when wet. It is available for residential uses as well.

### **Toolbase Services**

**Website:** <http://www.toolbase.org/ToolbaseResources/level4DG.aspx?ContentDetailID=3897&BucketID=4&CategoryID=61>

**Description:** Here readers can find porous alternatives to traditional pavement patterns and materials. Materials, methods, and installation for these materials are given.

### **Rain Gardens**

**Search Terms:** rain garden, bioretention cell

Rain gardens look like traditional gardens, but usually consist of deep-rooted native plant species and have a bowl-shaped dip in the center. They are used to absorb and filter rain as it runs off paved and other impervious surfaces on a home's landscape. Because they are typically planted with native species, they require little maintenance once they are established.

### **Water Collection Systems**

By collecting rain in a basin and either releasing it slowly to recharge groundwater or saving it for future irrigation and other non-potable needs, homeowners can reduce pressure on municipal water supplies and minimize stormwater runoff.

#### **Rain Barrels**

**Search Terms:** rain barrels, rain catchment

**Description:** By collecting rain, homeowners can save money on water used for irrigation. Systems range from simple, such as plain buckets, to advanced with cisterns, pumps, and flow controls. For more information on rain barrels see **Irrigation** in the **Landscaping** section of this Guide.

## **XIV. Renewable Energy**

There are a number of energy sources that are used to power homes and businesses in the United States and around the world. Renewable sources of energy have been gaining in popularity and are being integrated into our daily lives. The following energy source alternatives to natural gas, oil, and conventional electricity have become more common because of their reduced effect on the environment and human health. Some alternatives are more easily adapted for use in new homes and renovations, whereas it is more difficult to include others. Use the resources below to determine if renewable energy is right for you.

Contact your local energy provider to inquire about ways you can conserve energy and request that they provide you with renewable energy. Some energy companies already have renewable sources; you just have to let them know that you want to be a part of a renewable program. Below is a list of major utilities in Alaska and the Pacific Northwest that have renewable energy programs.

#### **Alaska**

Alaska Power Association  
<http://www.alaskapower.org/>

#### **Idaho**

Idaho Power's Green Power Program  
<http://www.idahopower.com/NewsCommunity/OurEnvironment/GreenPower/default.cfm>

#### **Oregon**

Energy Trust of Oregon's Renewable Energy Programs  
<http://www.energytrust.org/RR/index.html>

#### **Washington**

Tacoma Power's Green Power Program  
<http://www.mytpu.org/tacomapower/conserves-energy/green-power/Default.htm>

City of Seattle's Green Up Program

<http://www.ci.seattle.wa.us/light/Green/greenPower/greenup.asp>

Puget Sound Energy's Green Power

<http://www.pse.com/energyEnvironment/renewableenergy4/Pages/GreenPowerProgram.aspx>

### **Renewable Energy Options**

#### **Hydroelectric Energy**

**Search Terms:** hydroelectric power

**Description:** Hydroelectric power is derived from the energy in flowing water.

#### **Tidal Power**

**Search Terms:** tidal power

**Description:** Tidal power is power that is generated from tidal currents in waterways.

#### **Biodiesel**

**Search Terms:** biodiesel

**Description:** Biodiesel is made from domestic renewable resources and when used in low concentrations can be mixed with traditional diesel fuel to power vehicles or with heating oil for home heating. Consumers looking to mix biodiesel with traditional heating oil should ensure that their furnace or boiler can accommodate the concentration before use.

#### **Fuel Pellets**

**Search Terms:** fuel pellet

**Description:** Fuel pellets are typically made from sawdust and ground wood chips that would normally be disposed. Pellets can be stored easily and conveniently and burn readily with high heat output and very little emissions. Total heating costs may be less than the cost

of electric heat, and competitive with average costs of other fuels.

### **Geothermal Energy**

**Search Terms:** geothermal energy

**Description:** Geothermal energy, or heat from the earth, is a renewable energy source that is gaining popularity in residential markets. Geothermal heat pumps extract heat from the ground water for direct home heating. In the summer months, these same systems are able to release excess heat through a reversed process. They are not effective in very cold climates and may require backup heat sources. Although there is no cost for the energy, these systems can be expensive to install and are only available to customers with appropriate home sites.

### **Solar Energy**

**Search Terms:** solar power, solar energy, photovoltaic cells, solar cells

**Description:** Solar energy is power harvested from the sun and can be used for passive home heating and

water heating purposes. There are several technologies associated with solar power – photovoltaic cells and panels, solar power plants, passive solar heating, and solar hot water heating. While solar energy is free and renewable, the cost of the systems and retrofitting older homes can be costly. The federal government's latest energy bill has added a solar tax credit that will allow homeowners to redeem a percentage of the cost of purchase. Additionally, depending on the state where you reside where the local government may help subsidize the cost as well.

### **Wind Energy**

**Search Terms:** wind energy, wind turbines, wind farms

**Description:** Wind turbines and wind farms are increasing in popularity as wind energy becomes the world's fastest growing renewable energy source. Wind energy is clean, can be used as a source of home electricity, and is readily available for purchase from some utility companies. Contact your local power provider to see if wind energy is available in your area.

## **XV. Local Green Building Programs and Certification Programs**

The following local and national organizations provide standards for residential green buildings. While some publish guidelines for public use, others only allow use upon the completion of seminar courses or payment of fees. Homeowners can use these standards as checklists, recommendations, or suggestions for their own projects or can strictly follow any set and apply for certification.

### **Local Green Building Programs**

#### **Alaska**

##### **GreenStar**

**Website:** <http://www.greenstarinc.org/>

#### **Oregon**

##### **Oregon Department of Environmental Quality**

**Website:** <http://www.deq.state.or.us/lq/sw/wasteprevention/greenbuilding.htm>

##### **City of Portland**

**Website:** <http://www.portlandonline.com/osd/index.cfm?c=45837>

#### **Idaho**

##### **City of Boise**

**Website:** [http://www.cityofboise.org/Departments/Public\\_Works/EnvironmentalResourceCenter/Sustainable-andLivableBoise/index.aspx](http://www.cityofboise.org/Departments/Public_Works/EnvironmentalResourceCenter/Sustainable-andLivableBoise/index.aspx)

#### **Washington**

##### **Washington State Department of Ecology**

**Website:** <http://www.ecy.wa.gov/programs/swfa/greenbuilding/>

#### **King County Green Tools**

**Website:** <http://www.your.kingcounty.gov/solidwaste/greenbuilding/index.asp>

#### **City of Seattle**

**Website:** <http://www.seattle.gov/dpd/Planning/CityGreenBuilding/default.asp>

### **Certification Programs**

#### **American Lung Association – Health House (New Construction)**

**Website:** <http://www.healthhouse.org/consumer/build.cfm>

**Description:** This indoor air building program was designed by the American Lung Association. Health Homes are inspected during construction and tested upon completion. Visit the website to learn more and order a free copy of their building brochure.

#### **Energy Star and Indoor AirPLUS New Homes (New Construction)**

**Website:** [http://www.energystar.gov/index.cfm?c=bldrs\\_lenders\\_raters.pt\\_bldr](http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.pt_bldr)

**Description:** This site provides builders, raters, sponsors, and lenders of new homes with information about the voluntary label for Energy Star Qualified New Homes and information about Indoor AirPLUS.

#### **Leadership in Energy and Environmental Design (LEED) for Homes (LEED-H) (New Construction)**

**Website:** <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=147>

**Description:** The LEED-H program, released in August 2005, applies the US Green Building Council's (USGBC) existing programs to residential construction. You can find the new checklist, program provider lists, and contact information at their website.



### **Green Globes (New Construction, Existing Buildings)**

**Website:** <http://www.thegbi.org/green-globes-tools/>  
**Description:** Certification system for new and existing commercial buildings, but tools and resources for residential green building also provided.

### **Washington's BuiltGreen (New Construction, Existing Buildings)**

**Website:** <http://www.builtgreen.net/checklists.html>  
**Description:** Certification system for single family new construction, remodeling existing homes, multi-family complexes, and communities.

### **Oregon's EarthAdvantage (New Construction)**

**Website:** <http://www.earthadvantage.com/>  
**Description:** Certification for new construction only, but tools for existing homes.

## **Checklists, Criteria, Guidance**

### **Sustainable Building Industry Council's Green Building Guidelines**

**Website:** <http://www.psic.org>  
**Description:** The Guidelines provide homeowners green building criteria, checklists, and recommendations that they can share with their contractor. The guide is available online for a fee.

### **Green Communities Criteria (New Construction, Existing Buildings)**

**Website:** <http://www.greencommunitiesonline.org/get-started-request.asp>  
**Description:** The criteria here are focused on creating green affordable housing in American communities. Although not completely applicable to homeowners, some

of the approaches can be incorporated into renovation and new home construction. Readers can request the criteria from the above website for free.

### **Green Points (New Construction, Existing Buildings)**

**Website:** <http://www.stopwaste.org/home/index.asp?page=469>  
**Description:** Although designed for Alameda County, California, the Green Points system is applicable throughout the country. From this site, homeowners can find suggestions and guidelines for home remodeling, new construction, and the Green Points rating tool for evaluation of their home's green characteristics.

### **National Association of Home Builders (NAHB) – Model Green Home Building Guidelines**

**Website:** [http://www.nahb.org/publication\\_details.aspx?publicationID=1994](http://www.nahb.org/publication_details.aspx?publicationID=1994)  
**Description:** This set of voluntary guidelines was developed by the NAHB Research Center in an open, public process with many stakeholder groups from the home building industry. The guidelines are free and available for download at the website listed above.

### **US EPA Office of Compliance – Managing Your Environmental Responsibilities (MYER): A Planning Guide for Construction and Development**

**Website:** <http://www.cicacenter.org/links/>  
**Description:** The MYER Guide contains two different sets of checklists and detailed discussion/case studies on major environmental areas (including stormwater) affecting the construction industry. Readers will find answers to many environmental questions and can conduct self audits by using the self-audit checklists, included in Part II of the Guide, during the Construction phase.

## **XVI. Green Building Examples**

Below are examples of successful residential green building. Although they are not all in Alaska or the Pacific Northwest, they are useful models that readers might like to explore before starting their green building project.

### **Alaska and the Pacific Northwest Examples**

#### **Alaska's Cold Climate Housing Research Center**

**Website:** <http://www.cchrc.org/sustainable+norther+shelter+project.aspx>  
**Description:** The sustainable Northern Shelter demonstration house in Anaktuvuk Pass incorporates sustainable design principles that make it an example of affordable, energy-efficient, culturally-based, and environmentally-appropriate building for northern climates.

#### **City of Tacoma, Washington's EnviroHouse**

**Website:** <http://www.cityoftacoma.org/Page.aspx?hid=2218>  
**Description:** The City of Tacoma created a permanent model house that demonstrates sustainable ideas inside and outside of the home. The house showcases a number of ideas that range from flooring options, landscaping, roofing material, art, and much more. It is open to the public.

#### **City of Issaquah, Washington's zHome**

**Website:** <http://z-home.org/>  
**Description:** This is a zero-energy home (zero-utility costs) that is carbon neutral and located in Issaquah, WA.

#### **Cascadia Region Green Building Council Case Studies**

**Website:** <http://casestudies.cascadiagbc.org>  
**Description:** Collection of high performance building in-depth case studies from Oregon, Washington, and British Columbia.

### **Nationwide**

#### **Duke University Smart House**

**Website:** <http://delta.pratt.duke.edu/>  
**Description:** This house will act as a "living laboratory" for Duke University engineering students. Their goals are to promote the use of residential green building design, influence the market demand for green residential technology, foster innovation, and educate students.

**Habitat for Humanity**

**Website:** [http://www.habitat.org/env/project\\_examples.aspx](http://www.habitat.org/env/project_examples.aspx)

**Description:** Habitat for Humanity builds sustainable homes in communities around the world. The website has project examples and case studies from the U.S. and around the world.

**Hickory Consortium Projects**

**Website:** [http://www.hickoryconsortium.org/2\\_projects/projects.htm](http://www.hickoryconsortium.org/2_projects/projects.htm)

**Description:** These projects – Cambridge CoHousing, Erie Ellington, Reviviendo Housing, and more – are examples of residential, multi-family greenbuildings.



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[www.epa.gov/r10earth/greenbuilding/](http://www.epa.gov/r10earth/greenbuilding/)

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