green home remodel

healthy homes for a healthy environment

bath & laundry

green

What is a Green Remodel?

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

Cover photo: JAS Design Build (photo © John Granen).

Photo above and contents page, bottom right: VELOCIPEDE architects.

why

Why Consider a Green Remodel?

SAVE MONEY
Energy-efficient and water-wise designs or products reduce monthly bills. Home components chosen for their durability and timeless appeal will last longer and cost less to maintain in the long run. When you make living spaces welcoming to a variety of ages and abilities, your home will be marketable to a larger population (a key benefit for resale) and less likely to require costly modifications as your own abilities change.

MAKE A HEALTHIER HOME
A green remodel can be good for you, physically and emotionally. Health-focused designs maximize fresh air and natural light, while reducing the risk of injury. Potential problems like molds, allergens and toxic chemicals are identified and addressed early–a strategy that proves more effective and almost always much cheaper than fixing them after they develop.

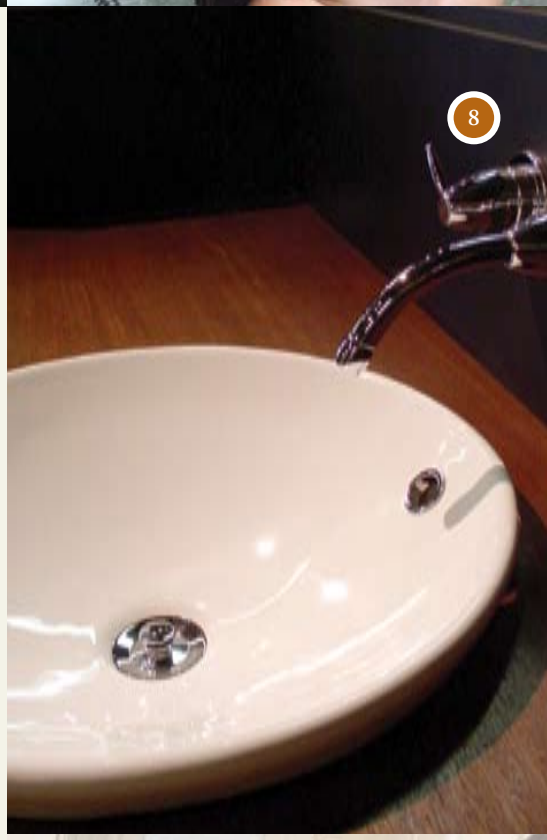
REDUCE ECOLOGICAL IMPACT
Remodeling is an opportunity to create a home that enhances the natural environment, instead of depleting it. You can make your living space more resource-efficient, minimize waste, and recycle what's left over to reduce the amount of materials ending up in landfills.

bath & laundry

A bath remodel is one of the most expensive upgrades you can make to your home on a per-square-foot basis. A study by the National Association of Realtors estimates the cost of a midrange Seattle bathroom remodel (replacing fixtures, vanity and medicine cabinet in a 5' x 9' bath, including tile floor and tub surround) at a little over $10,500. An upscale remodel (involving enlarging an existing space, tile floor and surround, top-of-the-line fixtures and counter, plus relocating and partitioning the toilet) is estimated at over $24,000. Such a sizable investment encourages lots of planning and up-front research to ensure you'll be happy with the results for a long time.

The ideal laundry area combines durability, functionality, and efficiency with concern for human and environmental health. Careful decisions about appliances, flooring, cabinetry and fixtures can ensure your laundry is the right mix of these factors. A laundry space can range from its own room to a closet tucked into a bathroom. In both the bath and laundry, you can protect your investment by maintaining it with products that are safer for you and the environment.

contents



rethink remodel

Green remodeling requires a new approach to the remodeling process, with more up-front planning and coordination to capture opportunities that are often missed in the conventional remodeling process. This includes expanding your list of objectives as well as the way you compare the price of products and services, by taking wide-angle and long-term views of decisions. It also means being willing to invest time and energy to find solutions that best fit your needs. And finally, it means approaching your remodeling project with health and safety at the forefront. This advance planning pays large dividends in terms of long-term satisfaction with your project and cost containment.

Let this guide serve as the starting point for your remodel. Each decision regarding your bath or laundry area, from appliances and lighting to flooring and fixtures will help you create a green remodel.

Decide What You Want

Planning a remodel can elicit equal parts excitement and terror. Where do you begin? Generally, the more you can stick with existing walls, cabinetry, plumbing and electrical layouts, the less you will spend on your remodel. You'll use fewer resources with less waste. So first, define your priorities and then consider all your options carefully.

Health & Safety	Are materials and finishes non-toxic? Is ventilation sufficient? Are surfaces easy to clean without harsh chemicals? Does the layout promote safety from slips and electric shocks? Is the water temperature set to avoid scalds? Are lighting levels sufficient for tasks, without creating glare?
Usefulness	Create a list of your most common tasks. Does the design make tasks easier and more pleasant? Or does it hinder them?
Efficiency	Are the fixtures and appliances resource-efficient? Toilets and showers make the bathroom your home's biggest water user. In the laundry, efficient clothes washers can save thousands of gallons of water a year, while providing energy savings, as well.
Comfort & Beauty	Is the space inviting and attractive? What makes the space uncomfortable: the layout, surfaces, colors or lighting? In the laundry specifically, consider whether items such as ironing boards and drying racks should be built-in or portable.
Durability	Do the materials stand up to use over time? Bath and laundry areas are both subjected to standing water and other forms of continual moisture. Are they designed to be timeless, meshing with the era of the home, or will they look dated in a few years?
Space	Is it lacking or wasted? Take an inventory of all categories of space: personal space, elbow room, storage, floor and visual space. Then be creative. Explore simpler solutions first, such as creating a grooming station in the bedroom to free up human traffic jams during the morning rush, or consolidating cleaning supplies in one area (that's inaccessible to children, of course).
Accessibility	Does the design accommodate a variety of people, both in age and ability? Is there space for a wheelchair to maneuver? Does the design include support bars, or the option to add them if needed?
Ecological Benefit	Do materials and appliances reduce or avoid environmental harm during their production, use, and disposal? Are they made from materials that are recycled, responsibly mined or harvested, renewable, and/or local? Are they reusable or recyclable?

Expand Your Definition of *Cost*

Focus on long-term savings, ease of maintenance and conservation. Initial price gives just a peephole view of the true cost of a product or design. A higher purchase price may mean a better deal in the long run. For example, you can actually reduce the cost of living in your home by choosing resource-efficient fixtures (lowering monthly utility bills) and durable materials (requiring less frequent replacement). A low purchase price may simply be a good deal, or it may signify a lack of quality or durability–even environmental, health, or social costs not reflected on the price tag.

Incentives and tax credits may be available for specific features of your green remodel, helping shorten the payback period. Be sure to check the incentives list at www.seattle.gov/dpd/greenbuilding (click on *Residential*, then *Homeowners*, then *Incentives & Assistance*).

Do Your Homework

Research helps you ask the right questions of retailers, your designer and/or contractor–or avoid costly mistakes if you are doing the work yourself. Finding green products can be a challenge. It pays to start early looking for businesses that carry products you like. Keep a file of contact names and businesses, and magazine and newspaper clippings. Identify everything for your new bathroom or laundry area–down to the product brands, light fixtures and finishes. This will help you determine cost and availability, while reducing the need for expensive, last-minute decisions. Find out how long it takes to special-order items and factor this into your schedule. The Internet is a great place to start when searching for information and products–but be aware of biases in information sources. The line between sales pitch and factual information can be quite blurry on the Web.

Remodel Safely

Select products to minimize the introduction of harmful fumes caused by paint, adhesives, sealers, formaldehyde-containing materials and more. Make your objectives for dust and fume containment, as well as cleanup procedures, clear with your contractor before the work begins. Beyond identifying health objectives for your new design, take time to identify the hazards that already exist in your home. Many old paints contain lead, and disturbing these surfaces can increase the risk of lead poisoning. Certain plumbing types can also contain lead, which can leach into drinking water. Asbestos is another potential hazard, most likely in older vinyl flooring in a bathroom. For more on toxics in the home, see www.watoxics.org.

Also, make sure all work follows building codes. Work that violates codes may also violate the terms of your insurance policy, leaving you vulnerable to loss. Following codes can also save you the hassle, waste and expense of having to tear out non-compliant elements. It's likely the reason it doesn't comply is due to safety, health, or energy efficiency issues–all goals of a green remodel.

Universal Design Benefits Everyone

Beyond basic accessibility issues, *universal design* strives to create spaces that welcome all ages and abilities. The result is a more flexible, adaptable design useful to a wide range of ages, sizes or physical abilities. These principles can help homeowners age in place and reduce the need for costly and wasteful tear-out and remodeling activity down the road. The National Kitchen and Bath Association maintains an excellent list of design and safety guidelines at www.nkba.org (click on *Online Remodeling Guide*).

Photo first and second from top: Environmental Home Center.

A healthy home breathes. Proper ventilation is especially key in bathrooms because they produce tremendous amounts of water vapor–therefore, greatly increasing the potential for mold and moisture damage. That's why building code requires adequate ventilation in the bathroom. Find quiet, energy-efficient fans at www.energystar.gov. Couple your fan with a timer or humidistat for optimal performance.

bath

Bathrooms, once considered purely utilitarian, are increasingly a place for everything from renewal and pampering to washing the family dog. Such a range of uses requires materials that are beautiful, durable, and impervious to moisture. The bath is also where most of the indoor water is used in a home, and energy is consumed by heating that water, as well as lighting, warming, and ventilating the space.

Tub and Shower Surrounds

As a surface doused with water several times a day in the average house, shower walls must obviously withstand long-term exposure to moisture. Fiberglass and acrylic enclosures make popular low-cost and easy-to-install options but raise concerns regarding manufacturing processes and durability. Long-lasting tile performs better environmentally, and often economically, when added durability is taken into account. If an existing tile surround is in good condition, consider re-grouting rather than re-tiling. This can be professionally contracted, or makes a good do-it-yourself project. A quality, properly installed and maintained tile wall can last as long as the house. Use a concrete backerboard for tile in wet areas. Moisture-resistant gypsum wallboard (often called *greenboard* and identified by a green paper surface) is not suitable for wet applications such as shower and tub surrounds. Look for solvent-free mastics or *thinset mortars*.

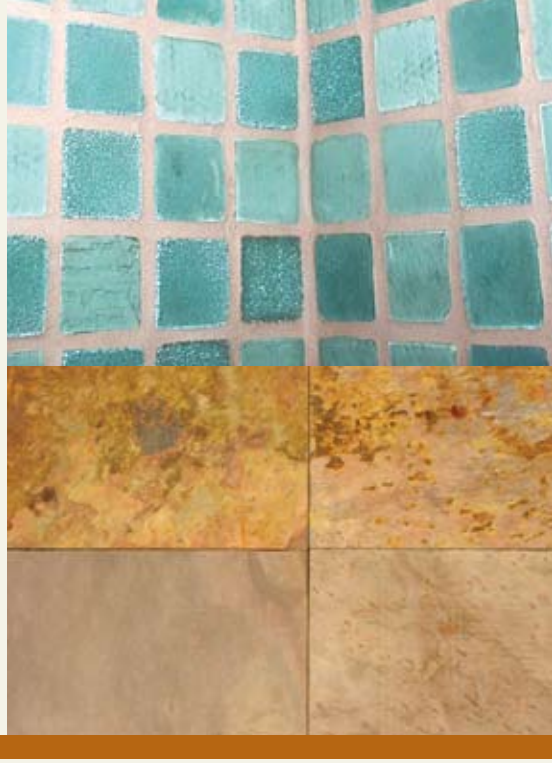
Tips for Easy-Maintenance Wall Tile

A common problem with tile tub enclosures is moldy, stained grout. To avoid this:

- Consider light-colored grouts rather than white.
- Choose tiles that can be set close together (⅛ inch or less). This means less grout to clean, and that you can use unsanded grout, a denser grout mix that makes it harder for mold to take hold.
- Use a water-based grout sealer, and latex-modified grouts.
- Squeegee tiles after each shower.
- Keep shampoos and other bottles in a caddy or in freely draining wall shelves.
- Install a timer on your bathroom fan. A fan should run for about ten minutes after each shower (or until steam is off the mirror, whichever is sooner) to exhaust water vapor from the space.

wall tile

In general, tile is considered an environmentally preferable choice, due to its durability and natural material origins. See Flooring, page 10, for more information on tile. Look for locally produced designs as tile manufacturing is a strong cottage industry in the Pacific Northwest. What's more, locally owned tile shops tend to carry a larger selection of regional manufacturers than you'll find in national chain home improvement stores. The cost of tile varies dramatically depending on material, quality, and complexity of the installed design. Research these costs along with products' other attributes.



wall tile options

MATERIAL	DESCRIPTION	SELECTION TIPS
Ceramic 	■ made of various clays, mined from the earth and fired at high temperatures ■ usually glazed for additional protection and ease of cleaning ■ ceramic glazes often contain lead and other toxic heavy metals; today most toxins are excluded from tile glazes in the United States, but some other countries have yet to follow suit	■ consider regionally manufactured ceramic tiles, many available with up to 70% recycled content ■ tiles incorporating recycled glass not only support recycling, but last longer ■ research imported tiles as quality varies greatly; however, little information is usually available on production practices or whether glazes are lead-free ■ choose sealers free of formaldehyde and low in volatile organic compounds (VOCs)
Glass 	■ dates back to Roman times; surviving mosaics from this period attest to their incredible durability ■ mosaic tiles (small, usually ¼"- 1" square) are usually cut from sheets of glass; larger glass tiles are often cast (either poured while glass is hot or made by placing ground glass in a mold and heating until fused)	■ look for regional manufacturers and 100% recycled content ■ recycled glass tiles manufactured using a sintering process (heated to the point of fusing rather than full melt) use less energy in production ■ larger glass tiles are usually irregular in shape, requiring wider grout lines and sanded grout ■ water-based grout sealers help keep grout surfaces easy to clean ■ avoid sealers with formaldehyde and other toxic substances
Terrazzo & Concrete 	■ traditional terrazzo embeds chips of marble in cement, with a smooth ground surface revealing the chip pattern ■ in some products, cement binder is replaced with a synthetic resin ■ commonly poured in place for floors; also available in tiles for wall applications	■ look for nontoxic sealers ■ the thickness of tiles can pose installation challenges ■ residential application is less common than commercial, so may be difficult to find an experienced residential contractor ■ look for options with recycled content, including recycled glass, fly ash (a byproduct of coal burning), or reclaimed carpet fiber (which increases the strength of the tile)
Stone 	■ cut and honed marble, granite, and slate are common choices ■ durable but may require more maintenance than ceramic or glass tile ■ many stones like marble and granite require periodic sealing to withstand moisture and staining ■ quarried around the world; difficult to assess environmental impact	■ select regional sources ■ cut stones allow for narrow grout lines and unsanded grout; tumbled stone often requires wider grout lines which increases maintenance ■ choose stone that does not require a sealant, or use a non-toxic version ■ create a one-of-a-kind shower with salvaged stone or remnants from fabricators ■ look for vintage slate at building salvage companies

caulking

Essential in areas where different materials meet, caulking joins tile to the tub or drain pan, shower corners, and some sinks. Proper caulk application in these areas can prevent serious moisture damage. Caulk comes in a variety of formulations, giving it a range of qualities. Many conventional formulations include very toxic substances, often in large enough quantities to result in nerve damage and other serious side effects if used without sufficient ventilation. Never use caulk specifically formulated for outdoor uses (such as *butyl rubber caulk* and oil-based *contractor's caulk*) inside the home–these hazardous substances can severely impact indoor air quality. Many caulks formulated for the bathroom contain fungicides and other fungus- and mold-inhibiting compounds. Balance the benefits of these additives against their risk to humans or the environment; better yet, avoid them altogether and look for non-toxic blends. In short, research before you buy.

At the very least, ask your retailer for the *Materials Safety Data Sheets* (MSDS) for the brands you are considering. A MSDS is an overview of a product's toxic characteristics, as well as use and handling cautions. Although produced for worker safety, they provide valuable information to the consumer, too. Whichever type of caulk you choose, purchase only the amount you need. Leftover caulk tends to dry out, wasting money and resources. The following is an overview of the most common caulk choices:

- Latex caulking is similar in makeup to latex paint, with added fillers and colorants. Generally, latex caulking is the least toxic caulking alternative, and cleans up with soap and water. However, it tends to be less durable than its more toxic counterparts.
- Acrylic caulking can also be cleaned up with water. Formulations range from all-acrylic to acrylic-latex blends. Resins and solvents make these products more toxic than their all-latex counterparts. Given the variation in formulations of this type of caulk, it makes sense to read the label, and ask the retailer for the MSDS.
- Silicone caulks contain silicone resin and vinegar. In fact, the evaporating vinegar is what produces their distinctive smell. Once this caulk is dry, it is essentially inert, with excellent indoor air quality characteristics. (However, the production process of silicone caulk creates hazardous waste and water pollution.) Cleanup usually requires solvents, although misapplied caulk can often be left to dry and scraped off most surfaces with a razor blade. Silicone formulations for the bath usually contain toxic compounds intended to reduce mold and mildew growth.

bathtubs

Bathtubs can be luxury or utility items, and often serve as both. If your current tub is in good condition, consider reusing it. If it dates from the period of your home's construction, the tub will help unify the bath remodel with the rest of the house. Removing an existing bathtub can be a major challenge or expense, often requiring stripping the walls above to the studs, or cutting a hole through an adjoining wall to remove it.

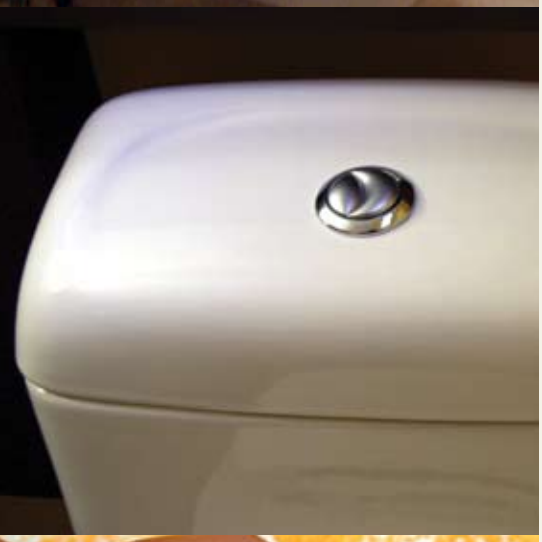
Bathtub Refinishing

It's possible to renew porcelain finished cast iron tubs. This entails repairing any chips in the porcelain finish with a fiberglass filler, etching the surface with hydrofluoric acid or other bonding agent, then applying several coats of acrylic urethane enamel to the surface. The process should extend the life of your bathtub by up to twenty years, with proper maintenance. Tub refinishing can run $500 and up and should be done by a professional. Refinishing processes and products vary widely in quality. Look for long, comprehensive warranties and check references before selecting a refinishing firm. Be sure to ask how the work area will be sealed off from the rest of your home and vented during the process, as well as how the refinisher treats the hazardous substances. Because tub refinishing requires toxic materials, persons with chemical sensitivities should conduct thorough research before choosing this option.

Bathtub Replacement

If you're intent on a replacement tub, be sure to explore the building salvage and architectural vintage retailers in your area. Occasionally, you can find an old tub in mint condition for a fraction the cost of new. If you opt for new, consider cast iron or heavy steel bathtubs with a porcelain finish. These can last 50 years or more. If you're a frequent tub user, one drawback of a steel or iron tub is heat loss. Carefully evaluate other tub choices: acrylic tubs, for example, are prone to scratching and short life spans, but retain heat better. A heavy object can chip a thin-gauge steel tub. Think carefully about jetted tubs. Make sure the tub will fit the space (including doorways leading to the bathroom), and that their use will justify the added expense. For those more likely to shower than soak, the money saved from eliminating a luxury tub can purchase other bath luxuries. Also, small tubs take less water to fill, saving water.

Photo top right: Martha Rose Construction. Photo middle right: Prentiss Architects.



toilets

Older toilets can be huge water wasters, using as much as five *gallons per flush* (GPF), while new models are required to use 1.6 GPF or less. The GPF rating is often located on the toilet bowl, just behind the seat hinges. If your toilet was installed before 1992, you'll save water by replacing it with a new, efficient toilet. *Dual-flush* toilet models save even more, by giving the user the option between a full or half-flush, depending on flushing needs.

Performance still varies widely between low-flow models. Look for a *Flush Star* qualified model, independently verified to save water *and* perform better. Go to the Saving Water Partnership's website at www.savingwater.org and click on *Conserve Inside* to access the Flush Star toilet list.

Did you know that a leaky toilet can raise a home's water bill up to $200 per month? The culprit is usually a worn-out or improperly functioning toilet *flapper* (that rubber device inside the toilet tank that holds water in the tank until it's needed for flushing), a low-cost replacement part available at hardware stores. Toilets often have silent leaks (which can still easily waste $50 per year), making them very difficult to detect without the use of *dye tablets*. See www.savingwater.org for more information on detecting and fixing leaks. King County residents can take their old water-wasting toilets to a special recycling event or to a commercial recycler. For information about special recycling events, visit www.metrokc.gov/dnrp/swd/calendar/calendar.asp/. To find a commercial recycler, use the "What Do I Do With..." site at www.metrokc.gov/dnrp/swd/wdidw/ or call 206-296-4466.

Seattle residents can recycle their old toilets at the South Seattle Recycling and Disposal Station. Toilet seats *must* be removed. Visit www.seattle.gov/util or call 206-684-8400 for location and hours of operation.

showerheads

Older showerheads can use 5 gallons of water per minute or more. New, low-cost designs save water and deliver plenty of shower power. Models are available that use 2 or even as little as 1½ gallons per minute (marked 2.0 or 1.5 GPM on the showerhead). Look for designs that deliver water in multiple individual streams rather than mist-like sprays–so water stays warmer, saving energy. Also consider installing a *showerhead shutoff valve*. This handy little contraption fits between the shower arm and showerhead, and features a button that reduces the shower stream to a trickle while the user soaps up. Also consider handheld showerheads, or showerheads installed on a vertical bar to allow for height adjustment. These provide greater accessibility, plus make rinsing down the shower after cleaning a breeze. You may also consider a *chlorine filter* on your showerhead. These devices remove chlorine from shower water, which otherwise can be inhaled and absorbed through the skin. The health effects of this exposure are debated, but many consider a chlorine filter a precautionary measure.

The Consumer Products Safety Commission estimates that 200,000 injuries occur per year in the United States from sudden changes in water temperature during baths and showers. Often, the elderly and children are most at risk. Anti-scald valves reduce the risk of this type of injury, and are now available in multiple styles to match any bath. Setting your water heater thermostat to no more than 120 degrees Fahrenheit reduces the risk of injury further, and reduces energy bills at the same time.

Photo bottom left (chlorine filter and recycled glass tile): Environmental Home Center. Inset: showerhead shutoff valve.

sinks

Like bathtubs, sinks make great reuse candidates, if they're in good condition and a style you like. If not, you can save money and resources by refinishing your existing sink (see Bathtubs on page 6 for details on refinishing) or looking for a vintage or salvaged model. When buying new, make classic design and durability a priority. Quality sinks should come with lifetime warranties. Common bath sink choices include:

- Enameled cast iron: Cast iron is a durable choice, handling scrubbing well. However, if the enamel chips, it can expose the iron and result in rust. Cast iron sinks are quite common at building materials salvage yards, where you can find one at a fraction of the price of new, and create "instant history" or match the period of your bath. Cast iron is recyclable.
- Porcelain: This durable sink choice is made of high-fire clay with a glazed finish. Easy to clean and classic in appearance, porcelain is an enduring favorite.
- Solid surface: Like solid surface countertops these sinks come in a variety of colors, and can be integrated into countertops. They also suffer the same shortcomings, including being prone to scorching (although small burns can be sanded out) and stains. Solid surface is resistant to scratching from scouring pads.
- Stainless steel: Designers often recommend thicker gauge steel, usually 18 or 16 gauge, but consumer tests found little difference in performance between gauges. A satin finish is better at hiding scratches, fingerprints and water spots than a polished finish. Quality stainless steel sinks are available at building salvage yards. Stainless steel can be recycled.

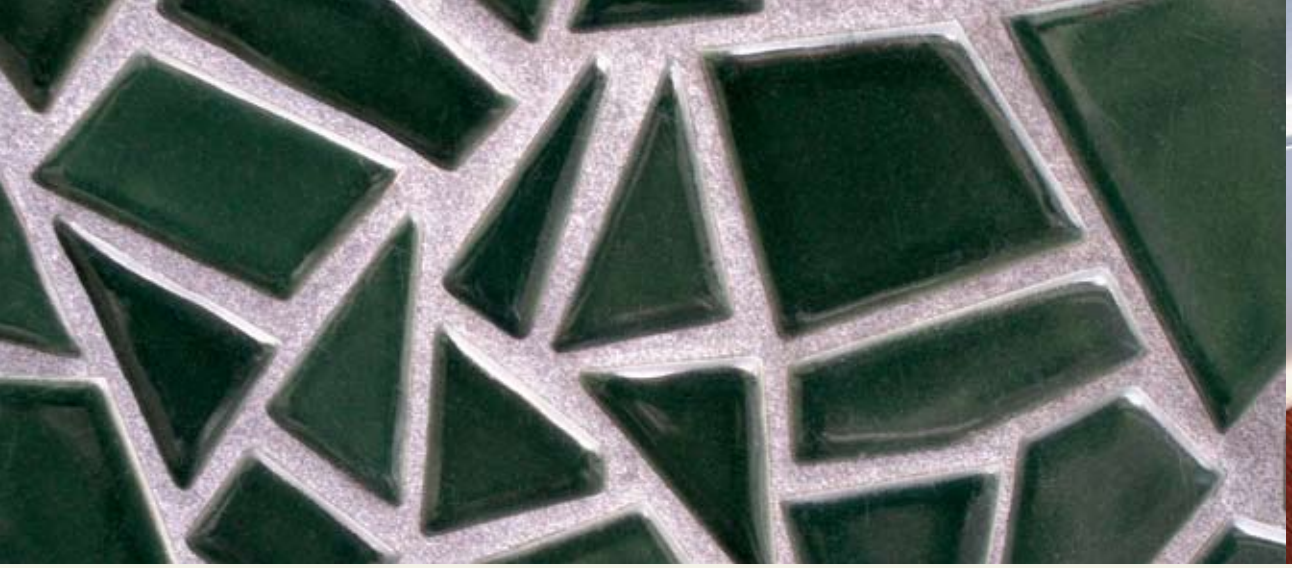
If you are planning on installing dual sinks, consider how much room you have. The National Kitchen and Bath Association recommends at least 30 inches of counter space between two bowls, measured from centerline to centerline; otherwise you'll be bumping elbows.

faucets

Since bathroom sink faucets are the most heavily used in the house, durability should be a primary consideration. Look for lifetime warranties, and ceramic disc valves (long-wearing and easily replaceable if worn or damaged). Remember that lever-handled or single-lever mixer handles are easier to operate than knobs or cross handles. Look for faucets that comply with Americans with Disabilities Act guidelines (marked *ADA Approved*). As a simple rule, the National Kitchen and Bath Association recommends selecting faucets that can be operated without having to grip and twist.

If you're reusing your existing faucet, see if it can be outfitted with a water-conserving *aerator*–a device that screws onto the end of the faucet to reduce flow, either by adding air to the stream or directing the flow into multiple small jets. Aerators that deliver water at rates as little as one gallon per minute are sufficient for most lavatory tasks.

Photo middle right: VELOCIPEDE architects (photo © Michael Moore).
Photo bottom right: Environmental Home Center.



flooring choices

MATERIAL	INSTALLED COST/DESCRIPTION/TIPS	BENEFITS	DRAWBACKS
Tile 	$10-$100/sq.ft Made primarily from clays and talc combined with water, pressed or poured into forms, then fired in a kiln. Most are also glazed with a mixture of ground glass, metals or minerals. You can find 100% recycled glass tile, but it makes for a slippery surface. Wider grout lines can add traction but glass tile is generally better suited for accents, or walls, tubs or shower surrounds. Tips: Look for tiles with recycled content, such as waste glass, feldspar tailings, or reprocessed porcelain. Note that high-fire porcelain is more durable than low-fire clay tile. Consider locally manufactured tile. Make sure the tile you choose is meant for flooring applications. Proper preparation of the substrate (surface to which the tiles are applied) is critical. Most professionals suggest hand-applied mortar and galvanized reinforcing mesh for a base that will last as long as the tiles (and most likely, outlast your home). An alternative is cement board, applied to a sufficiently rigid subfloor.	exceptionally durable if of high quality and properly installed individual damaged tiles can be replaced	energy-intensive production requires careful surface preparation for lasting results cold and hard on feet
Concrete	$15-$20/sq.ft. Made from Portland cement, sand, stone and other fillers, concrete floors are applied by hand. Recycled materials such as glass can also be incorporated into the concrete mix. Tips: For lasting color, use nontoxic natural pigments mixed into the concrete or integral color rather than surface-applied stains. Many concrete sealers are toxic–choose water-based products appropriate for the bath. Consider in-floor radiant heating when applying concrete in a bath situation; this energy-efficient heating method makes a concrete floor much more welcoming for bare feet. Consider replacing a portion of the cement used in the concrete mix with fly ash, a byproduct of coal-fired energy production. This reduces the environmental impact of this flooring choice, and makes for a more water-resistant concrete.	can incorporate recycled materials durable	extremely energy-intensive to produce (for every ton of cement produced, approximately one ton of greenhouse gases is released) porous; requires sealing and periodic treatments cold and hard on feet

flooring

The material underfoot is especially critical in bathrooms. Floors must tolerate constant moisture, standing water, frequent scrubbing and high traffic, plus clean easily. Because the demands are so great, effective flooring options are somewhat limited. The following table outlines some of the more green floors available.

Popular for its low purchase price, vinyl sheet flooring offers questionable durability and raises concerns over environmental and health safety, especially during manufacturing and disposal. Vinyl sheet flooring is essentially a thin layer of vinyl on top of a paper base. Vinyl is more than 50% chlorine by weight, and when burned, can produce both hydrochloric acid and dioxins.

Existing vinyl flooring can also pose hazards during remodeling. Vinyl sheet flooring manufactured before the mid-1980s may contain high levels of asbestos in its backing material, which is easily released into the air when the flooring is removed. Vinyl tiles from this era may also contain asbestos (especially the smaller 9" x 9" tiles common in many 1940-60s houses). The asbestos in these tiles is usually much less likely to be released into the air than from sheet vinyl backing, but they should not be sawn, drilled, or otherwise disturbed. If you suspect you may have asbestos-containing flooring, contact the Puget Sound Clean Air Agency: 206-689-4058 or online at www.pscleanair.org/asbestos. You may be able to avoid tearing out the first layer by using a synthetic floor leveling material, then installing the new material directly on top of the first. Consult manufacturer's instructions to ensure that this approach is compatible with your new flooring choice.

Photo top right: Environmental Home Center.

MATERIAL	INSTALLED COST/DESCRIPTION/TIPS	BENEFITS	DRAWBACKS
Natural Linoleum 	$6-$10/sq. ft. Made from linseed oil, wood flour, pine resin, and pigments with a plant fiber backing, natural linoleum has been popular for kitchens and bathrooms for over a century. Currently manufactured in Europe, available in both sheets and tiles. Tips: Proper application requires a very smooth surface, as any imperfections in the substrate will likely show in the linoleum surface. On uneven surfaces, self-leveling floor fillers can help. Note that one manufacturer recommends against installing linoleum in the bathroom; be sure to consult with manufacturers for warranty requirements. Linoleum tiles are considered do-it-yourself-friendly; professional installation is recommended with linoleum sheet.	made from natural, renewable products antibacterial and anti-static (repels dust) exceptionally durable appropriate for many architectural styles	one manufacturer recommends against installing linoleum in the bath
Stone 	$10-$150/sq. ft. Includes granite, marble and slate. Sources exist around the world; environmental impact depends on quarrying and production practices as well as transport distance. Tips: Look to salvage yards for stone–at a fraction of the cost and environmental impact of new. Remnants are also often available from fabricators and stone yards. If buying new stone, look for local sources and local fabrication (some domestic stone is shipped overseas for processing. Use non-toxic water-based sealers and treatments.	durable and reusable	difficult to repair porous depending on finish; requires sealing and treatment heavy; may require subfloor reinforcement cold and hard on feet
Laminates 	$10-$20/sq. ft. Also called floating floor, systems usually consist of a thin pattern layer over a tongue-in-groove base of wood or wood fiber. These floors are either glued or snap-locked together, creating a single unit. Some brands contain adhesives and formaldehydes that can negatively affect indoor air quality. Tips: Look for versions with recycled content, especially in the wood base, which makes up the majority of the product. One brand is faced with natural linoleum, providing a much thicker wear layer than the other versions. Avoid products containing tropical hardwoods, such as lauan, which is currently being harvested beyond sustainable levels. Snap-lock models can be removed and reused. Not all laminates are up to the wet environment of the bath–make sure the brand you select is.	do-it-yourself-friendly inexpensive, especially if you install some brands are reusable or incorporate recycled material	cannot be refinished composite wood base vulnerable to moisture damage not readily recyclable, due to its composite nature

save energy

Put light where you want it with properly sized and positioned light fixtures. Reduce the need for supplemental light sources by using paler wall and ceiling colors to bounce light rather than absorb it. New fluorescent lighting has more natural color and instant-on technology, fortunately eliminating the flicker-flicker-on annoyance of years past. Want more natural light? Consider light tubes. Alternatives to skylights, they fit between roof joists to allow natural light into a bathroom without compromising privacy or reducing insulating power. Look for models that include light-dispersing lenses that spread daylight throughout the room. For excellent information on energy-efficient lighting in the bath, go to www.elflist.com.

Insulation and air sealing details are very important in the bathroom–water and waste pipes require penetrations between heated and unheated areas such as crawl and attic spaces, resulting in heat loss and the introduction of moist or mold-laden air. Seal all plumbing and electrical openings leading into unheated space, and seal and insulate any exterior walls before tub or tile is installed. Gaskets are available to cover the large hole created for bathtub drainpipes (hidden by the tub). These gaskets are applied from underneath the floor supporting the tub, and stapled to the subfloor. Any holes in the gasket created to allow drainpipes through should also be sealed. Insulation and air sealing is much cheaper and easier to accomplish during construction; make sure you contractor is briefed and follows your sealing and insulation details. Take pictures of the walls before the drywall, shower or tub enclosures, or cement board is installed, to create a record of not only what's been insulated but the location of plumbing, electrical, and blocking for support bars.

Perhaps the simplest way to reduce energy use in a bathroom–and minimize the risk of scalding–is to keep your water heater set at 120 degrees Fahrenheit. Also consider that a bath remodel offers a great opportunity to update an inefficient water heater. When planning the plumbing, try to minimize the distance hot water needs to travel from the heater to your bathroom by locating the shower as close to the heater as possible. Or, consider some of the new and innovative energy-saving technologies to heat water for the bathroom, including:

solar hot water

Solar hot water systems provide hot water for all domestic needs. Usually configured as panels containing fluid-filled tubes, they capture the sun's energy and use it to preheat your water heater's input. In the summer and on sunny days, they can provide enough hot water for all home needs, and then some. Solar hot water systems have a much faster payback than solar electric systems, and work even on cloudy northwest days. Visit www.eere.energy.gov/consumer (click on *Solar Water Heating*) to learn more.

heat recovery

Waste-water heat recovery captures the leftover heat that would otherwise escape down the shower drain and transfers it to the cold water entering the water heater. Heat is transferred while keeping the incoming and drain waters separate. By preheating the incoming water, the water heater doesn't need to work as hard, which saves energy. This system requires access below the shower or tub with enough space to install the unit (the shortest unit is 30 inches long).

hot water circulating

Hot water re-circulating systems use a pump to circulate cold water sitting in the hot water pipe back to the water heater, eliminating the need to run the tap until the water warms. They also increase the speed at which hot water is delivered to the tap, saving time and reducing heat loss along the length of the pipe. One unit installed at the point of use farthest from the hot water heater will serve an entire home. Look for versions specifically designed for existing plumbing systems.

laundry

Like the bath, laundry rooms must be durable and moisture-resistant. They can take many forms, ranging from an unfinished basement corner or multitasking bathroom closet to a specifically designated room. First, think of how you accomplish laundry-related tasks. A laundry area can often be a multitasking space, functioning as a mud room, sewing/craft/gift-wrapping center or storage area for tools and cleaning supplies. By designing flexibility into this space, you can keep a range of options open.

Cabinetry

Get creative with storage in your laundry area. Consider what you need and whether open shelving or cabinets will work best. Salvaged items may be just the solution–old locker bays and gym baskets are often perfect for storing small items. Vintage fruit boxes can be reincarnated as eclectic laundry storage. If you choose to build new cabinets, look for Forest Stewardship Council (FSC) certified plywood, or eco-friendly wheatboard or strawboard products made from agricultural waste. FSC certification ensures wood has been harvested and processed in an environmentally and socially responsible manner. For details on the FSC program and help finding retailers that stock FSC products, see www.certifiedwood.org. Strawboard products are available at specialty retailers of environmental building products, and occasionally at standard home improvement centers.

Laundry Sinks

The laundry sink makes a perfect candidate for salvage. Vintage cast iron utility sinks are relatively common, and will last as long as your home. A salvaged mop sink placed on the floor with a rod above is great for drip-drying clothes, rinsing off work boots or even the family dog. Of course, you can use it to store mops, too.

Flooring

Flooring choices that work for the bathroom function equally well in the laundry area. Due to its incredible durability, natural linoleum is an excellent choice. Refer to the Flooring Choices table in the Bath section of this guide for details.

Photo third from top: Progress Lighting.

Get a rebate when you buy a qualified energy- and water-efficient clothes washer! The WashWise program of the Saving Water Partnership encourages the purchase of efficient clothes washers by offering financial incentives. See www.savingwater.org for details.

Puget Sound Energy customers are eligible for rebates on a variety of energy efficient appliances. See www.pse.com for details.

Washers

Conventional clothes washers use tremendous amounts of water and energy. According to the EPA's Energy Star® program, if your washing machine is more than ten years old, plan to save up to $120 a year on your utility bill simply by switching to an efficient model. Most of these are *front-loading* washers. Compared to a conventional washing machine, the drum is placed on its side, and clothes are tumbled through water that partly fills the drum. This configuration not only saves water and energy, it is easier on your clothes, uses less detergent, and since front-loaders have a faster spin cycle, clothes dry faster.

Find out about rebates for efficient washing machines by visiting the Saving Water Partnership at www.savingwater.org and Puget Sound Energy at www.pse.com. Save additional energy by selecting a washing machine location to minimize water pipe distance to the water heater.

Dryers

Since dryers aren't required to display EnergyGuide labels, it's difficult to compare efficiency among models. Natural gas dryers are less costly to operate than electric dryers, but consider this: much of our electricity comes from renewable hydroelectric sources, while natural gas is non-renewable and produces greenhouse gas emissions. Look for a moisture sensor and automatic shutoff control, rather than just a timer. To make your dryer use most effective:

- select the fastest spin cycle on your clothes washer; more water extracted from clothes in the washer means less work (and energy use) for the dryer,
- dry full loads, but don't over-fill,
- clean the lint filter after every load,
- run loads back-to-back so energy will go toward drying clothes, rather than heating up a cold dryer, and
- keep the gasket around the dryer door clean and free of lint so heat, moisture and combustion gases stay in the dryer, rather than in your laundry room.

Is your washer or dryer all dried up? Visit King County's "What do I do with…?" website at www.metrokc.gov/dnrp/swd/wdidw to find a recycling location near you.

Venting

Dryers must be vented to the outside. Plastic ducts are prone to punctures and are not fireproof. Choose a metal duct, preferably one with a smooth interior, and use the shortest, most direct route possible to vent it to the outdoors. Be sure to check your duct twice a year, cleaning it of accumulated lint and making sure the venting hasn't come loose in the wall cavity, attic or crawl space.

Three Cheers for the Clothesline

Although a good portion of our year is gray and drizzly, our July through September weather is actually as dry as Tucson, Arizona. If you have the space and inclination, a clothesline or drying rack can save money and energy. Available in many configurations, one is certain to work for your living situation. According to the book *Seven Wonders: Everyday Things for a Healthier Planet* by John Ryan (1999, Sierra Club Books), the average American clothes dryer is responsible for the release of *one ton* of carbon dioxide, the greenhouse gas, per year! Note that drying laundry indoors during rainy months can introduce unwanted moisture into your home, and make clothes musty. This again points to a benefits of a horizontal-axis washer: the increased spin cycle means laundry comes out of the wash with less moisture, and will dry more quickly on the line. A fan vented to the outdoors (preferably set on a timer) will help reduce moisture in the laundry and may be required by code.

salvage & recycling

In 2005, Seattle and King County sent over 560,000 tons of building construction and demolition waste to the landfill. By salvaging building materials, and recycling as much as we can of what's left over, we can reverse this trend. Building materials salvage is an active market in King County, with several businesses; you can support the growth of this local business sector by purchasing used materials for your project and selling or donating your salvageable items to these businesses. Recycling construction and demolition waste is almost always cheaper than sending it to the landfill, and conserves resources. Materials from asphalt shingles to cast iron tubs can be recycled.

buy used

Reduce costs and conserve natural resources by creatively incorporating second-hand materials into your remodeling project. In the bath, vintage sinks, tubs, cabinetry, towel rails, drawer pulls and more are easy to reuse. This can be a challenge or an opportunity–and often, both. Materials are available from a variety of sources, including:

- Used building materials retailers. Find them in the phone book under *Building Materials - Used*
- Classified Ads. See the Building Materials section of local newspapers.
- Online materials exchange: www.metrokc.gov/dnrp/swd/exchange/. Browse for items by category; most items are free or available for a nominal price.

A word of caution: be sure that what you salvage is safe, efficient and meets building codes. Old paints often contain lead, antique fixtures can waste water, and the pilot light and asbestos in that vintage gas stove could wreak havoc on your indoor air. Be sure to contact your local permitting agency for guidelines to using salvaged materials in the jurisdiction where you live.

salvage

Just as there are many elements available to incorporate into your project, there are places to take reusable materials from your current bath or laundry. Sinks, tubs, vanities, medicine cabinets and mirrors, wainscoting, lighting and plumbing fixtures, hooks, shelves, and towel bars are all readily reusable. Look in the phone book under *Building Materials - Used* for businesses that may take your items. Consider giving away those materials not valuable enough for resale. The online materials exchange at: www.metrokc.gov/dnrp/swd/exchange/ is a good place to start. You can list your available items for free.

Again, exercise caution when salvaging materials or doing any demolition work. For cautions about lead-based paint, asbestos, and other remodeling hazards, go to www.watoxics.org and click on *Toxics in the Home*, then *Building Materials*.

Photos: The ReStore.

recycle

Make sure your contractor has a construction waste management plan for your project. For Seattle projects, have your contractor visit the Resource Venture website for information, assistance, and referrals at www.resourceventure.org. For King County projects outside Seattle, have your contractor call 206-296-4466 to find out how King County can help maximize recycling opportunities.

If you're dealing with construction waste yourself, visit King County's *What do I do with…?* web service at www.metrokc.gov/dnrp/swd/wdidw and select *Construction/Demolition Debris*.

Location: Capitol Hill

Architect: VELOCIPEDE **architects,** *Seattle*

Green elements:

MATERIALS

- recycled glass tiles, made in Seattle
- recycled insulation (two types: cotton from denim scraps, and cellulose from newspapers)
- recycled aluminum towel bars
- locally made countertops, a composite of *FSC-certified* paper and resin
- slate flooring salvaged from a demolished school's chalkboards
- antique light fixtures converted from gas to electricity
- sustainable harvest cedar beadboard
- cabinetry wood is from salvaged Seattle trees

ENERGY & WATER EFFICIENCY

- Energy Star® clothes washer
- half or full flush toilet (uses 1.6 or 0.8 gallons per flush)
- hydronic radiant heating in floor and walls
- GFX wastewater heat recovery unit

HEALTHY INDOOR ENVIRONMENT

- plant based wood finishes
- locally made, low-toxic paints
- abundant natural light
- operable windows
- quiet, energy-efficient ventilation

UNIVERSAL DESIGN

- height-adjustable showerheads
- curb-free shower entry

case study

Here's how one Seattle home incorporated beauty, utility, and conservation in a single design. In this 1900s Capitol Hill Bungalow renovation, a bathroom and dressing area are tucked under the raised eaves of the second floor, creating a master suite on the second floor. The owners wanted to be protective of our global resources, and so selected an architectural firm with experience in green building.

Forest-friendly Wood

The owners felt strongly about using wood from environmentally responsible sources. The beadboard ceiling is Forest Stewardship Council (FSC) certified Incense Cedar, finished with a plant-based clear sealer. FSC certification ensures that forest products have met stringent environmental and social standards during harvest and production (see more at www.certifiedwood.org). Wood for cabinetry and laundry closet doors is from a Seattle company that mills urban trees cleared for safety or development reasons–wood that normally is chipped into mulch.

Resource-wise Products

From the 100% recycled aluminum towel rails to the salvaged chalkboard slate floors, materials were selected for their environmental origins and long-lasting beauty. The toilet allows for a water-wise 1.6 gallon flush, or an even thriftier 0.8 gallon half-flush (standard low flow toilets flush 1.6 gallons). The room also hosts a suite of energy conserving features, including a device that captures waste heat from drain water and transfers it to the incoming hot water, an Energy Star® clothes washer, and radiant in-floor heating that keeps warmth where it's needed rather than on the ceiling.

Smart Space

The laundry area is a textbook example of space efficiency. The doors are backed with shelves, which when opened create a mini-laundry station with laundry supplies and linen storage all within easy reach. When closed, the laundry area disappears, leaving an uncluttered bath ready to enjoy.

The Result: Conscientious Luxury

"Building green was our utmost priority with this renovation," according to the owners. "Along the way, we learned how easy it is to choose earth-friendly products that not only work great but look fantastic."

resources

Built Green™

If you're hiring a professional for your remodel work, consider Built Green™, a rating system created specifically for Northwest homes by the Master Builder's Association of King and Snohomish counties.* With over 250 health and environmentally friendly building strategies to choose from, the system is flexible enough for just about any remodeling project. Built Green™ covers all the areas of a green remodel, including site and water quality protection, energy and materials efficiency, healthy indoor air, as well as how to keep a green home green. For more information and to find builders who use this system, go to www.builtgreen.net.

** In partnership with King County.*

Online

The Internet is a great place to research green remodeling topics. Try search terms such as: residential green building, green building materials, healthy building, energy conservation, water conservation and sustainable building.

Other useful web pages include:

The City of Seattle

- Seattle's City Green Building program
  www.seattle.gov/dpd/greenbuilding
- Seattle City Light Energy Conservation
  www.seattle.gov/light/conserve/
- Seattle Public Utilities Water Conservation and Protection
  www.seattle.gov/html/environment/water.htm

King County

- "What do I do with…?" Recycling Information
  www.metrokc.gov/dnrp/swd/wdidw/
- Construction Recycling
  www.metrokc.gov/dnrp/swd/construction-recycling/links.asp
- Sustainable Building
  www.metrokc.gov/dnrp/swd/greenbuilding/gb-links.asp

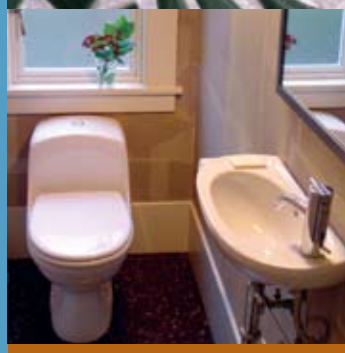
Regional

- The Built Green Program
  www.builtgreen.net
- Saving Water Partnership
  www.savingwater.org
- Energy Star
  www.energystar.gov
- Puget Sound Energy's Rebate Program
  www.pse.com/yourhome/rebates/index.html
- Solar Washington
  www.solarwashington.org

This guide was developed by Seattle's City Green Building Program, with the assistance of Seattle Public Utilities Resource Conservation and Urban Sustainability staff and with content review and input from Seattle City Light and the Environmental Home Center. Jointly printed by Seattle and King County Green Building Programs.

This information can be made available on request to accommodate people with disabilities.

Photo top: Environmental Home Center. Photo center: JAS Design Build (photo © John Granen).



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Department of
Natural Resources and Parks
Solid Waste Division
King Street Center, Suite 701
201 S. Jackson St.
Seattle, WA 98104-3855

City of Seattle
Department of Planning & Development
City Green Building
700 5th Ave., Suite 2000
P.O. Box 34019
Seattle, WA 98124-4019

Want to learn more? Seattle residents visit www.seattle.gov/dpd/greenbuilding or call 206-615-0731.
King County residents visit www.metrokc.gov/dnrp/swd/greenbuilding or call 206-296-4466 or 711 TTY Relay.

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