



VANCOUVER
GREEN CAPITAL*

Bath & Laundry

green home renovation

healthy homes for a healthy environment





Green

WHAT IS A GREEN HOME RENOVATION?

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 renovation 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.

Why

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 renovation 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 moulds, 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

Renovations are 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 bathroom renovation is one of the most expensive upgrades you can make to your home on a per-square-foot basis. A full-scale renovation of a three-piece bathroom will cost at least \$15,000. An upscale makeover (replacing fixtures, tiles, cabinetry, finishing carpentry and redoing flooring and walls) could come in at nearly \$35,000. 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.



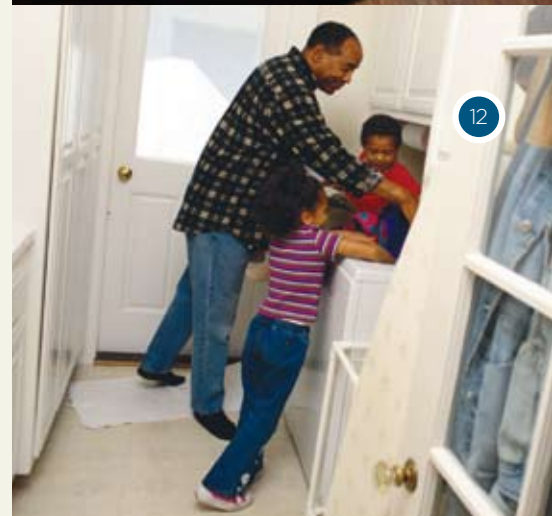
Cover photo: Graham Winterbottom
Photography

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



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Rethink Renovation

Green renovating requires a new approach to the renovation process, with more up-front planning and coordination to capture opportunities that are often missed in the conventional approach. 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 renovation 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.

Decide What You Want

Planning a renovation project 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 renovation. You'll use fewer resources with less waste. So first, define your priorities and then consider all your options carefully.

*Let this guide serve
as the starting point*

for your renovation.

*Each decision regarding
your bath or laundry area,
from appliances and
lighting to flooring and
fixtures will help you
create a green project.*

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 litres 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, colours 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 manoeuvre? 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 loans may be available for specific features of your green renovation project, helping with initial investment costs. Be sure to check the incentives list provided by Metro Vancouver's BuildSmart program at www.metrovancouver.org/buildsmart. You may qualify for additional financing options from Vancity or CMHC. Check out Vancity's Bright Ideas program, which provides loans to cover the costs of energy efficient upgrades, and Canada Mortgage and Housing Corporation's (CMHC) energy savings renovations and flexible mortgage loan insurance options.

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. 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. You can cross reference your research with information from green building product directories like those available from Metro Vancouver's BuildSmart program and Light House Sustainable Building Centre (www.metrovancouver.org/buildsmart and www.sustainablebuildingcentre.com).

Renovate Safely

Select products to minimize the introduction of harmful fumes caused by paints, 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 indoor air quality in the home, see CMHC's Your Home and Your Health series at www.cmhc-schel.gc.ca

Also, make sure all work follows building codes and bylaws. Work that violates these codes or bylaws 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 noncompliant elements. It's likely the reason it doesn't comply is due to safety, health, or energy efficiency issues—all goals of a green renovation.

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 renovation activity down the road.

The US National Kitchen and Bath Association maintains an excellent list of design and safety guidelines at www.nkba.org/guidelines/bathroom.aspx while the BC Building Code includes a set of Adaptable Housing Standards found at www.housing.gov.bc.ca/building/adaptable_housing/summary.html.



A healthy home breathes. Proper ventilation is especially key in bathrooms because they produce tremendous amounts of water vapour—therefore, greatly increasing the potential for mould and moisture damage.

That's why building codes require adequate ventilation in the bathroom. Look for quiet ENERGY STAR exhaust fans coupled with a timer 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 surfaces doused with water several times a day in the average house, shower walls must obviously withstand long-term exposure to moisture. Fibreglass 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 backer or cement board for tile in wet areas. Moisture resistant fibre reinforced wallboard is suitable for wet applications such as shower and tub surrounds. Look for solvent-free mastics or thinset mortars.

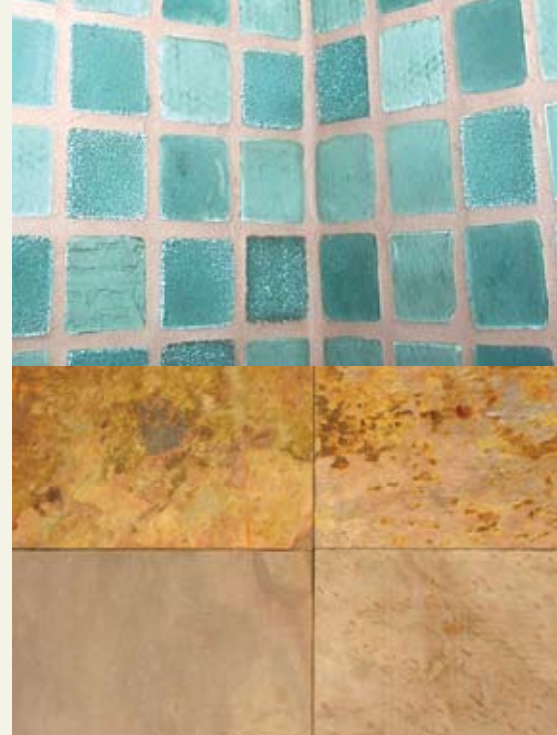
Tips for Easy-Maintenance Wall Tile

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

- Consider light-coloured grouts rather than white.
- Choose tiles that can be set close together (less than 1/8 inch or 3.17mm). This means less grout to clean, and that you can use unsanded grout, a denser grout mix that makes it harder for mould 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 20 minutes after each shower (or until steam is off the mirror, whichever is sooner) to exhaust water vapour 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 Lower Mainland. 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 the 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 Canada, but some other countries have yet to follow suit

- consider regionally manufactured ceramic tiles, many available with up to 70 per cent 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 1/4" - 1" or 6.35mm-25.4mm 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 mould and heating until fused)

- look for regional manufacturers and 100 per cent 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 usually added to inhibit mold growth

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 non-toxic 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 fibre (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 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 mould-

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 Material Safety Data Sheets (MSDS) for the brands you are considering. A MSDS is an overview of a product's potential hazards, 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.

Caulking Options

MATERIAL	DESCRIPTION	CONSIDERATIONS
Latex	Latex caulking is similar in makeup to latex paint, with added fillers and colourants. 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.	Latex is generally safer to handle than other caulking with a higher solvent content, but test a small amount before using large quantities inside.
Acrylic	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 based	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.	Some silicone based caulks use a neutral cure rather than an acetic acid cure. These release an ammonia smell while curing, but are better tolerated than acetic cure caulks. Cleanup usually requires solvents, although misapplied caulk can often be left to dry and scraped off most surfaces with a razor blade.
Water based	These are specialty products formulated to reduce emissions and to maintain a low level of toxicity in use.	These types of caulking should only be applied to clean dry surfaces. They may contain substances which are skin irritants to some people.
Gypsum joint compounds	This filler is used in drywall installation and is essentially similar to plaster. It does not cure but dries, and can emit many irritants during this process. A fine dust is also created on sanding of the filler.	Installation and upkeep are major factors to evaluate. Use low toxicity compounds if available.
Oil or resin based	These caulks dry rapidly but have poor durability. They often contain toxic petroleum solvents which are moderate irritants.	Test a small amount first and select varieties without petroleum solvents.
Butyl rubber	Butyl rubber is a waterproof caulk which lasts longer than oil caulk, but cures more slowly and releases noxious solvent odours.	This product is not recommended for indoor use or areas subject to high moisture.
Polyurethane	Polyurethane caulking contains solvents and plasticizer emissions that may be irritating or neurotoxic (i.e. have adverse effects on the central nervous system).	This product is not recommended for indoor use.



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 renovation 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 fibreglass 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. Bathtub refinishing can be 80 per cent cheaper than installing a brand new bathtub, and can be completed within just one day by a professional. Refinishing processes and products vary widely in quality. Look for 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. Metro Vancouver provides a directory of recycling and salvage businesses at www.metrovancouverrecycles.org. Here you can look to recycle your old tub, or even 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.



Photos above: Graham Winterbottom Photography



Toilets

Older toilets can be huge water wasters, using as much as twenty litres per flush, while dual flush models are required to use three or six litres (depending on half or full flush). Dual-flush models give the user the option between a full or half-flush, depending on flushing needs. The flow rate data is often located on the toilet bowl, just behind the seat hinges. If your toilet was installed before 1980, you'll save water by replacing it with a new, efficient toilet — the City of Vancouver requires low flow (less than six litres) or dual-flush toilets for all new construction.

While many first generation six-litre toilets did not perform well, today's low flow and dual flush toilets have been engineered to flush better than their predecessors. Select toilets that have been tested by the Canadian Standards Association or an equivalent lab — a list of high-performing toilets can be found in the CMHC study 'Maximum Performance Testing of Popular Water-Efficient Toilet Models', available at www.cwwa.ca.

Did you know that a leaky toilet can raise a home's water bill and waste water? 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 which is readily available at hardware stores. Toilets often have silent leaks, making them very difficult to detect without the use of dye tablets. See CMHC's Household Guide to Water Efficiency available for download at www.cmhc.ca for more information on detecting and fixing leaks. Metro Vancouver residents can search where to recycle their old toilets using the directory of recycling and salvage businesses available at www.metrovancouverrecycles.org.

Showerheads

Older showerheads can use 19 litres of water per minute - or more. New, low-cost designs save water and deliver plenty of shower power. Models are available that use as little as six litres or one and a half gallons per minute. Look for designs that deliver water in multiple individual streams rather than mist-like sprays—so water stays warmer, saving energy. There are many types of low-flow showerheads now available, including ENERGY STAR qualified designs.

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. A chlorine filter on your showerhead will 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 US 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. Keep your water heater thermostat no higher than 60°C no lower than 55°C to avoid the risk of developing harmful bacteria in your water. Anti-scald valves reduce the risk of this type of injury, and are now available in multiple styles to match any bath.

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

Sinks

Like bathtubs, sinks make great candidates for reuse, 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 favourite.
- Solid surface: Like solid surface countertops these sinks come in a variety of colours, 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 polished to remove scratches and eventually recycled.

If you are planning on installing dual sinks, consider how much room you have. The US National Kitchen and Bath Association recommends at least 76cm (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 even less than four litres (one gallon) per minute are sufficient for most lavatory tasks.

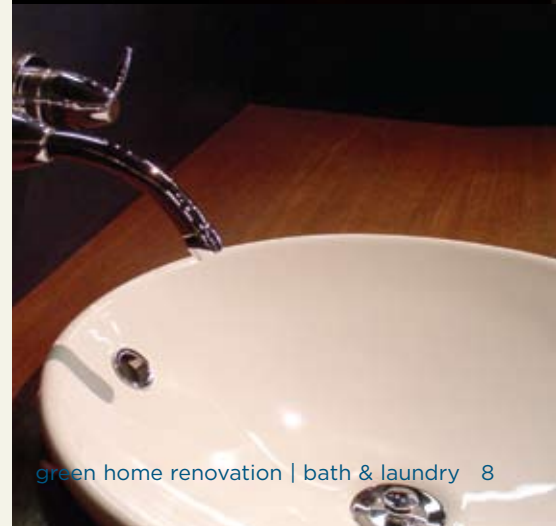


Photo middle right: Graham Winterbottom Photography
Photo bottom right: Environmental Home Center.



Flooring Choices

MATERIAL

DESCRIPTION

CONSIDERATIONS

COSTS

Tile



Made primarily from clays and talc combined with water, pressed or poured into forms, then fired in a kiln, most tiles are glazed with a mixture of ground glass, metals or minerals. You can find 100 per cent 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.

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
- Can be cold and hard on feet

Prices range from \$7/ sq. ft. (for recycled porcelain) and go up to \$95/sq. ft. (for recycled glass mesh sheets). Installation of porcelain and ceramic tiles is straightforward and can work out to \$2-2.50/ sq. ft. for 12"x12" (30.5 x 30.5cm) tiles. Costs increase for complicated tiles or different shapes and sizes.

Concrete



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.

For lasting colour, use non-toxic natural pigments mixed into the concrete or integral colour 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.

Because of some of the difficulties associated with poured in place concrete, you may want to consider concrete tiles.

- Can incorporate recycled materials and is durable
- Extremely energy intensive to produce (for every tonne of cement produced, approximately one tonne of greenhouse gases is released)
- Porous and it requires sealing and periodic treatments
- Can be cold and hard on feet

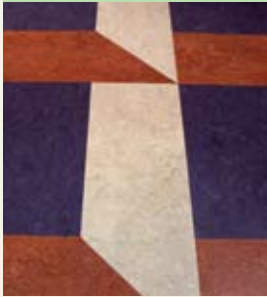


Poured in place concrete is expensive unless you are considering application to larger areas in your home. Prices for materials and installation start at \$25/ sq. ft. and you may need to consider structural issues or the installation of a membrane.

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 table below outlines some of the greener 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 per cent chlorine by weight, and when burned, can produce both hydrochloric acid and dioxins.

Existing vinyl flooring can also pose hazards during renovation. 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" or 23cm x 23cm 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, you may be able to avoid tearing out the first layer by using a synthetic floor levelling 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. If you have to dispose of asbestos-containing materials, review the City of Vancouver's Asbestos Policy for guidelines on proper disposal at vancouver.ca/solidwaste/landfill/asbestos.htm.

MATERIAL	DESCRIPTION	CONSIDERATIONS	COSTS
<p>Natural Linoleum</p> 	<p>Made from linseed oil, wood flour, pine resin, and pigments with a plant fibre backing, natural linoleum has been popular for kitchens and bathrooms for over a century, and is available in both sheets and tiles.</p> <p>Proper application requires a very smooth surface, as any imperfections in the substrate will likely show in the linoleum surface. On uneven surfaces, self-levelling floor fillers can help. Some manufacturers recommend 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.</p>	<ul style="list-style-type: none"> • Made from natural, renewable products • Can have antibacterial and antistatic (repels dust) properties • Exceptionally durable • Appropriate for many architectural styles 	<p>Prices range from \$7.50/sq. ft. for 12" x 12" (30.5 x 30.5 cm) clickable tiles to \$3.90-\$6.70/sq. ft. for sheets of varying thickness.</p>
<p>Stone</p> 	<p>This includes granite, marble and slate. Sources of stone exist around the world; environmental impact depends on quarrying and production practices as well as transport distance.</p> <p>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.</p>	<ul style="list-style-type: none"> • Durable • Reusable • Can be difficult to repair and porous depending on finish • Requires sealing and treatment • Heavy product 	<p>Prices range from under \$2/ sq. ft. for 12" x 12" (30.5 x 30.5 cm) slate tiles, through to \$3-12/ sq. ft. for granite.</p>
<p>Laminates</p> 	<p>Also called floating floors, these systems usually consist of a thin pattern layer over a tongue-in-groove base of wood or wood fibre. 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.</p> <p>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.</p>	<ul style="list-style-type: none"> • Do-it-yourself-friendly • Inexpensive, especially if you install yourself • Some brands are reusable or incorporate recycled material • Cannot be refinished 	<p>Prices range around \$5/ sq. ft. for 12" x 12" (30.5 x 30.5 cm) tiles.</p>

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 colours to bounce light rather than absorb it. New fluorescent lighting has more natural colour 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. Appropriate glazing strategies including light tubes can eliminate the need for artificial lighting, further reducing utility bills. If this is an option with your renovation, see the City of Vancouver's Passive Design Toolkit for Homes downloadable at vancouver.ca/sustainability

For excellent information on energy-efficient lighting incentives and rebates visit BC Hydro's Lighting Specials page at bchydro.com.

Insulation and air sealing details are very important in the bathroom – water and waste pipes may require penetrations between heated and unheated areas such as crawl and attic spaces, resulting in heat loss and the introduction of moist or mould-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 your 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 60°C. Also consider that a bathroom renovation 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 require a much smaller capital investment than solar electric systems, and work even on cloudy Vancouver days. Visit Solar BC at www.solarbc.ca 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 76cm or 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 centre 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 see www.fsc.org, and for help finding retailers that stock FSC products, see MetroVancouver's BuildSmart product directory at metrovancover.org/buildsmart.

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 washing 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.



*Find out more about
saving water from*

www.waterfootprint.org

or www.livingwatersmart.ca

Washers

Conventional clothes washers use tremendous amounts of water and energy. Plan to save on your utility bill 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 use gravity to tumble 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. Front-loading clothes washers can provide cost savings of up to \$95 a year through reduced use of energy for water heating, and they can save 14,000 to 22,000 litres of water a year. The most efficient new appliances typically use 50 per cent to 25 per cent less energy than the most wasteful models, and ENERGY STAR qualified models are even better using 50 per cent less energy and up to 40 per cent less water than traditional models. Efficient and durable features can last longer and cost less to maintain in the long run. Save additional energy by selecting a washing machine location to minimize water pipe distance to the water heater.

Find out about appliance rebates and savings for efficient washing machines by visiting BC Hydro at bchydro.com.

Dryers

Since dryers use far too much energy to be considered efficient, they don't qualify for the ENERGY STAR labels. In fact, clothes dryers are still only about 18 per cent more energy efficient today than they were in 1990. It's difficult to compare efficiency among models, though the Office of Energy Efficiency at Natural Resources Canada does offer some guidance at oee.nrcan.gc.ca. 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 the Metro Vancouver Recycles website at www.metrovancouverrecycles.org 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

If you have the space, 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 Statistics Canada, B.C. falls behind the national average in the use of clotheslines and drying racks at 54 per cent compared with the Canadian average of 61 per cent. Hanging clothes to dry rather than using an electric dryer can save you around \$100 a year in energy costs –plus there is no need for anti-static sheets and clothes last longer. All the lint that builds up in your dryer is the result of clothes slowly breaking down.

Some municipalities and strata corporations have restrictions against the installation of clotheslines. It is recommended that you check the bylaws regarding the type and location of clotheslines you are allowed to avoid disappointment.

Salvage & Recycling

In 2007, about 3.6 million tonnes of solid waste was generated in Metro Vancouver. Though 55 per cent of this is currently diverted from landfill, the demolition, construction and landclearing sector still sends about 375,000 tonnes to landfill, much of which consists of wood waste that could be otherwise diverted. By salvaging building materials, and recycling as much as we can, we can reverse this trend. Building materials salvage is an active market in Metro Vancouver; 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. The Recycling Council of BC established a free province wide reuse and recycling service in 1985. The RCBC MEX program is a completely self-serve web-based program comprised of Residential Reuses Programs and the BC Industrial Material Exchange. Visit www.bc.reuses.com.

Buy Used

Reduce costs and conserve natural resources by creatively incorporating second-hand materials into your renovation project. In the bathroom, vintage sinks, tubs, cabinetry, towel rails, drawer pulls and more are easy to reuse. Materials are available from a variety of sources, including:

- Used building materials retailers. See the salvaged building materials suppliers list maintained by Metro Vancouver's BuildSmart program at metrovancover.org/buildsmart.
- Classified Ads. See the Building Materials section of local newspapers or online boards like www.craigslist.org.

A word of caution: be sure that what you salvage is safe, efficient and meets the building code. 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 quality. Be sure to contact your local permitting agency for guidelines on 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. See the hauling services directory maintained by Metro Vancouver's BuildSmart program at www.metrovancover.org/buildsmart for businesses that may take your items. Consider giving away those materials not valuable enough for resale.

Again, exercise caution when salvaging materials or doing any demolition work. For cautions about lead-based paint, asbestos, and other renovation hazards, you may find the following resources useful:

- CMHC's Indoor Air Quality series, www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/index.cfm
- The Washington Toxics Coalition, www.watoxics.org

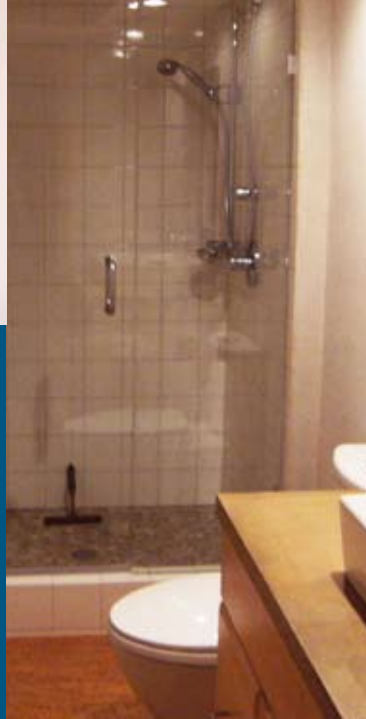
Recycle

Make sure your contractor has a construction waste management plan for your project. Have your contractor visit the Metro Vancouver BuildSmart website (www.metrovancover.org/buildsmart) and download the Demolition, Land Clearing and Construction (DLC) Waste Management Toolkit at no cost.



Photos: RE Store





Location: Edgemont Village, North Vancouver

Architect: Robert Bradbury

Project Impacts:

Compact Design

- square footage before: 3,100 sq. ft.
- square footage after: 2,800 sq. ft.

Energy & Water Efficiency

- electricity use before: 19,650 kWh/year
- electricity use after: 8,087 kWh/year
- gas use before: 41,700 kWh/year
- gas use after: 36,140 kWh/year
- greenhouse gas savings: 1.9 tonnes/year
- EnerGuide Rating Before: 49
- EnerGuide Rating After: 75
- water use before: 259,281 litres/year
- water use after: 134,164 litres/year
- number of water saving fixtures installed: 16

Construction Waste Management

- renovation waste diverted: 5.4kg
- household waste diverted: 718kg/year

Case Study

Here's how one North Vancouver home incorporated beauty, utility, and conservation in a single design. In this \$560,000 gut and rebuild project, the goals for the project included restoring the original character of this single-family home, improving its efficiency and incorporating sustainable and non-toxic materials and finishes. The total extra cost of the green investments was estimated at \$15,000, while the project qualified for \$5,000 in rebates.

Energy Conservation

- energy efficient combo washer/dryer
- solar hot water heating
- radiant hydronic in-floor heating
- increased cotton insulation (interior wall)
- mineral wool insulation (exterior wall)
- rigid foam insulation (upper roof)
- double glazed, argon-filled windows with soft spacers and Low-E coating on side 2

Natural Daylighting

- clerestories
- LED lights
- real-time energy use monitoring
- heat recovery ventilation

Water Conservation

- dual flush and low -flow toilets
- low flow showerheads
- rainwater collection barrel

Indoor Air Quality

- non-toxic finishes (no urea formaldehyde)
- clay plaster/paint

Waste Management

- drywall, metal wiring, fixtures, piping were recycled
- bathroom shower stall, jacuzzi, wooden interior and exterior doors, sliding patio door, and washer/dryer were given to Jack's New and Used Building Materials
- old windows and light fixtures were given to Habitat ReStore
- cedar siding was reused for outdoor LED light housings and skylight trim
- all of the unpainted waste wood was kept to burn in the waste wood cooker/boiler
- crushed concrete was used as fill on site to avoid sending it to the landfill

Sustainable Materials

- FSC-certified wood flooring and cedar siding
- bamboo cabinetry
- countertops made from 100 per cent recycled paper or, recycled glass, coal fly-ash and cement mix
- fly-ash concrete floors
- cork floors
- recycled glass tiles

Resources

Design

- The US Green Building Council and the American Society of Interior Designers have a resource called the REGREEN Residential Remodeling Guidelines (www.regreenprogram.org). These guidelines, rather than a checklist rating program, were created to address the unique aspects of residential renovations, such as the varying range of projects, the existing conditions, the custom nature of the work and the occupant's needs.
- The US National Kitchen and Bath Association maintains an excellent list of design and safety guidelines at www.nkba.org/guidelines/bathroom.aspx while the BC Building Code includes a set of Adaptable Housing Standards found at www.housing.gov.bc.ca/building/adaptable_housing/summary.html.
- CMHC has a series of renovation fact sheets that can help you plan your project. You can download these at www.cmhc-schl.gc.ca/en/co/reno/refresh.
- For tips on harnessing the natural power of the sun for heating and cooling, see the City of Vancouver's Passive Design Toolkit for Homes downloadable at vancouver.ca/sustainability/building_green.htm.

Toxics

- CancerSmart Consumer Guide from Toxics Free Canada, www.toxicfreecanada.ca
- CMHC's Indoor Air Quality series, www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/index.cfm
- CMHC's 'Building Materials for the Environmentally Hypersensitive', available to purchase from www.cmhc.ca
- The Washington Toxics Coalition, www.watoxics.org

Material Selection

- For details on the Forest Stewardship Council program and certification see www.fscscanada.org.
- For details on the merits of various green building products and where you can purchase them locally, see MetroVancouver's BuildSmart product directory at www.metrovancouver.org/buildsmart, as well as Light House Sustainable Building Centre at www.sustainablebuildingcentre.com.

Incentives & Funding

- For a comprehensive list of incentives available, visit the Metro Vancouver BuildSmart website at www.metrovancouver.org/buildsmart. Incentives and funding are available from:
 - BC Hydro bchydro.com
 - Solar BC www.solarbc.ca
 - Terasen www.terasen.com
 - CMHC www.cmhc.ca
 - Vancity www.vancity.com
 - Federal Eco Action program oee.nrcan.gc.ca

Waste

- Metro Vancouver provides a directory of recycling and salvage businesses at www.metrovancouver.org/Metrovancouverrecycles. There is also more information about recycling available from the Recycling Council of BC at <http://rcbc.bc.ca>.
- Material Exchange RCBC's MEX program is a completely self-served web-based program comprised of Residential Reuses Programs and the BC Industrial Materials Exchange. Visit www.bc.reuses.com.
- If you have to dispose of asbestos containing materials, review the City of Vancouver's Asbestos Policy for guidelines on proper disposal at vancouver.ca/solidwaste/landfill/asbestos.htm.
- BC Paint Exchange. Groups and individuals who wish to obtain leftover paint should call the BC Recycling Hotline at 1-800-667-4321. This program is run by Product Care, a not-for-profit industry association which manages product stewardship programs for household hazardous and special waste on behalf of its members across Canada www.productcare.org.

Water Efficiency

- Select toilets that have been tested by the Canadian Standards Association or an equivalent lab – a list of high-performing toilets can be found in the CMHC study 'Maximum Performance Testing of Popular Water-Efficient Toilet Models', available at www.cwwa.ca.
- CMHC's 'Household Guide to Water Efficiency' available for download at www.cmhc.ca for more information on detecting and fixing leaks.
- The City of Vancouver provides residents with Water Saving Kits that can help your bathroom use 15 to 20 per cent less water. Visit vancouver.ca for details.

Energy: Appliances and Fixtures

- For further details on the ENERGY STAR and EnerGuide labelling programs and energy efficiency of household appliances, visit Natural Resources Canada, oee.nrcan.gc.ca (click on Residential).



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