

ENERGY

Re-energize your home: Invest in energy efficiency

Improve your comfort

Insulation

If your home was built before 1980, you most likely need an insulation upgrade. Good insulation is an inexpensive way to make a big improvement in home comfort. Insulation performs best when combined with comprehensive air sealing.

Sealing

Air leaks in the home and duct system can be the single largest cause of heat loss. Sealing them can reduce drafts and moisture problems, while making your home more comfortable and energy efficient.

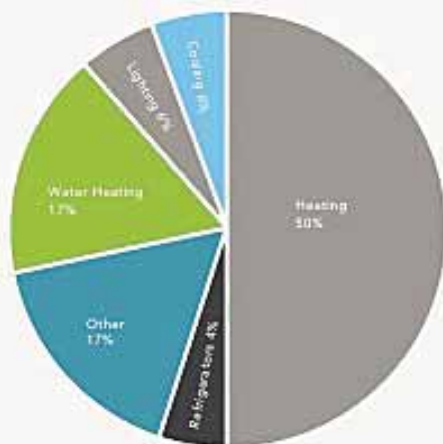
Heating

Your heating system is the largest energy user in your home. Some of your biggest energy savings will come from replacing an inefficient system with an ENERGY STAR heat pump or natural gas furnace.

Water heating

Replace any water heater more than 12 years old with an ENERGY STAR qualified model.

Places a typical Northwest home uses energy:



Get the most for your money

Lighting

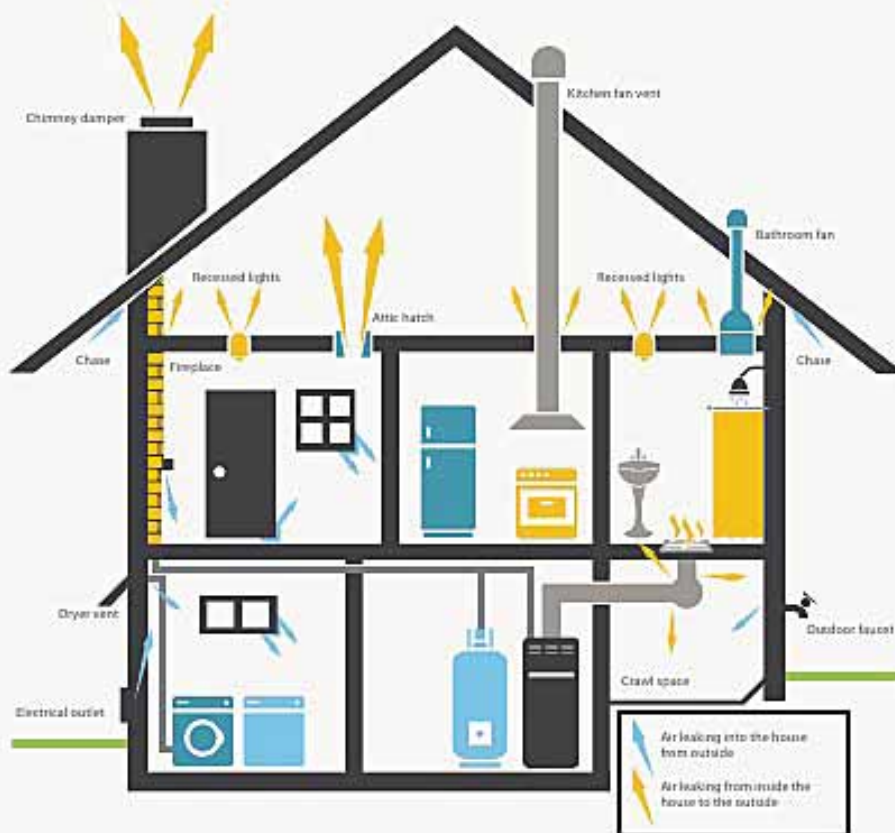
Replace incandescent bulbs with ENERGY STAR qualified compact fluorescent light (CFL) bulbs and fixtures. They use 75 percent less energy, last up to 10 times longer and now come in a variety of sizes.

Appliances & electronics

Electronics draw power even when turned off. Plug items like TVs, DVD players and game consoles into power strips that can be switched off when not in use. Purchase ENERGY STAR appliances and electronics.

Windows

Double-pane, low-emissivity windows will keep your home warmer in the winter and cooler in the summer. Upgrading is a higher priority for homes with single-pane windows.



SOLAR ENERGY

Solar electricity is generated using photovoltaic (PV) cells, which convert sunlight into electricity. Grid-tied PV systems, such as at zHome, provide power that is compatible with the utility grid and can be interconnected easily.

Did you know?

- Federal and State incentives support the investment in solar electricity.
- You can use renewable energy while enjoying the benefits of reliable grid power.
- As more people install renewable energy systems, we reduce our reliance on new power plants to meet the growing energy demands of our region.



zHome's cells are regionally made in Hillsboro, Oregon



zHome microinverters, visible on back side of solar trellis



Net meters for three zHomes



Production meters three zHomes



How does zHome's solar energy system work?

Like almost all systems these days, zHome's solar systems are tied to the electric grid. Each zHome includes enough solar cells to generate the same amount of energy the unit is expected to use over the course of a year. The larger units are expected to use more power and thus have more panels. Individual unit arrays range from 4900 to 7100 kwh – considered quite large for a residential installation.

Solar cells are the basic building blocks of a PV system, consisting of semiconductor materials made of silicon crystals grown from very pure sand. When sunlight is absorbed by the silicon, the solar energy knocks electrons loose from their atoms. This is called the "photoelectric effect." These free electrons then travel into a circuit built into the solar cell to form electrical current. Only sunlight of certain wavelengths will work efficiently to create electricity. PV systems can still produce electricity on cloudy days, but not as much as on a sunny day. zHome's solar cells are made by Solarworld in Hillsboro, Oregon.

A power inverter converts the DC output of the PV cells into usable AC output that can be fed directly into the home or business and the utility grid. In many systems, a number of cells wired together run through one larger inverter, operating as a single unit. At zHome, each cell has its own small inverter, called a microinverter. This provides greater system efficiency and reliability, because if one cell is dirty or damaged, it doesn't impact production of adjacent cells.

Two meters are provided for each unit - a production meter and a net meter have been installed by PSE. The production meter measures the total solar production of each home. This enables the 15 cent/kwh production incentive to be determined. The net meter shows monthly net power usage. This will run forwards and backwards, and at the end of the month be positive or negative, resulting in either a charge or a credit.

MATERIALS

How to “z” your own home with green materials!

It can be overwhelming to choose from the many available building products for your own home. zHome materials were selected using performance and environmental criteria to reduce the impacts of the building.

Specifically, zHome materials were selected because they helped support local economies; were recyclable at the end of their life; conserved natural resources in their harvest or manufacturing; and/or were healthy for the manufacturing staff and homeowner.

zHome also proves that deep green materials don't compromise aesthetics or cost more. At zHome, materials were minimized and structural elements were used as a finish. This provides a cutting edge “modern organic” aesthetic at a price any homeowner can afford.

There are often tradeoffs when selecting materials, and there aren't always clear answers. When searching for materials for your own home, consider the following options:

- Don't replace it until you need to. Keep existing materials working for you for as long as you can, or refurbish what you have. This minimizes waste, natural resource consumption and the environmental impacts associated with new material transportation. However, if the product uses significantly less energy or water, the environmental benefits of increased efficiency usually outweighs the impact of producing the new product.
- Reuse what you can. Whether it is from your own home or from recycled house-part stores, find creative ways to reuse existing materials. Turn gym bleachers into floors, find an antique claw foot tub, re-stain that antique desk and you have both style and a great story.
- Recycle construction waste from your house projects. Much of the waste thrown into landfills can be re-manufactured into building products, lowering the amount of new resources needed.
- Use Forest Stewardship Council (FSC) certified wood – which ensures that a forest is managed based on ecologically-sound principles and remains a viable ecosystem – while also allowing wood harvest. FSC products bear the FSC logo and are readily available in flooring, decking, framing lumber, sheathing, window frames and trim.
- Look for materials with recycled content. The less raw material that has to go into a new building product, the lower the environmental impact. You can find countertops made from recycled glass or recycled paper; tile made from recycled glass and porcelain; recycled wood fiber decking and siding; and even recycled gypsum in drywall.
- Buy products that are manufactured or harvested locally. Locally manufactured materials help to support local economies and lower the carbon footprint of a product by reducing the distance it is shipped.
- Choose materials that last a lifetime. Highly durable products go a long way to reducing the amount of resources we consume over time, because they have to be replaced less frequently. Challenge yourself: Can you find an appropriate product that will last 100 years?
- Look for products with a green certification. Third-party product certification means that a product is recognized as sustainable by an independent entity. Certifications include Built Green, Greenseal, CRI Green Label+, Greenguard, ENERGY STAR, WaterSense and FSC. In a market where it can be tough to tell the difference between a truly green product and just green marketing, looking for a certification can help.
- Research the products you like and ask about them. Ask suppliers and retailers about their environmental products and values. The more frequently consumers ask, the more likely manufacturers and suppliers will be to provide more green choices.
- Design for disassembly, which ensures that materials can be reused in a future life should the project ever be deconstructed. An easy way to design for disassembly is to use fasteners, like screws, instead of adhesives.
- Reduce the number of materials used in your project by designing construction materials as finish. For example, concrete can be used as building structure and finished flooring.
- Use rapidly renewable products, which are manufactured from plants that grow in a 6-10 year lifecycle. Because they are non-petroleum based, they easily biodegrade at the end of their lifespan. Examples include cork, sisal and bamboo.

EFFICIENT USE OF MATERIALS

The materials that go into any building have an impact on both the environment and the quality of the indoor environment.

Construction and demolition waste constitutes about 45% of the total solid waste stream nationwide. To protect the environment, the zHome team worked to reduce, reuse and recycle building materials:

Reduce

The greenest material is one that isn't used. Using fewer materials means fewer impacts from manufacturing, transportation and waste disposal.

Reuse

Reusing existing materials prevents the negative environmental impacts of the harvest or extraction of new materials. Salvaged materials can also reduce costs and add character to the building.

Recycle

Recycling helps prevent pollution by keeping waste out of landfills and incinerators, and lessens the demand for raw materials.

Strategies utilized at zHome

- zHome recycled over 90% of its waste from construction. That's more than 164,175 pounds diverted from landfills!
- Many "extra" products were repurposed right on site and transformed into key features in the project. For example, framing elements were reused for the trellis and handrails.
- Locally manufactured or harvested materials include sheathing, framing, roofing, sheetrock, concrete, siding, cabinets and flooring.
- Prefabricated panelized foam components reduced wasted material from cutting.
- Exposed beams are beautiful, and they "save" materials by not requiring additional materials to cover or finish them.
- Reclaimed wood was used as a butcher block for the kitchen countertop.
- The concrete elements used a high percentage of flyash, a waste product from coal plants (zHome used 30% while typical is 5-10%).
- The sheetrock contains 50% recycled content.

zHome was designed to minimize the use of materials through the whole project lifecycle.



FOREST STEWARDSHIP COUNCIL (FSC)

The Forest Stewardship Council (FSC) is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests and forestry products.

Established in 1993 as a response to concerns over global deforestation, FSC is the pioneer third-party system for responsible forest management. FSC is the only global certification system in which forest management practices are evaluated by an independent third party according to strong social, environmental and economic standards.

Driven by strong market demand for responsible forest products, FSC is the fastest growing forest certification system worldwide with more than 140 million hectares in over 80 countries. In 2011, FSC chain of custody certification surpassed 20,000 certificates. The green building industry can take a lot of credit for increasing the demand of these products.

Green building is booming in the United States. By 2013, green building is expected to represent 25 percent of all commercial and institutional building starts and 20 percent of residential construction. Programs like Built Green encourage the use of FSC wood and consider it the highest standard of certification in today's wood market. FSC certified wood was found to be the most commonly specified green building product in McGraw-Hill's database, even surpassing the Energy Star label.

zHome set a benchmark of 25% FSC wood and exceeded those goals by purchasing over 78% FSC wood products for the project. FSC certified lumber products for zHome include:

- Framing lumber
- Flooring
- Cabinets
- Butcher block counters
- Decking
- Trellis and fence materials



LOCAL/REGIONAL MATERIALS AND DURABILITY

Local products

Buying locally manufactured or assembled materials and products helps support local economies and lowers the carbon footprint by reducing transportation. Generally, products are considered local if they are manufactured or assembled within 500 miles of the project site.

zHome materials sourced locally:

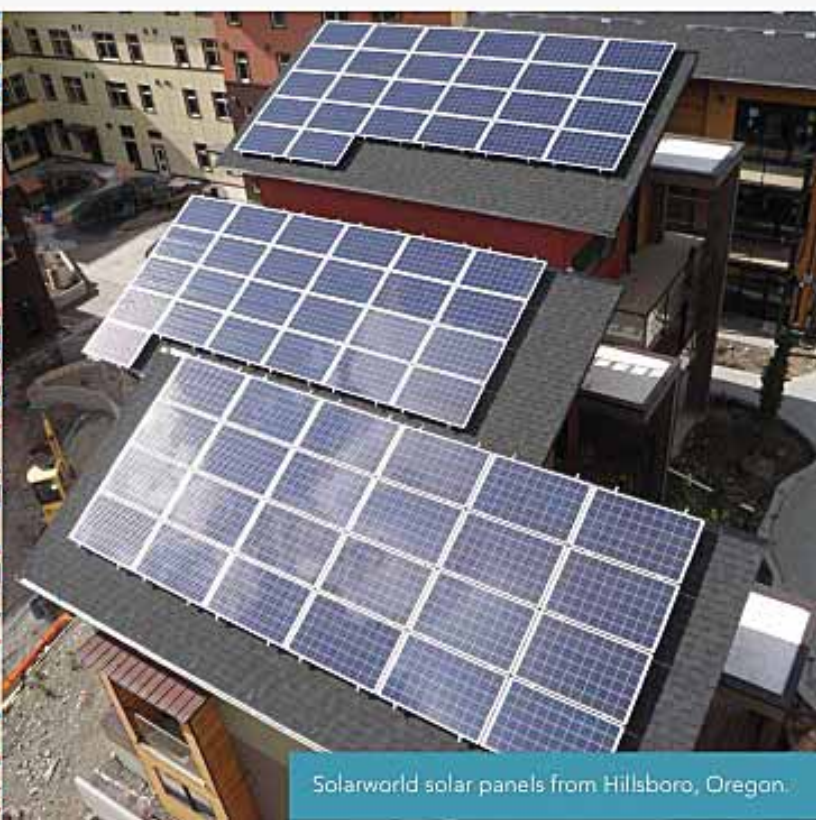
- Solar panels – Hillsboro, Oregon
- Framing lumber - Forest Grove watershed, Oregon
- Roofing – Portland, Oregon
- Concrete – Snoqualmie, Washington
- Siding – Tacoma, Washington
- Sheetrock – Tacoma, Washington
- Cabinets – Lynnwood, Washington
- Rainwater cisterns – Vancouver, Washington
- Metal railings and stair stringers – Seattle, Washington
- Butcher block countertop – Olympia, Washington
- Aluminum ventilation panels – Wenatchee, Washington
- Doors – Grants Pass, Oregon
- Topsoil and compost – King County, Washington
- Pre-grown green roof - Cornelius, Oregon
- Landscape plants – Oregon and Washington

Durability

When selecting a building material, look for time-tested materials such as linoleum, metal roofs or wool carpet. Durable materials can reduce maintenance and replacement costs, and extend the history of the building.

zHome materials chosen with durability in mind include:

- Siding with a 50-year warranty
- Roofing with a 40-year warranty
- FSC hardwood decking
- Woven bamboo flooring
- Solid surface countertops made with recycled content
- Aluminum and glass railings
- Fiberglass windows and doors
- Concrete floors
- Concrete pavement and walls
- Fiberglass exterior doors
- Metal garage doors and ventilation panels
- Pump-based heating system
- Stainless steel and aluminum solar panel racking
- Tempered glass and aluminum solar panels



Solarworld solar panels from Hillsboro, Oregon.

YARD

Green your yard!

Creating a more natural landscape reduces use of water and chemicals. Plus, a natural landscape retains more water than a lawn, and can recharge groundwater and streams during droughts.



Follow the zHome path:



Use native plants, remove unneeded lawn and add compost to your soil

- Select plants that grow well in the Northwest, and consider the sun, soil and water available in your yard before planting.
- Mix lots of compost into your existing soil, which holds rainwater and gives plants lots of natural nutrients.
- Replace some or all of your lawn with native plants. They require less care, and they can be a home for native wildlife.

If you decide to keep some lawn, use natural lawn care

Weed and feed products spread herbicides and fertilizer over your entire lawn. These chemicals end up in our lakes and streams. Children are especially sensitive to pesticides, which may cause cancer. Frequent use of chemicals also damages native organisms that help keep your lawn and soil healthy.



Keep water on site with a rain garden

Rain gardens are areas of deep organic soil, with wet tolerant plants, where the rainwater can seep back into the ground like it did before the site was cleared. Roof and driveway runoff can be channeled to these areas, rather than into the storm drainage system, which often discharges directly into salmon streams with no treatment.

Create a backyard wildlife sanctuary

You don't have to use feeders. Choose plants that provide berries, food and shelter, which will attract many friendly birds to your yard. Nest boxes are also easy to install.



Plant a vegetable garden

Growing your own food gets you closer to natural rhythms and saves on the environmental impacts of food transportation. Get closer to the Earth, plant some seeds and watch them grow.

MATERIALS

How to “z” your own home for a healthy indoor environment

- Clean your home. Regular cleaning will prolong the life of your new green materials, and keep your indoor air healthier. Use green cleaning products. Remove shoes before entering the house and consider walk-off mats. Shoes track in all sorts of unhealthy things, including dirt, toxins and petroleum products.
- Use low toxic and low VOC paints and finishes, which reduces the amount of chemicals that off-gas from a product and makes for healthier indoor air. They are safer to handle, easier to clean up and do not emit harmful fumes as they dry. Look for paints and finishes that bear the Green Guard or Green Seal label.
- Avoid thick wall-to-wall carpeting. Use tile, wood and linoleum. If you must have carpet, use less dense “Berber” carpets. Wall-to-wall carpet traps dust, dirt and other tracked-in toxics and allergens, releasing them slowly with every step.
- Avoid products containing urea-formaldehyde, especially particleboard or medium density fiberboard (MDF). Urea formaldehyde is a frequently-used building adhesive that can create respiratory issues and may cause cancer. If you have a lot of particleboard (cabinets, shelves, trim, etc), it should be sealed with a laminate or vapor barrier sealer. Also avoid furniture made with particleboard and fabric coated with “stain guards.”

Consider these greener options:

- o Formaldehyde-free MDF made with exterior-grade resins for added durability
- o Agricultural fiber panels such as wheatboard or strawboard
- o Forest Stewardship Council (FSC) certified exterior grade plywood made with phenol formaldehyde-based glue, rather than harmful urea formaldehyde-based glue
- Avoid toxins (pesticides, solvent-based paints, etc.) in your house. Store any potentially toxic materials in airtight boxes in an outdoor storage unit or in a detached garage. Over time, these toxins can migrate out of their containers and then move around inside the home.

- Open windows and doors, operate window or attic fans (when the weather permits) or run a window air conditioner with the vent control open to increase the outdoor ventilation rate.
- Use bathroom or kitchen fans that direct exhaust outdoors. This removes contaminants directly from the room where the fan is located, and also increases the outdoor air ventilation rate.
- Avoid wood-burning fireplaces, which contribute to poor indoor and outdoor air quality and are the least efficient way to heat your home (90% of the fire's heat goes up the stack). Change to a certified wood stove, a wood pellet stove or a high-efficiency gas fireplace.
- Install a carbon monoxide (CO) detector near your wood- or gas-burning stove or fireplace that warns occupants when CO levels reach unhealthy levels. They are inexpensive and relatively easy to install.

Retail resources for green materials:

- Green Depot
- Green Home Solutions
- Lowe's
- McClendon Hardware
- ProBuild
- ReStore
- Second Use
- Seattle Habitat Outlet (Habitat for Humanity)



TOXICITY

Americans, on average, spend approximately 90% of their time indoors, where the concentrations of some pollutants are often 2 to 5 times higher than typical outdoor concentrations.

Most pollutants affecting indoor air quality come from sources inside buildings, although some originate outdoors.

Common indoor pollutants include:

- Formaldehyde
- Particulates
- VOCs
- Carbon monoxide
- Mold
- Radon

Most products that are applied wet and dry later on give off volatile organic compounds (VOCs). They are emitted by thousands of products. Examples include: paints and lacquers; paint strippers; cleaning supplies; pesticides; building materials and furnishings; office equipment such as copiers and printers; correction fluids and carbonless copy paper; graphics and craft materials including glues and adhesives; permanent markers; and photographic solutions. That new carpet or new car smell is one indication of VOCs, but VOCs don't always have an odor. Concentrations of many VOCs are consistently higher indoors (up to 10x higher) than outdoors. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.

Strategies utilized at zHome

- Use of Greenseal and GreenGuard certified low or zero VOC paints
- Use of plant-based or Greenseal, or GreenGuard certified adhesives, floor finishes, caulks and sealants
- No urea-formaldehyde products used in interior spaces
- Homes are ventilated continuously for one week after final finishes are applied and prior to occupancy
- Minimal vinyl
- The cars/garages are isolated/sealed from the units and are vented to the outdoors
- Use of passive ventilation with architectural perforated screens
- Built in track-off mats are installed at the entrance of each zHome

Low VOC paints meet the 50 g/L VOC threshold, with many paints doing better than this.



WATER

How to “z” your home using WaterSense!

By making just a few changes, you can save water, save money and preserve our fresh water supplies far into the future. Look for the WaterSense label to help you identify high-efficiency products, which provide the high performance and quality you’ve come to expect, but have the added benefit of water savings.

WaterSense labeled products:

- Showerheads
- Toilets (check into ultra low flush and dual flush models)
- Faucets
- Clothes washers (Look for an ENERGY STAR model with a low water factor (WF))
- Homes
- Irrigation controllers*

*coming soon!

Check with your local water utility for rebates on appliances, fixtures, irrigation upgrades and more. Free leak test kits, faucet aerators and other resources may be available as well.

Along with using WaterSense labeled products, adopt water efficient practices:

Fix that leak

Leaky faucets that can waste more than 3,000 gallons of water each year. Leaky toilets waste about 200 gallons of water every day.

Make it a full load

High-efficiency washing machines use 30-50% less water per load. Make the most of that water and energy by washing only full loads of laundry. Do the same for dishwashers!

Shower down

A full bath tub uses about 70 gallons of water, while an efficient 5-minute shower uses 8-12 gallons.

Turn it off

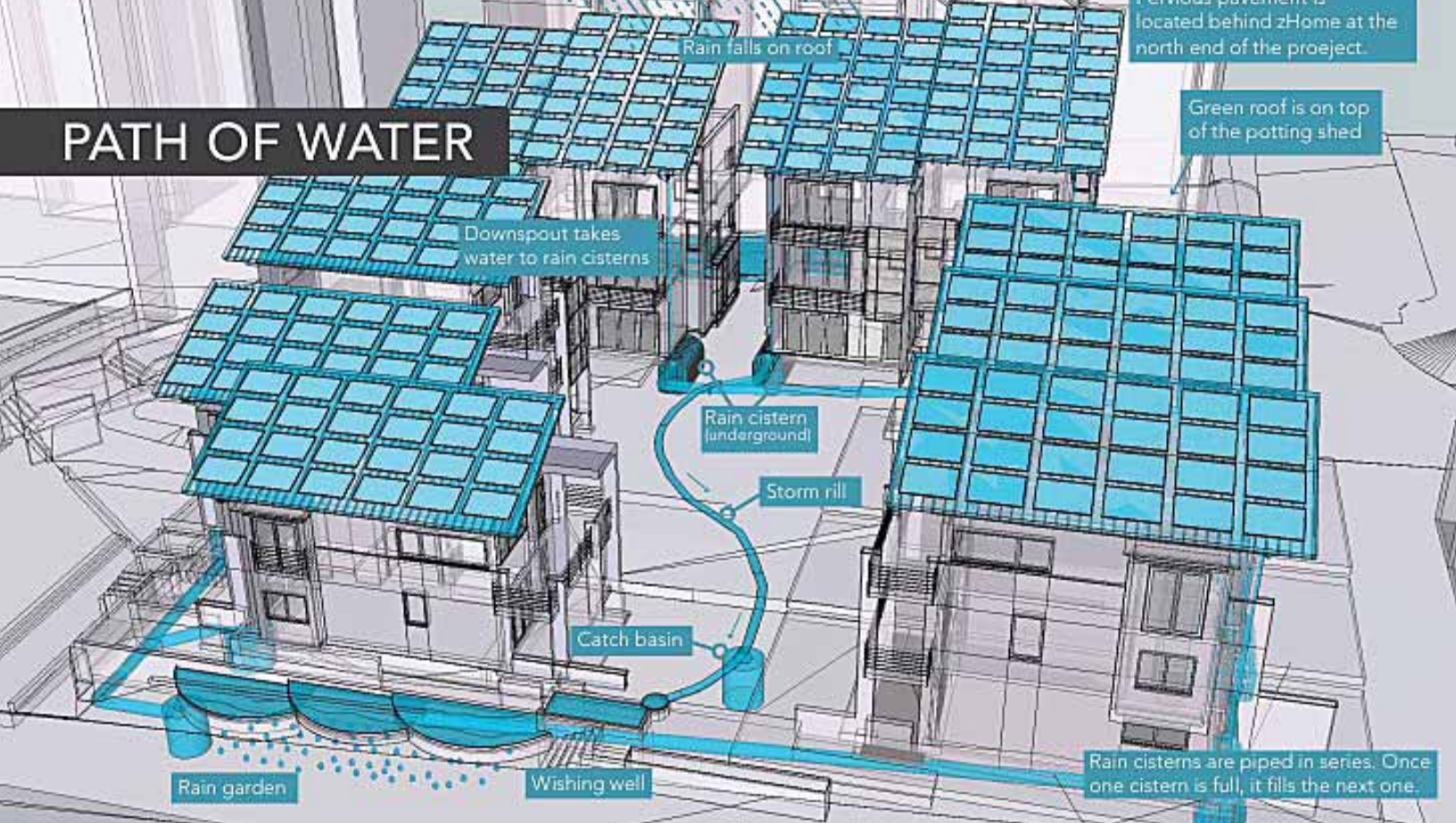
A typical faucet flows at two gallons per minute. Turn off the tap while brushing your teeth.

Water wisely


Typical homes use 30 percent of their total drinking water outdoors for irrigation. As much as 50 percent can go to waste due to evaporation or runoff caused by overwatering. Use drip irrigation, shrink your lawn and select plants that are right for your site – and you won’t need as much water for irrigation.



PATH OF WATER



In a typical development, storm water collects in large detention ponds or vaults, where it is piped to local streams and rivers. This requires significant infrastructure and can contribute to local water quality problems. In green construction, Low Impact Development (LID) works with nature to manage storm water close to its source.

 = the flow of water of through zHome

Low Impact Development features at zHome

- Preserve natural landscape features
- Create drainage that treats storm water as a resource, not just waste
- Put water back into the ground close to where the rainwater falls

Rainwater runs off zHome roofs, and flows through downspouts into rain cisterns, where water is collected and stored. The overflow water flows down a storm rill and into a rain garden, where it is absorbed back into the ground.



zHome is the first residential community in Washington to be certified as Salmon Safe. Salmon Safe certification requires design and management practices that protect water quality and downstream fish habitat, such as infiltration stormwater on site, and landscaping with native plants, and avoidance of irrigation and pesticides. Everywhere in the watershed matters to the survival of our native salmon.

Green roof

The potting shed at zHome has a green roof, which is covered in plants to absorb rainwater.



Rain cisterns

There are 10 rain cisterns at zHome. They range in size from 1,000-1,800 gallons. This water is stored and used for flushing toilets and washing clothes.



Pervious pavement

zHome uses a pervious pavement that allows water to run through it.



WATER CONSERVATION

WaterSense for Homes

The EPA's WaterSense program labels plumbing fixtures, and now homes. To be eligible for a label, a WaterSense home must reduce water use by 20%. zHome is the first WaterSense certified project in the State of Washington.

z-Home goes further, achieving a remarkable 70% reduction using the following strategies:

