

# What is “Green Building?”

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CLALLAM COUNTY  
*Environmental Health*  
SERVICES

# What is Green Building?

- “Green Building,” is a holistic approach that minimizes environmental impact, reduces maintenance and creates a healthier atmosphere for the occupants.
- Green building focuses on siting issues, energy and water efficiency, recycled content building materials, minimizing local and global environmental effects caused by buildings, and improving indoor environmental quality.

# Who's Involved with Green Building?

- Government Agencies
  - Federal
  - State
  - Local
- Private
  - Engineers
  - Architects
  - Builders
- Non-Profit
  - U.S. Green Building Council

# Green Building Goals and Benefits

- **Increase** human health and productivity
- **Achieve** energy & other utility cost savings
- **Reduce** environmental impacts

Green Building... is good design and smart construction



*Chartwell School, Seaside, CA*



# Facts About Your Home



## Water

- Older toilets use 3.7-7 gallons per flush
- Dishwashers use 8-14 gallons per cycle
- Top-loading washers use 45 gallons/load
- A dripping faucet waste 15-21 gallons per day
- US water users withdraw enough water to fill a line of Olympic-size swimming pools reaching around the world EVERY DAY (300 billion gallons)
- Although our planet is 71 percent water, humans depend on a mere .65 percent of the water for survival
- About a quarter of the nation's largest industrial plants and water treatment facilities are in serious violation of pollution standards at any one time.



# Facts About Your Home

## Indoor Air Quality:

- US EPA ranks indoor air pollution among top five environmental risks. Unhealthy air is found in up to 30% of new and renovated buildings
- W.H.O. reports that indoor air pollution causes 14 times more deaths than outdoor air pollution (2.8 million lives)
- Of hundreds of EPA-regulated chemicals, only ozone and sulfur dioxide are more prevalent outdoor than indoors
- 20 percent of all housing in the US has too much lead dust or chippings (causes kidney and red blood cell damage, impairs mental and physical development, may increase high blood pressure)

# Facts About Your Home



## Pesticides:

- In the US, pesticides poison 110,000 people each year. More than one-third of calls to animal poison control centers result from pets exposed to pesticides.
- The volatile organic compounds (including pesticides) found indoors are believed to cause 3,000 cases of cancer a year in the US.
- According to the New York State Attorney General's office, 95 percent of the pesticides used on residential lawns are considered probable carcinogens by the EPA

# Facts About Your Home

## Wood

- Although the US is home to only 4.5 percent of the global population, it is responsible for over 15 percent of the world's consumption of wood.



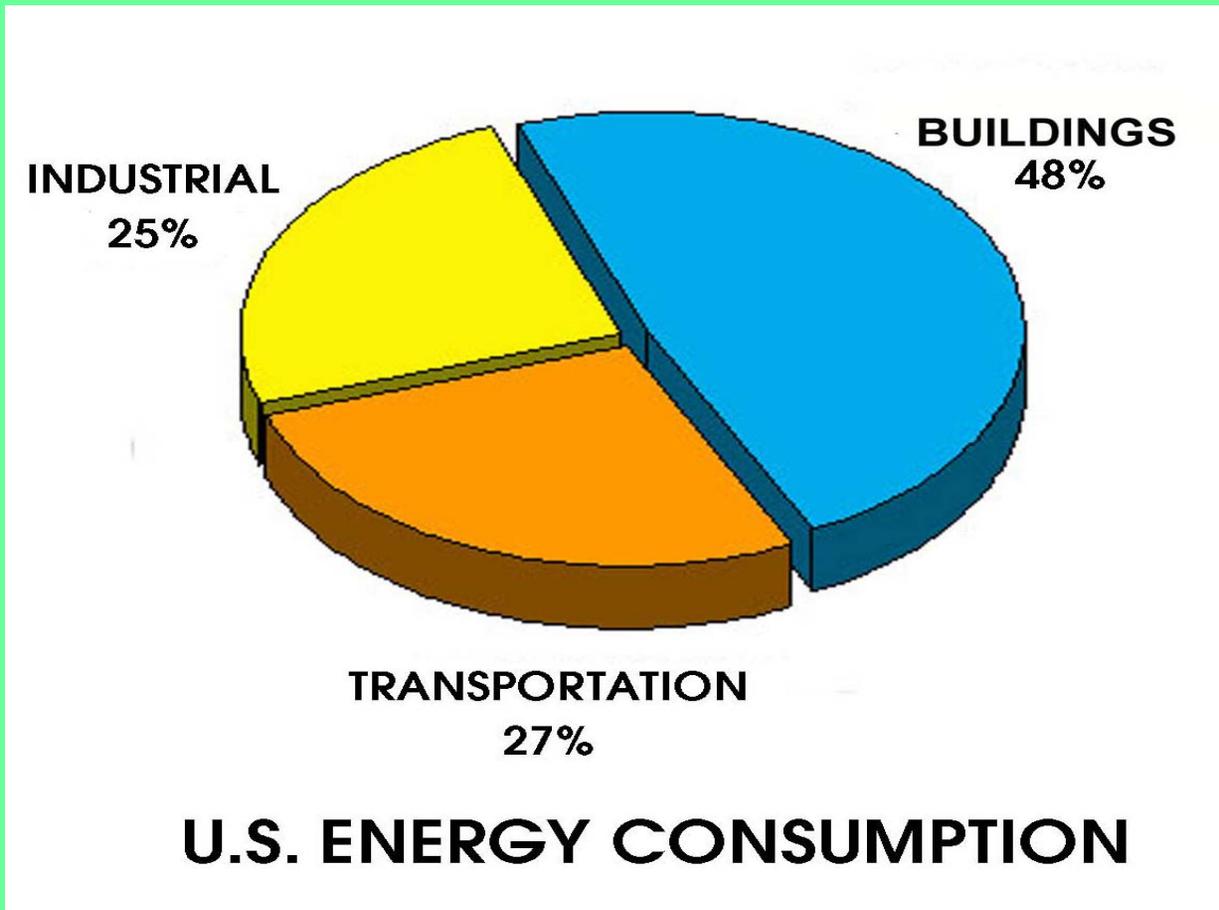
Source: [GreenBuilding.com](http://GreenBuilding.com)

# Why Green Building?

- Environmental challenges are forcing a change in how we design and construct buildings
- Use the power of the market to affect change (market transformation)
- Make environmental and social values part of design decision-making (“triple bottom line”)
- Washington State population will double in 50 years (Office of Financial Management)

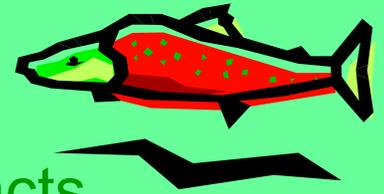
*Source: Stuart Simpson, Green Building Advisor, WA State Dept. of General Administration*

# U.S. Energy Use by Sector



*Source: Energy Information Administration Statistics (Architecture 2030)*

# What are the Challenges which have lead us to Build Green?



## Local Environmental, Social, Economic Impacts

- Salmon listed as Endangered Species
- Water shortages (municipal and agricultural)
- Flooding
- Loss of wildlife and habitat
- Energy shortages & dependence on foreign sources (contributing to trade deficit )
- Municipal wastewater treatment plants overwhelmed
- Landfill closures
- Materials cost inflation



# Environmental Impacts of Buildings



- Use 33% of total energy and 66% of electric energy
- Produce 33% of CO<sub>2</sub> (directly or indirectly)
- Consume 50% of CFC-based substances
- 25% of all harvested wood and 3 billion tons of raw materials worldwide
- Construction, Demolition & Landclearing (CDL) waste is 40% of landfill waste
- Use 17% of potable water
- Sick Building Syndrome, increased asthma rates

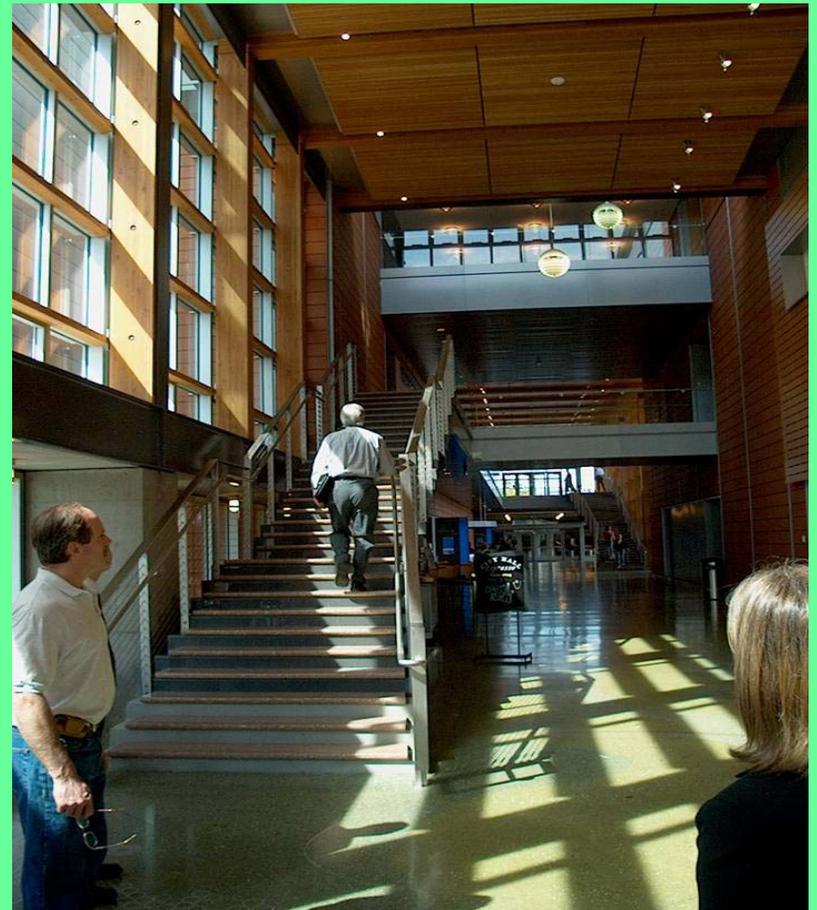
# Green Building Design Basics

- Keep it small
- Consider building orientation
- Design an open layout/floor plan
- Eliminate floor finishes (no carpet) Use energy and water-efficient fixtures
- Be mindful of material unit sizes (minimize cutting and waste)
- Design for disassembly (easy to reuse materials)

*Source: American Institute of Architects*

# Key Features

- Use of free daylight and solar heat
- Good ventilation, including windows that open
- Low-toxic indoor environment
- Sustainable materials
- Walk to services, easy access to public transit
- Infill sites instead of sprawl



*Bellevue City Hall, photo by Vicki Colgan*

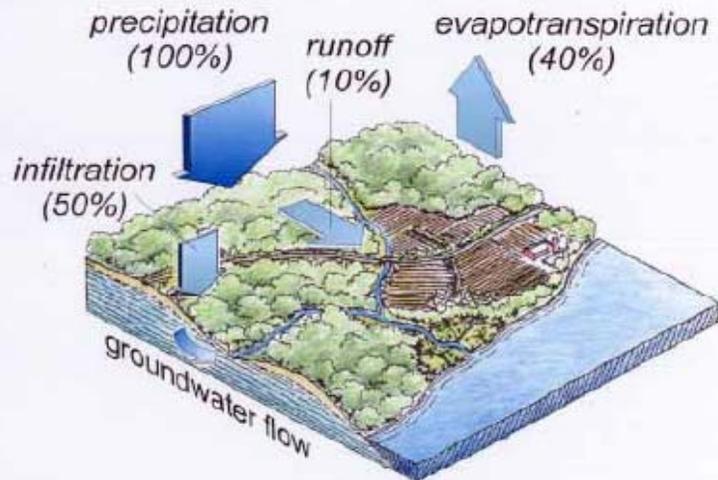
# Green Building Principles

- Integrated Design – Project team meets & agrees on goals in pre-design, works collaboratively throughout project
- Site – Minimize impacts on project site
- Energy – Save money, save energy
- Water – Use it wisely, or not at all
- Materials – Low or no toxic, recycled or rapidly renewable
- Indoor Environmental Quality – Protect occupant health and increase productivity

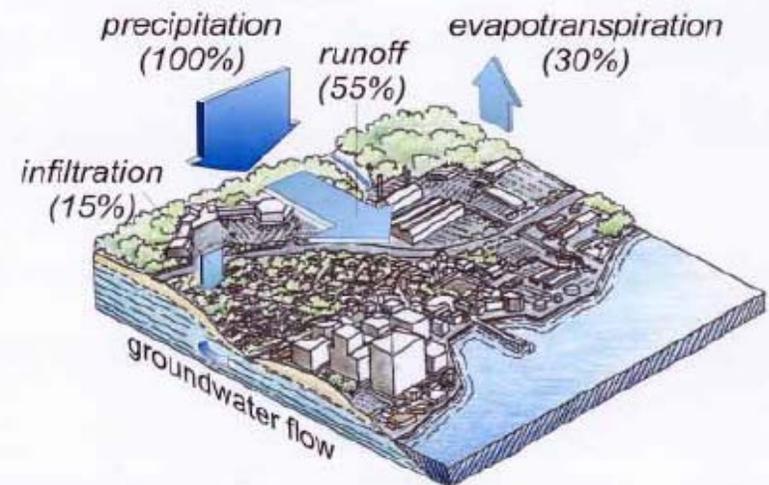
# Site Design-Low Impact Development (LID)

LID is a site planning and design strategy that uses decentralized controls to manage stormwater

## Pre-Development



## Impacts from Typical Development

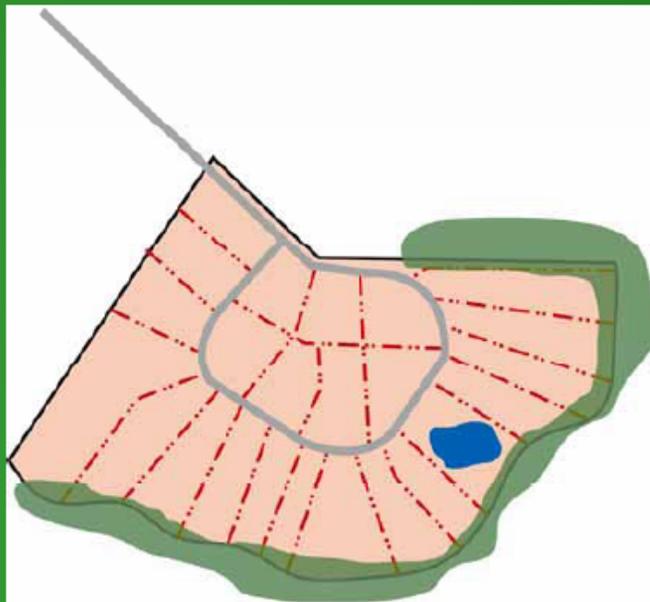


# Site Development

## Multi-lot Development

Open Space- cluster development

**Conventional**



**Cluster**



# Multi-Lot Development



**FAT STREET**

**Narrow  
Roads**



**THIN STREET**

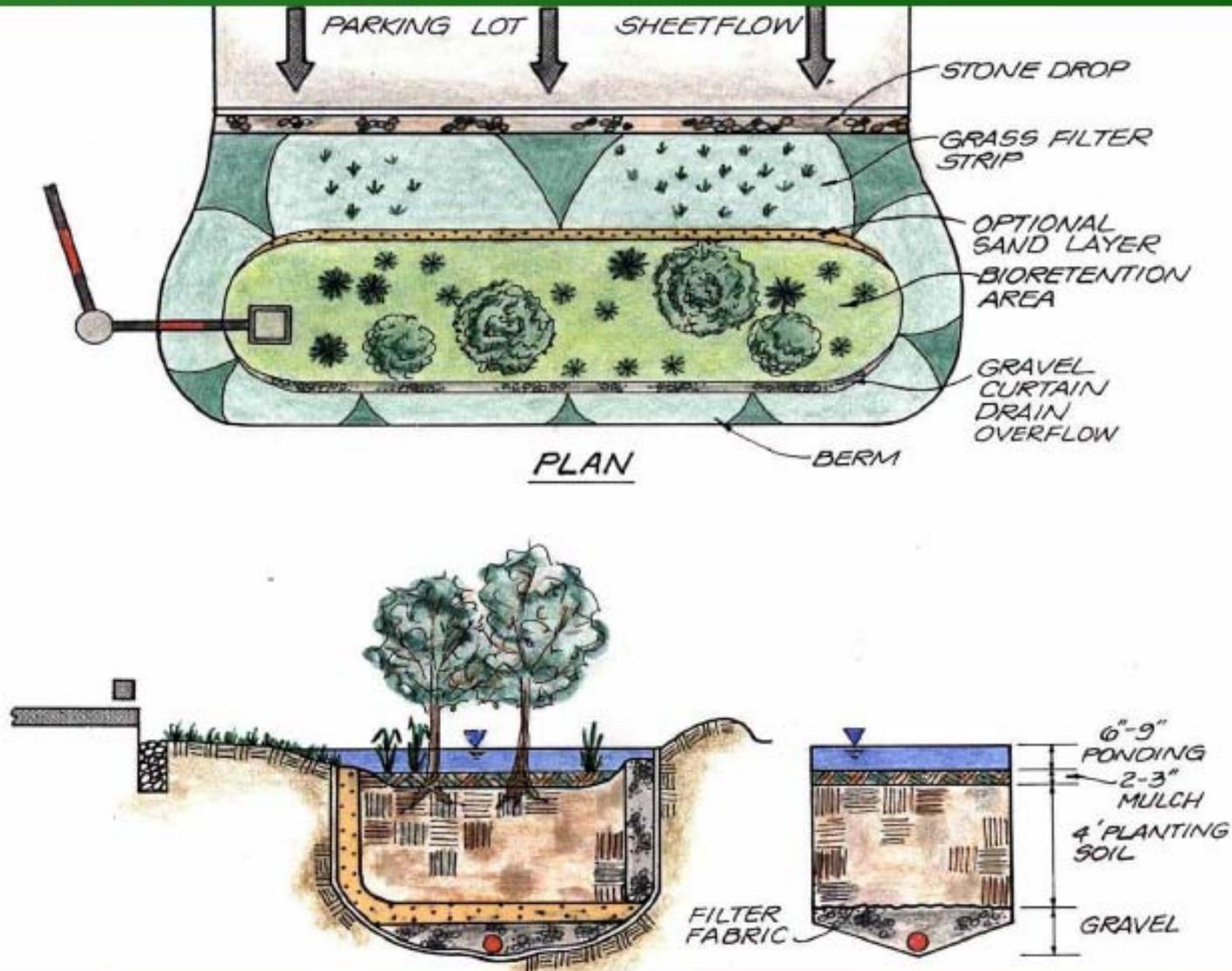
# Site Development



Permeable  
Paving



# Bioretention Area



# Energy Efficiency

## Structural Insulated Panels (SIPS)

- These panels combine plywood and insulation into an integrated unit. The openings and channels for wires are cut at the factory. They go together very tightly, creating a very energy efficient wall or roof assembly.



## Ample Natural Light

- Well placed, high quality, energy efficient windows deliver lots of natural light, reducing the need for electrical lighting. Light colored surfaces help bounce the light deeper into the space.





# Energy Efficiency-Energy Star

- Did you know that the average home spends about \$1,900 on energy costs every year? Change to appliances that have earned the ENERGY STAR, and you can save \$80 a year in energy costs, while saving the environment.
- ENERGY STAR qualified appliances incorporate advanced technologies that use 10–50% less energy and water than standard models. The money you save on your utility bills can more than make up for the cost of a more expensive but more efficient ENERGY STAR model.
- If just one in 10 homes used ENERGY STAR qualified appliances, the change would be like planting 1.7 million new acres of trees.
- Qualified appliances include top loading washers, dishwashers, refrigerators, and freezers. Contact your utility company.



# Energy Efficiency-Energy Star



## Lighting

- ENERGY STAR qualified lighting provides bright, warm light but uses at least 2/3 less energy than standard lighting, generates 70 percent less heat, and lasts up to 10 times longer.
- If every American home changed out just five high-use light fixtures or the bulbs in them with ones that have earned the ENERGY STAR, each family would save about \$60 every year in energy costs, and together we'd save about \$6.5 billion each year in energy costs and prevent greenhouse gases equivalent to the emissions from more than 8 million cars.



# Green Roofs

- One more way to reduce stormwater runoff and the problems it causes in our water ways (carrying heat, pollution) is to put vegetation on the roof of buildings. While this one is flat, they can happily exist on a slope. The right plant choices and materials are critical. Done right it adds additional landscaping. Since UV rays do the greatest damage to roofing materials, they actually reduce roof failures.



Looking north across the newly planted roof (taken from the upper roof); 2003

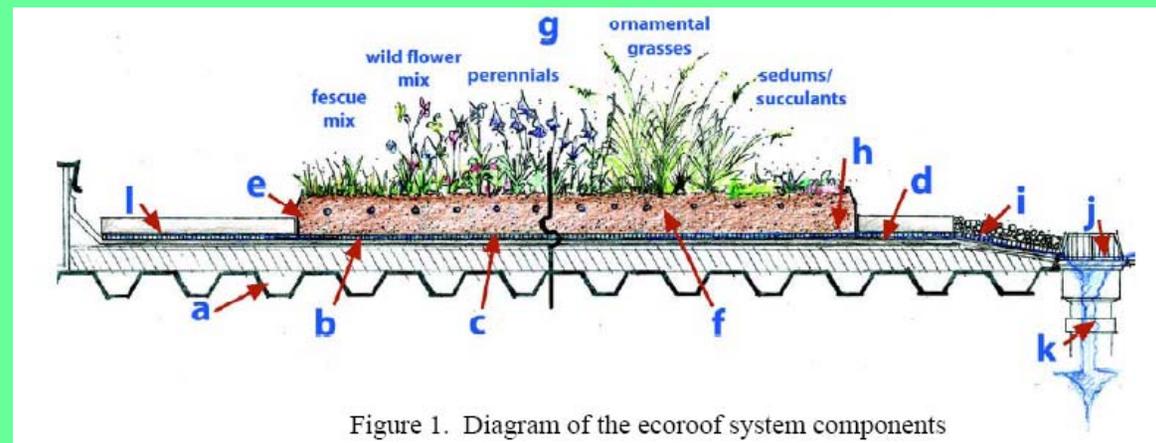


Figure 1. Diagram of the ecoroof system components

# Water Efficiency

- Between 1950 and 2000, the U.S. population increased nearly 90 percent. However, in that same period, public demand for water increased 209 percent! Americans now use an average of 100 gallons of water each day—enough to fill 1,600 drinking glasses!
- The average household spends as much as \$500 per year on its water and sewer bill. By making just a few simple changes to use water more efficiently, you could save about \$132 per year. If all U.S. households installed water-efficient appliances, the country would save more than 3 trillion gallons of water and more than \$17 billion dollars per year!

# Water Efficiency

## Simple Steps to Save Water

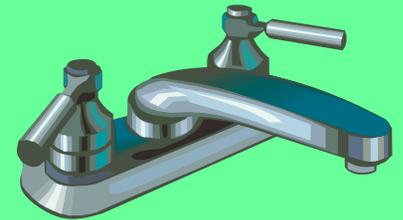
### ■ Fix That Leak!



- Leaky faucets that drip at the rate of one drop per second can waste up to 2,700 gallons of water each year. A leaky toilet can waste about 200 gallons of water every day.

### ■ Turn it Off!

- The average bathroom faucet flows at a rate of two gallons per minute.



### ■ Make it a Full Load



- The average washing machine uses 40.9 gallons of water per load. High-efficiency washing machines use less than 27 gallons of water per load. To achieve even greater savings, wash only full loads of laundry or use the appropriate load size selection on the washing machine.

### ■ Don't Flush Your Money Down the Drain!

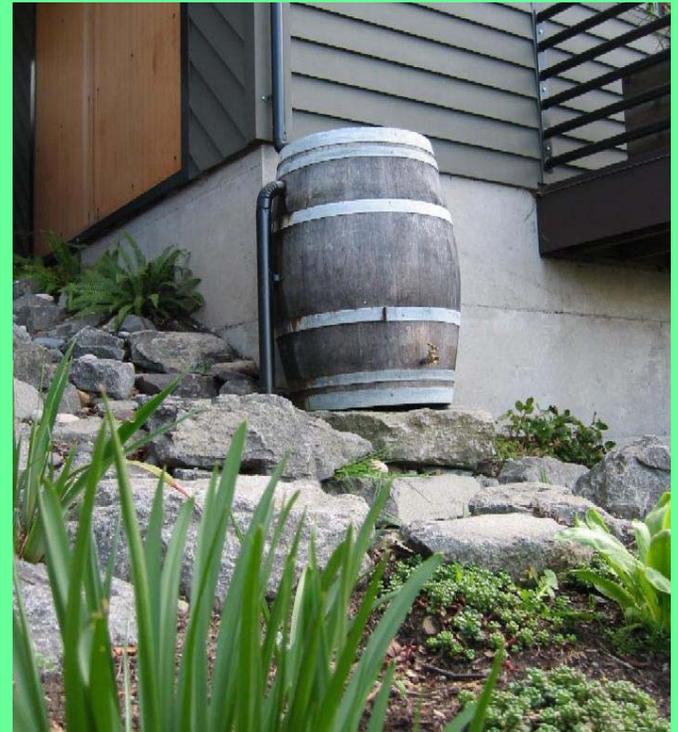
- If your toilet is from 1992 or earlier, you probably have an inefficient model that uses between 3.5 to 7 gallons per flush.



# Water Efficiency

## Rainbarrel

- A rainbarrel like this one collects the rainfall from the roof runoff during the wet winter and spring, and saves it for use during the dryer gardening season.



# Materials and Design Efficiency

- Build small
- Design a livable attic
- Use locally milled wood products
- Use recycled products
- Be innovative!



# Green Materials



## Green Materials

- Green materials reduce demand on natural resources and reduce pollution in their use and manufacture while delivering on performance and quality.

## Fiber Cement Siding

- Fiber cement siding is durable (up to a 50 year warranty) and low maintenance. It is available in shingles, panels and planks.

## Bamboo

- Bamboo is a fast growing grass that produces a strong fiber that can be used in place of wood for flooring, cutting boards and counters.

## FSC Certified Wood

- Forest Stewardship Council (FSC) is a certification program that verifies sustainable forest practices and tracks products from tree to store.



# Health and Indoor Air Quality

- Planning and design to promote the health of the residents living in the home
- Reduce indoor pollutants and protect from hazardous materials
- Prevent mold growth by managing mold growth
- Improve indoor air quality for occupants by increasing ventilation and air purification

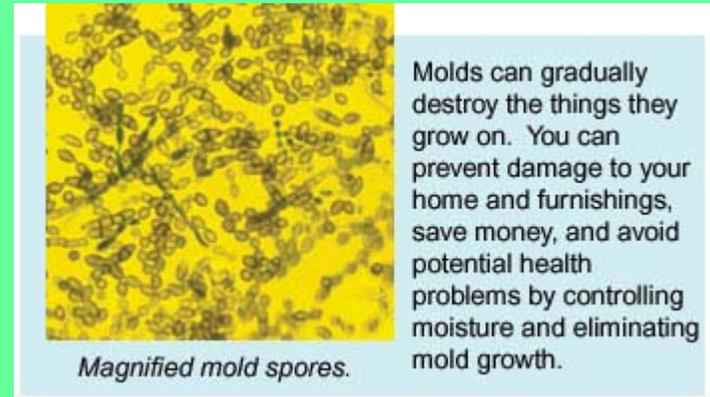
# Health and Indoor Air Quality

- Most people spend 90% of their time indoors
- Homes built green can be better for your health
- People with allergies and asthma generally have less symptoms
- Infants, elderly and infirm spend most of their time indoors
- Homes now are built “tight” and are usually constructed with toxic materials



# What are some types of Indoor Air Quality (IAQ) contaminants?

- Biological Contaminants
  - Mold and Mildew
  - Dust
- Chemical Contaminants
  - Carbon Monoxide (CO)
  - Volatile Organic Compounds (VOCs)
  - Radon
- Respirable Particles



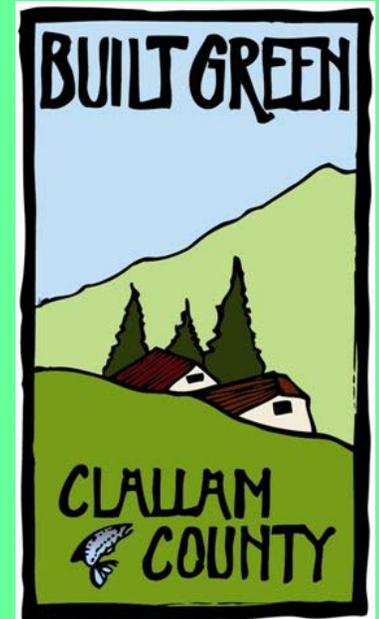
# Will green buildings help?

You be the judge:

- LEED™ (Leadership in Energy and Environmental Design) buildings: average of 40% energy cost savings over code
- Occupant satisfaction is higher
- 100% of LEED projects recycle 50% of construction waste; ~70% recycle 75%
- Reduction in potable water use

# North Peninsula Builder's Association (NPBA) Built Green Checklist™

- August 2005 NPBA started to establish a Clallam County Built Green™ Checklist
- Over 100 people in the community worked to develop the Checklist
- September 2006 the Checklist was completed for use



# Green Building at State Facilities

ESSB 5509/RCW 39.35D – Related to High Performance Green Building State facilities will not be designed and built to the LEED™ Silver standard. LEED™ is a Green Building Rating System developed by the US Green Building Council.

All major facility projects of public agencies receiving any funding in a state capital budget, or projects financed through a financing contract as defined in RCW 39.94.020, must be designed, constructed, and certified to at least the LEED™ silver standard.

This process applies to all new major facility project construction and renovation projects over 5,000 GSF, where the renovation costs exceed 50% of the building assessed value.

UW Bothell Campus



# Example in Kitsap County



## ■ **General Description**

The owners decided to build small. This resulted in significant resource conservation (both in building the structure and in operating it) and it meant less disturbance to the site.

The architect used several techniques to create a space that works for the owners, including a series of eight skylights, contrasting colors, orientations, degrees of privacy and ceiling heights, built-ins, and rooms with multiple functions. Although the house is much smaller than conventional homes --1,650 square feet -- most visitors comment that the home "seems much bigger."

## ■ **Site and Water Protection**

- Small footprint.
- Protected natural vegetation/limited site disturbance.
- Amended soil with high quality compost, made from reclaimed yard waste.

## ■ **Using Energy Wisely**

- Energy Star appliances.
- Clean, efficient hydronic, radiant in-floor heating provides more comfortable heating for less fuel.
- Compact fluorescent lights.

## ■ **Health and Indoor Air Quality**

- Non toxic and no-VOC interior paint (Rodda Horizon Clean Air)
- Water-based floor sealer, (Conquest).

## ■ **Using Materials Wisely and Reducing Waste**

- Concrete foundation used fly-ash instead of some cement, an industrial by-product.
- Recycled content in metal roof; vinyl sheet flooring, carpet pad, insulation (fiberglass) drywall clips, drywall, composite decking (also durable and low maintenance).
- Resource efficient finger-jointed studs and parralam framing are engineered from smaller pieces of wood that might otherwise be wasted.
- Bamboo flooring and counters are a rapidly renewable alternative to hardwoods.
- Bio-composite counters and flooring, made from soybeans and waste paper fiber.

# Example at High Point in West Seattle



# Upcoming Events

- NPBA Sequim Expo, March 10<sup>th</sup> and 11<sup>th</sup> at the Sequim High School
- 2007 Built Green™ Conference and Expo on March 13<sup>th</sup> in Everett
- Making it Last! Solutions for Sustainable Living in Clallam County, March 30<sup>th</sup> and 31<sup>st</sup> at Peninsula College

# Green Building Web Resources

- U.S Green Building Council  
[www.usgbc.org](http://www.usgbc.org)
- Northwest EcoBuilding Guild  
[www.ecobuilding.org](http://www.ecobuilding.org)
- Built Green  
[www.builtgreenwashington.org](http://www.builtgreenwashington.org)
- Ecology Green Building site  
[www.ecy.wa.gov/programs/swfa/greenbuilding/](http://www.ecy.wa.gov/programs/swfa/greenbuilding/)
- North Peninsula Builder's Association  
[www.nbpa.info](http://www.nbpa.info)
- U.S. Environmental Protection Agency  
[www.epa.gov](http://www.epa.gov)

*Any Questions?*