Build A Home On Sustainability Street!

Inside is everything you need to build your own earth-friendly house! Each choice makes your home special. Flip to the back for contacts to help you learn and do more!

Choice 1: Site Selection! Where will you build your home and what does that mean for you?

Choice 2: Materials! What will you use to build your home and how do the materials work?

Choice 3: Indoor Environment! What will you use to make your home healthy and affordable to live in?

Choice 4: Renewable Energy! How will you power your home sustainably?

Choice 5: Water Management! How will you protect and preserve water in and around your home?

Choice 6: Move In Day! Snap a picture and share what you built with the world!

Photo Credit: Albert the Squirrel was created by the City of Flagstaff Sustainability Team!

If you're interested in a color copy of this booklet, download it at www.hfhnaz.org/earthday2016!

Choice #1: Site Selection

Activity

1. Color your site.
2. Attach house to site with velcro tape.
3. Tape string "wattles" onto the site.

Sustainable Site Planning

When building a new home, proper site selection minimizes the negative impacts of construction on the environment. Construction should be considerate of natural ecosystems such as living soil communities and root systems. These can be critically damaged during construction by trenching, soil compaction, flooding, and vehicles. Planning can help conserve and protect plant communities, watersheds, and wildlife habitats. Erosion control measures prevent soil loss and water pollution from stormwater runoff. Other goals may include maximizing open space, accessibility, stormwater retention, transportation connectivity, and renewable energy.

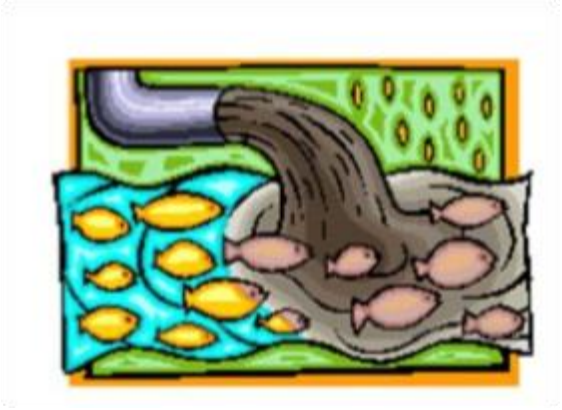
Water-Smart Landscaping

Outdoor water use makes up 30% of the water used in residences. Landscaping wisely can reduce water use significantly. Key tips to remember for water-smart landscaping:

- Go native or choose plants that need less water.
- Group plants according to their water needs
- Minimize turf areas and be selective about usage
- Irrigate efficiently
- Use mulch

Stormwater Management

Stormwater can pick up debris, chemicals, dirt, and other pollutants while flowing to washes, streams, rivers, or lakes. Anything that enters a watershed is discharged *untreated* into the water bodies we use for swimming, fishing, and providing drinking water. Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.



Choice #1: Site Selection, Cont'd

What You Can Do!

Five things you can do at home to help keep storm water clean:

1. Auto Care: don't dump automotive fluids or detergents onto the ground. It has the same result as dumping them directly into a body of water.
2. Landscaping and Lawn Care: use pesticides and fertilizers sparingly.
3. Maintain Your Septic System: inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
4. Pet Waste: remember to pick up the waste and dispose of it properly.
5. Recycle or Properly Dispose of Household Products: they contain chemicals, such as insecticides, pesticides, paint, and solvents, so don't pour them onto the ground.

For more information on the Coconino County Storm Management Clean Stream Program, see their website at:

http://www.coconino.az.gov/index.aspx?nid=1090

For more information on site planning and water-smart landscaping, see the Sustainable Site Planning section of the Coconino County Sustainable Building Program website at: http://www.coconino.az.gov/index.aspx?NID=625

Thank you to these organizations for their help today!

NATUREBADGE.COM

COCONINO COUNTY Sustainable Building Program

COCONINO COUNTY Stormwater Management CLEAN STREAM PROGRAM www.coconino.az.gov/SWMP

Choice #2: Materials

Activity

1. Choose Material Sheet
2. Glue Materials Sheet to front of house

House Size

Smaller houses not only use less material to build, they also use less energy to heat and cool.

Did you know that 40% of all raw materials worldwide—three billion tons a year—are used to construct buildings? Here, you're going to learn what materials can help change that! Choose building materials that:

- Require less energy to produce,
- Are renewable,
- Are made from recycled materials,
- Increase energy efficiency of the home,
- And will reduce environmental impacts!

Natural Materials

People have lived in buildings made of natural materials throughout history. Natural materials take less energy to make and can come right from the site or close by, thus reducing the energy of transporting them.

Strawbale

Strawbale houses use waste straw that is otherwise burned after a grain crop is harvested. Strawbales are excellent insulation and result in beautiful wide walls.

Adobe

Adobe bricks are made by mixing dirt with straw and water and letting them dry in the sun. Adobe buildings have thick walls and that hold heat well (aka "thermal mass").

Cordwood

Cordwood construction uses short logs with mud or cement in between for building walls. The wood can come from the trees that were removed to make room for the house. A good idea in a Ponderosa pine forest!

Choice #2: Materials, Cont'd

Synthetic Materials

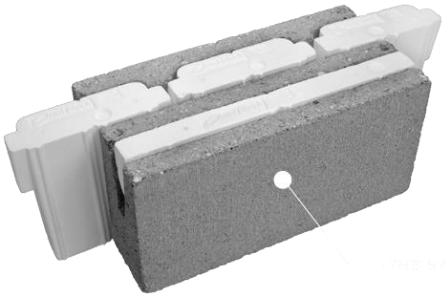
There are many good synthetic (aka man-made) insulation products that will reduce the energy use of a home over time. Some of these use renewable or recycled materials.

Spray Foam

Spray foam can be made from a mixture of plant and petroleum products, has a high insulation value and blocks cold air from seeping into the house.

Cellulose Insulation

Cellulose insulation is made from recycled newspaper and also provides a better barrier to air infiltration than other loose fill types of insulation.



Insulated Blocks

Insulated blocks are often made with recycled foam beads mixed with cement.

Structural Insulated Blocks

Structural Insulated Panels (SIPs) have a foam core and a structural "skin" of strand board (often recycled!). The foam gives the panels a high insulation value.

Insulated Concrete Forms

Insulated Concrete Forms (ICFs) are hollow forms of foam that are held apart by a spacer made of plastic, metal, or more foam. The holes are filled later with concrete, and sometimes rebar. Again the foam is a great insulator.

COCONINO COUNTY

Sustainable Building Program

Learn More!

Materials are important for new construction, renovations, and additions to a home! These are only the basics!

For more information see the materials section of the Coconino County Sustainable Building Program website: http://www.coconino.az.gov/index.aspx?NID=625.

Choice #3: Energy Efficiency & The Indoor Environment

Activity

1. Glue cottonball "insulation" to sides (walls) of house.
2. Glue HRV (fresh air supply) to indoor ceiling

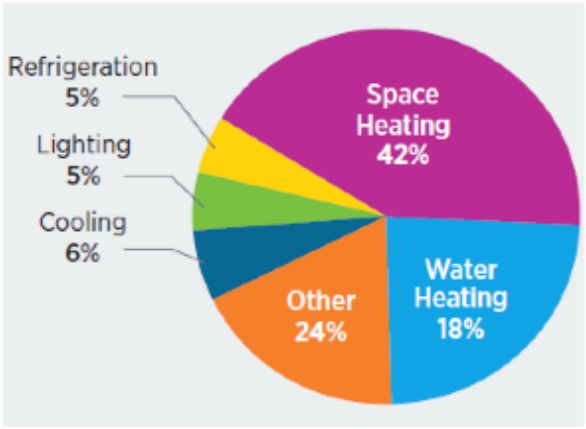
Typical/Standard Choice

Every year, much of the energy the U.S. consumes is wasted through heat loss and inefficient technology costing American families money, and leading to increased carbon pollution. Energy efficiency is one of the easiest and most cost effective ways to reduce carbon footprint and clean the air we breathe.

Home Energy Use

Space heating is the largest residential use of energy. Choose an energy efficient furnace or boiler to reduce energy usage in the home. Save more with an energy efficient water heater and appliances. Reducing water use reduces water heating, too! Look for the Energy Star label for energy efficient products.

ENERGY & THE HOME



Air Sealing

Reducing the amount of air that leaks in and out of your home is a cost-effective way to cut heating and cooling costs, improve durability, increase comfort, and create a healthier indoor environment. This can be achieved with caulking and weather stripping on old houses, and with the installation of an air barrier on new construction.

Insulation

Insulation resists heat flow in your home. The more heat flow resistance your insulation provides, the lower your heating and cooling costs. Properly insulating your home not only reduces heating and cooling costs, but also improves comfort. Insulation comes in many forms including batt, spray foam, rigid foam and blown-in cellulose.

Home Energy Audit

A home energy audit, also known as a home energy assessment, can help you understand the whole picture of your home's energy use. With one, determine how much energy your home uses, where your home is losing energy, and which problem areas and fixes you should prioritize to make your home more efficient and comfortable.

Choice #3: Energy Efficiency & The Indoor Environment, Cont'd

The Indoor Environment

As we build houses that are more energy efficient, they are more sealed off from the outside and less fresh air comes in. This means that any pollutants within the house are not diluted as in older, leakier homes. Carpets, paints, sealants, cleaners and other products may contain toxins that are released into the indoor air. Carbon monoxide and carbon dioxide are combustion products and radon can seep into the home from the soil below. Minimizing toxins and maximizing ventilation are effective approaches to incorporating good indoor environmental quality in new and existing buildings. Some ventilation strategies are:

- Heat Recovery Ventilators: These mechanical systems continuously bring in fresh air and warm it with the warm air leaving the home.
- Whole house exhaust fans: These systems pull out old air and bring in fresh air to the house regularly.
- Trickle Vents: These small vents installed on either side of the house use wind currents to draw air through the home.

For more information on Home Energy Audits, see Cozy Home: http://cozyhomeaz.com/.

For more information see the Indoor Air Quality and Energy sections of the Coconino County Sustainable Building Program website at: http://www.coconino.az.gov/index.aspx?NID=625.

Thank you to these organizations for their help today!

CozyHome

COCONINO COUNTY
Sustainable Building Program

Habitat for Humanity® of Northern Arizona

Choice #4: Renewable Energy

Activity

1. Choose roof-mounted or ground-mounted solar panels
2. Attach solar panels to house or site.

Typical/Standard Choice

Most homes in the Flagstaff area are powered by the Navajo Generating Station (NGS), a coal-burning power plant. NGS is the 3rd largest CO_2 emitter in the US. NGS has scrubbers to clean sulfur dioxide from its emissions but consumes over 3.7 million square meters of water in the process. It is estimated that about 4% of the electricity produced is lost in transmission lines (about 720 GWh/year) between the plant and the homes it serves.

Grid-Tied Solar

Grid-tied systems are the most common solar systems in use today. Being grid-tied means the energy produced by your home or business will go back into the main utility grid system. Your utility company tracks the energy you produce with a dedicated meter that is part of your solar array. At the end of the month you are credited for any excess energy that you produce.

With grid-tied systems, during the day produce electricity for yourself and send the extra electricity into the grid for others to use. During the night when your system is not generating electricity, you will be drawing power from the grid. Overall your net production of energy can be enough to offset your electricity use entirely.

Off-Grid Solar

Going off-grid is a way to become your very own sustainable power plant. With the use of batteries at the site, you are not wasting any power in transmission and distribution – ever!

Many living in rural areas can chose a clean and quiet battery-based solar array over constantly running a generator for their power. Those living in urban areas with an electric utility can also chose to live partially or completely off of batteries, especially during times of high demand or for backup power during an outage.

Thank you to these organizations for their help today!

Prometheus SOLAR
SOLAR ELECTRIC COMPANY

ROOFTOP SOLAR

Choice #5: Water Management

Activity

1. Glue toilet and sink to inside of house.
2. Tape grey pipe cleaner under tub, around bottom of house and out to fruit trees.
3. Tape blue pipe cleaner along "roof" of house and down to the garden.

Typical Water Use

Did you know that less than 1% of all the water on Earth can be used by people? The rest is salt water or is permanently frozen and we can't drink it, wash with it or use it to water plants. As our population grows, more and more people are using this limited resource. It is important that we use our water wisely and not waste it. Conserving water at home will help- every drop counts!

Indoor Water Conservation

There are many ways to reduce the use of water in your house through changing the way you use it. Turning off the tap when you brush your teeth or wash the dishes, taking shorter showers, and fixing leaks are a few. There are also ways of building water conservation into your house.

Low flow fixtures

Manufacturers are getting better and better at producing fixtures that use less water while giving the same feel as older higher flow fixtures. When buying new fixtures, look for EPA's WaterSense logo. WaterSense products perform as well or better than their less efficient counterparts and are 20% more efficient than average products in their category.

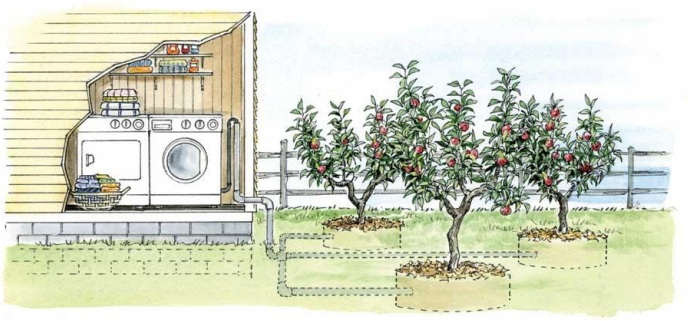
Appliances

The Energy Star label now signifies not only energy conserving models; it also is an indication of water efficiency. Energy Star washing machines use about 40% less water than standard models, and Energy Star dishwashers use about 85% the water a standard model does. Look for this logo when buying new appliances.

Choice #5: Water Management, Cont'd

Outdoor Water Conservation

Outdoor water use accounts for about 30% of home water use. In addition to using low water landscaping, harvesting rainwater from the site and reusing greywater for irrigation will reduce the amount of potable water being used.



Rainwater Harvesting

Water harvesting is the capture, diversion, and storage of rainwater for plant irrigation and other uses. Many methods are available to harvest rainwater for landscape use, some of them inexpensive and easy to construct. An example would be storing water in a barrel for later use or constructing small berms and drainages to direct water to a row of trees. Even the simplest methods provide benefits.

Greywater Use

Greywater is the used water that comes from showers, bathroom sinks and washing machines. It does not include wastewater from toilets, kitchen sinks or dishwashers. The only allowable use of greywater is the irrigation of non-edible landscaping (with the exception of fruit and nut trees). While using greywater does not require a formal permit, there are 13 Best Management Practices that must be met to be in compliance with the code. See the "Coconino County Greywater" brochure for more information.

Learn More!

For more information see "Water Conservation and Reuse" at the Coconino County Sustainable Building Program website at: http://www.coconino.az.gov/index.aspx?NID=625.

Thank you to these organizations for their help today!

COCONINO COUNTY
Sustainable Building Program

COCONINO COUNTY ARIZONA
COMMUNITY DEVELOPMENT
ENVIRONMENTAL QUALITY

Directory

These partners made Sustainability Street's activity possible and can help you do more! Whether you're planning, improving, or just dreaming, get in touch with these partners today!

Organization or Business Name	Choices	Phone Number	Email Address	Website
Coconino County Engineering Division Stormwater Management	1: Site Selection,	(928) 679-8881	jcarr@coconino.az.gov	coconino.az.gov/index.aspx?nid=1090
Coconino County Engineering Division manages stormwater quality through our Stormwater Program - Phase II general permit with Arizona Department of Environmental Quality (ADEQ). The ADEQ approved Stormwater Management Plan (SWMP) defines what and how the County maintains our stormwater quality permit.				
Coconino County Sustainable Building Program	All choices!	(928) 679-8853	aacheson@coconinoaz.gov	coconino.az.gov/sustainablebuilding
The Mission of Coconino County Sustainable Building Program (CCSBP) is to educate, support, encourage and help develop sustainable building practices & processes for the citizens of Coconino County				
Cozy Home	3: Efficiency and Indoor Env't, Renovation	(928) 853-0423	eli@cozyhomeaz.com	cozyhomeaz.com
CozyHome LLC is a licensed, Bonded and Insured Arizona Contractor ROC#281166. We service Flagstaff, Prescott, Prescott Valley, Chino Valley, Winslow, Cottonwood, Sedona, Camp Verde, Holbrook, Williams and other towns in Coconino and Yavapai Counties. Eli Chamberlain is a Certified Building Analyst and Envelope Professional through the Building Performance Institute (BPI). He is also a Certified HERS Rater through the Residential Energy Services Network (RESNET). He has an extensive background in construction, remodeling and building science.				
Habitat for Humanity of Northern Arizona	3: Indoor Env't, Renovation, Home Repair, Financing	(928) 779-1314	caleb@flagstaffhabitat.org	hfhnaz.org
HFHNAZ builds and repairs simple, affordable home for partner families in the Greater Flagstaff Area. We also work with community partners for neighborhood cleanups, community facilities renovation, and neighborhood research. Learn more about zero-interest lending for weatherization and home repair, how to apply for a Habitat home, volunteering on a project or in our ReStore, or just donate an old sofa or stove to the ReStore!				

Norman S. Lowe Consulting	**1: Site Selection, 5: Water**	**(928) 853-8554**	**loweflag@gmail.com**	**naturebadge.com (under construction)**
Norm is a natural resource management specialist assisting ranchers in our region to conserve vegetation, soils, and water. His Nature Badge products educate children about energy, water, climate, plants, animals, and earth.				
Prometheus Solar	4: Renewable Energy	(928) 527-1034	info@prometheussolar.com	prometheussolar.com
Prometheus Solar is a Flagstaff-grown solar electric company that started up in 2006. We specialize in grid-tied, off-grid, and battery backup solar electric systems. We also offer our Plug and Play Solar Kits in both grid-tied and off-grid versions for those who want a portable solar solution.				
Rooftop Solar	4: Renewable Energy	(928) 213-5670	info@rooftopsolar.us	rooftopsolar.us
Rooftop Solar takes a look at your past energy usage to determine how much electricity you currently use. Our team then designs a custom system specific to your individual electric needs. Every moment the sun hits your panels you'll be creating your own clean, renewable energy. Any excess energy goes back onto the grid and gets used up by your neighbors. Meanwhile you get credit for the energy you are producing for your neighbors.				