

Facilities Fundamentals

*Everyday Sustainability
for Home & Work*



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Icebreaker

With no nutritional, economical, industrial, or ecological value, what is the biggest irrigated crop in the United States?



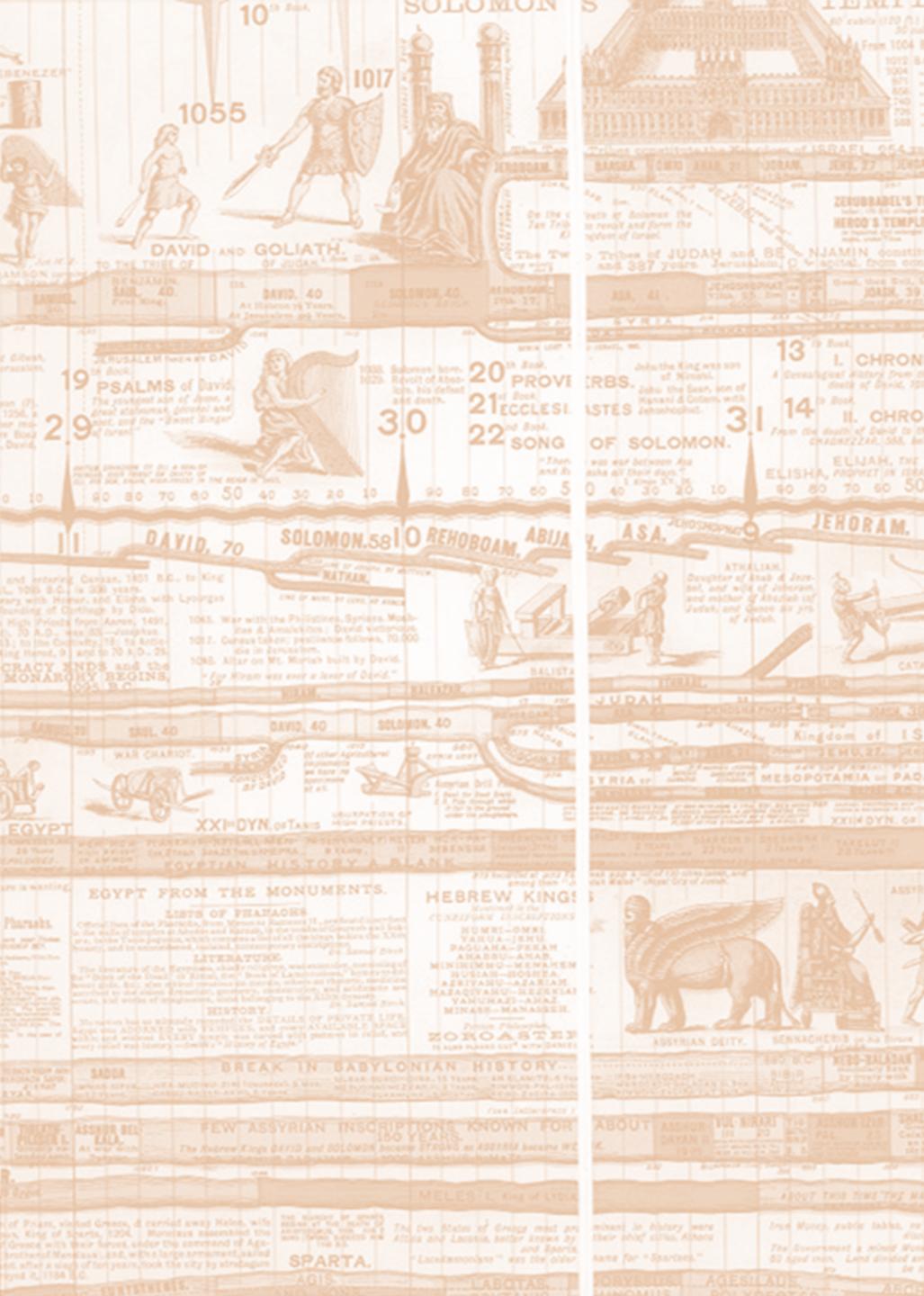
Outline

- History of Environmentalism
- Defining Sustainability
- Benefits
- Carbon Footprint
- Actions
- Technologies
- UT's Sustainability Program

History of Environmentalism

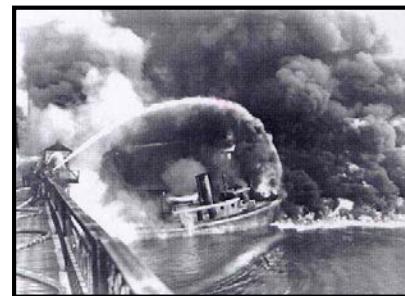
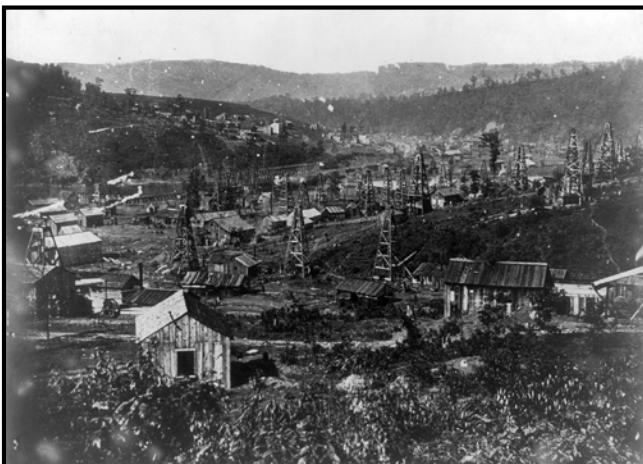


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History of Environmentalism

When do you think the environmentalism started, in particular, when did famous individuals & government began to make the environment a priority?



Movement before Action

To better understand the actions companies and government organizations took throughout the 20th and 21st century, we need to understand the drivers that spurred such a movement



Early Origins

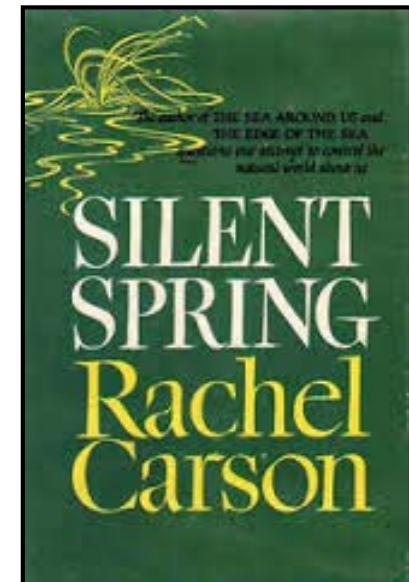
- Rooted in American Philosophy; 1830's
 - Early influential environmentalists
 - Henry David Thoreau
- Tapped into American Pragmatism; 1860's
 - John Muir was highly influential
 - National Parks and Wildlife Reserves were created
 - Sierra Club founded in 1892

20th Century

- National Park Service established in 1916
- Two World Wars stifled environmental growth
- “Donora Death Fog” in 1948 brought environmentalism back to the forefront
([video](#))
- Wilderness Protection Act in 1964
- Cuyahoga River Fire in 1969 ([video](#))

20th Century; Modern Movement

- During the 60's and early 70's the *Modern Green Movement* was established
 - *Silent Spring* was published in 1962
 - EPA was established in 1970
 - 1st Earth Day was 4.22.1970



20th Century; Modern Movement

- Other influential policies
 - National Environmental Policy Act
 - Water Pollution Control Act
 - Endangered Species Act
 - Banning of DDT



20th Century; Other Influential Moments

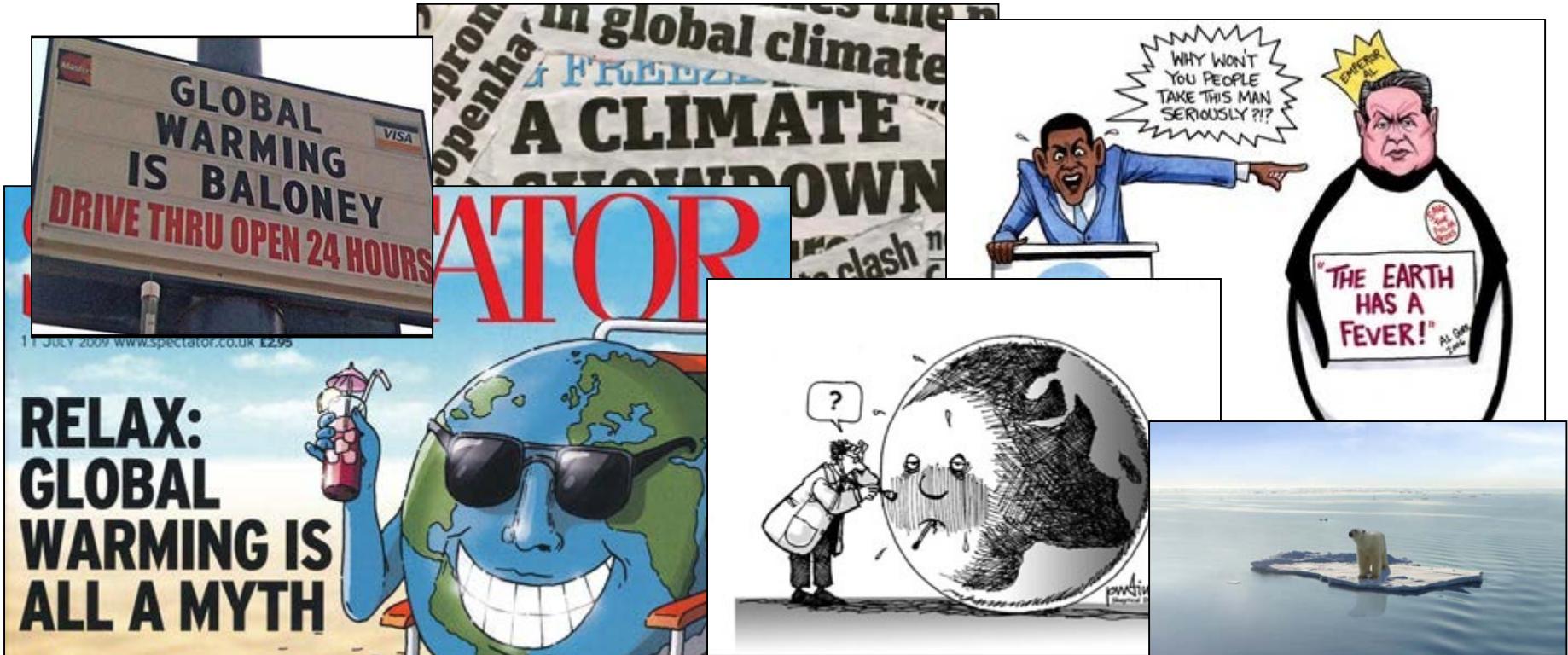
- Greenpeace is founded 1971
- Three Mile Island in 1979
- Congress creates the SuperFund
- Large hole in Ozone found in 1985
- Exxon Valdez oil spill in 1989 ([video](#))

21st Century

- Senate passes aid bill to restore Everglades in Florida at 7.8 billion in 2000
- Arctic Sea Ice drops to an all time low in 2007
- EPA celebrates its 40th year in 2010
- Fuel efficiency standard 54.5 mpg by 2025
- IPCC releases its 5th and most alarming Climate Assessment Report (March 2014)

Climate Change

A highly contested debate, still continuing with numerous findings supporting both sides.



Climate Change

WHO CARES?!?!

Why debate if the climate is changing?

Why try to pinpoint an issue 1,500 miles away,
when bigger issues are at your doorstep?

Live Local, Defend Local

- No one person wants to drink polluted water, breathe tainted air or watch their community fade away to nothing.
- Be aware of global issues, but work to secure your community 1st and foremost.
- If every town took such an approach, global warming issues would not be so contagious.



Defining Sustainability



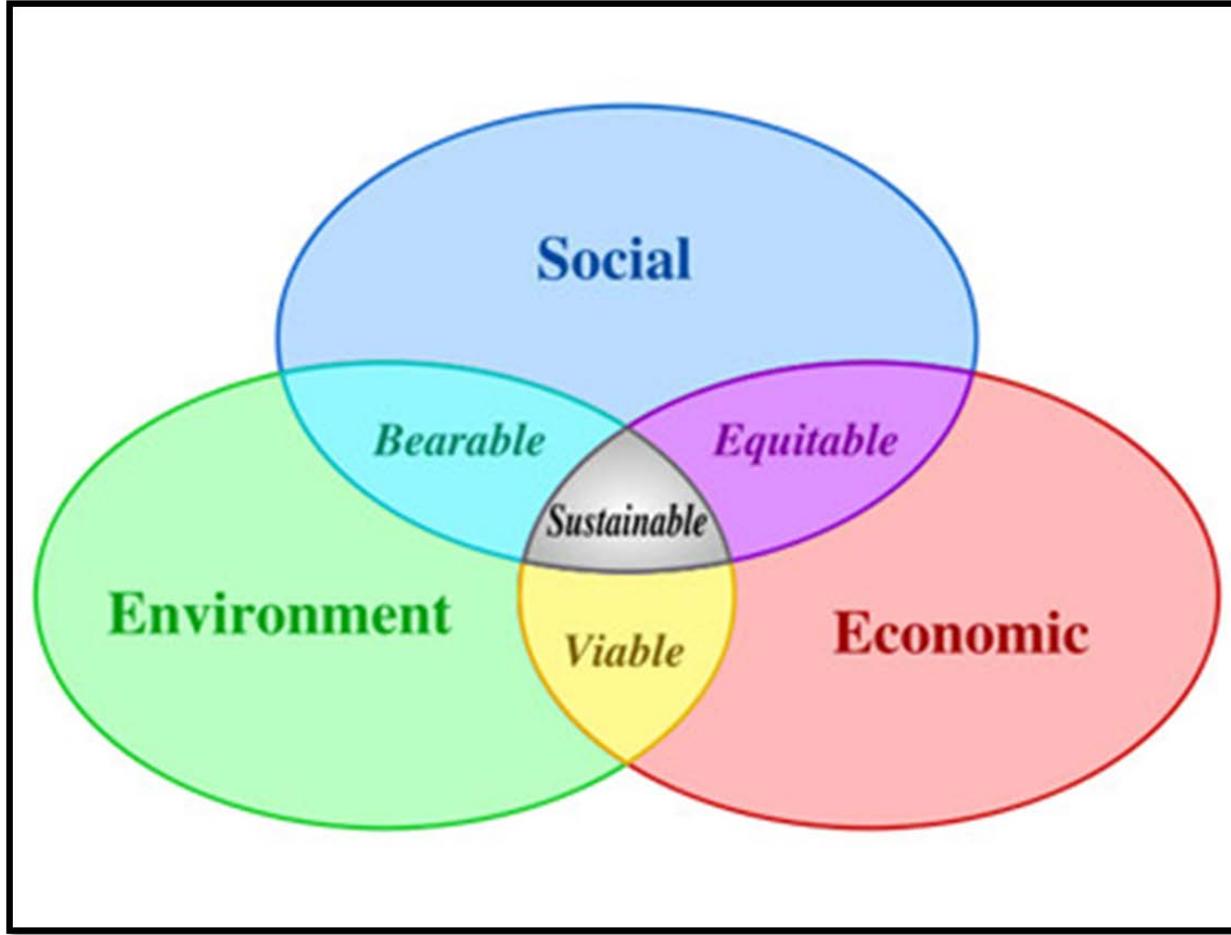
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Defining Sustainability

“Meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

- *The Brundtland Report, 1987*

Diving Deeper





Sustainability Benefits



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Benefits

- Healthier Living
 - Natural Material Use and Open Bldg. Design
 - Reduced Health Risk
- Financial and Investment Opportunity
 - Reduced Maintenance Cost
 - Sustained Return on Investment
- Community Engagement
 - Resource Sharing

Healthier Living

- Natural Material Use
 - Chemical free exposure
- Open Bldg. Design
 - Natural daylighting
 - Works with your surroundings
- Reduced Health Risk
 - “you are what you eat”



Sustainability Facts	
Area: 700 ft ²	
Annual Energy Consumption (kBtu)	10,929*
Percentage of national average	9%
Annual CO2 Emissions (lbs)	6,861**
Percentage of national average	12%
Average Annual Water Use (gall/day)	86
Percentage of regional average	24%
Insulation (R-value)	
Wall Assembly	22.5 % State Minimum
Roof	38.0 175%
Floor	32.0 164%
Windows (R-value)	
Glass U-value & glazing	3.6 240%
U-Value	0.25
* Projected usage based on total energy usage for heating, cooling, domestic hot water, appliances and lighting ** Based on site specific energy consumption	



Financial & Investment Opportunity

- Reduced Maintenance Cost
 - Utilizing natural system design
 - Higher up front cost, translate to little to no maintenance cost over time
- Sustained Return on Investment
 - Continuous production with minor resource demand
 - Long term cycle gain mentality

Community Engagement

- Resource Sharing
 - Pooled funds to achieve longer lasting projects
 - “you get what you pay for”
 - Possible increase in innovation
- “Sense of Community”
 - More likely to protect one’s environment



Carbon Footprint



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Carbon Footprint

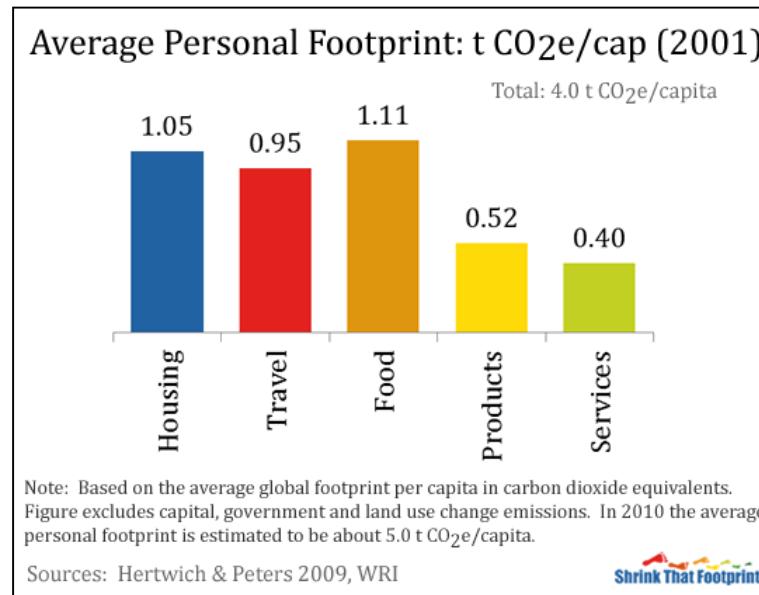
- A carbon footprint is the set of greenhouse gas emissions caused by something.
- It can be calculated for a product, service, person or even a country, and is used to understand the impact human activity is having on the earth's climate.
- The standard unit of measurement for carbon footprints is carbon dioxide equivalents (CO₂e).

CO₂e Defined

- CO₂e combines the measurement of six types of greenhouse gasses by weighing them each for their global warming potential relative to carbon dioxide over a period of time, generally 100 years.
 - carbon dioxide (CO₂)
 - methane (CH₄)
 - nitrous oxide (N₂O)
 - perfluorocarbons (PFC)
 - hydrofluorocarbons (HFC)
 - sulphur hexafluoride (SF₆)

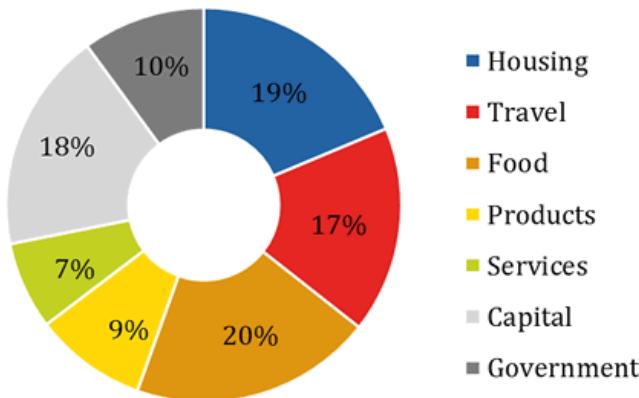
Personal Footprint

- Personal footprints can be broken down into five main categories:
 - Housing
 - Travel
 - Food
 - Products
 - Services.



Global Breakdown

Global Average Footprint: share of total (2001)

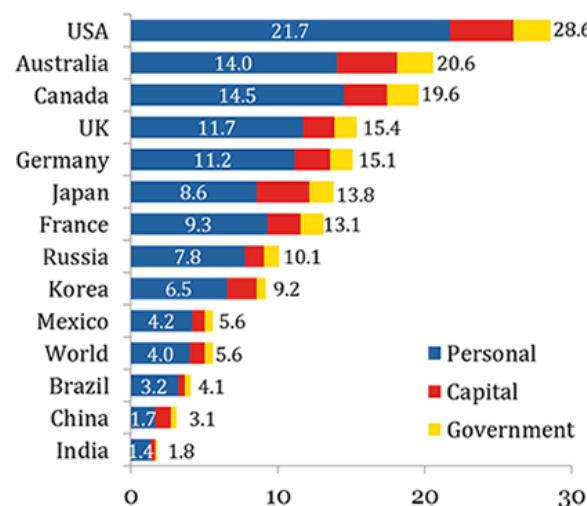


Note: Figure excludes land use change. Global average footprint was approx 5.6 t CO₂e/cap in 2001 excluding land use, which was roughly 1 t CO₂e/cap.

Sources: Hertwich & Peters 2009, WRI



Footprints by Nationality: t CO₂e/cap (2001)



Note: Personal emissions include housing, travel, food, products and services emissions. Figures include bunker emissions but exclude land use change

Sources: Hertwich and Peters 2009



Number Crunching

EPA Carbon Footprint Calculator Exercise

<http://www3.epa.gov/carbon-footprint-calculator/>



Sustainable Actions



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Water Conservation

- Check faucets and pipes for leaks
 - A small drip from a worn faucet washer can waste 20 gallons of water per day.
- Check your toilets for leaks
 - Put a little food coloring in your toilet tank. If, without flushing, the color begins to appear in the bowl within 30 minutes, you have a leak that should be repaired immediately.

Water Conservation

- Put a layer of mulch around trees and plants.
- Put plastic bottles or float booster in your toilet tank
 - To cut down on water waste, put an inch or two of sand or pebbles inside each of two plastic bottles to weigh them down. Fill the bottles with water, screw the lids on, and put them in your toilet tank.
 - This may save ten or more gallons of water per day.

Energy Conservation

- Avoid energy vampires. Even when they're turned off, home electronics in "standby" mode use energy to power features like clock displays.
- Use microwaves and toaster ovens to cook or warm leftovers. You'll use less energy than cooking with a conventional oven.
- Grill out more often during the summer. Using the oven in the heat of summer forces your AC to work harder, which raises your energy bill.

Energy Conservation

- Block the sun from overheating your home.
 - Inside, use shades, blinds and drapes.
 - Outside, use awnings, trees and shrubs.
- Raise the temperature on your thermostat by a few degrees to save on your cooling costs.
- Give your AC tune-up. Running an inefficient AC system can result in high monthly bills.
 - Plus, you could qualify for a rebate.



Sustainable Technologies



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Transportation

- Electric/ Hybrid Vehicles
- Self Driving Cars
- Electricity Generating Tires
- Hydrogen Powered Tram

<http://www.alternative-energy-news.info/technology/transportation/>

Buildings

- Cool Roofs
 - Designed to offer increased solar reflectance and decreased thermal emittance.
- Geothermal Heating
 - A water/antifreeze mixture is pumped through pipes buried underground to collect thermal energy, then routed to a heat pump and takes that energy and puts it to use to heat or cool your house.

Buildings

- Solar Power
- Electrochromic Smart Glass
 - Uses a tiny burst of electricity to charge ions on a window layer and change the amount of light it reflects.
- Storm Water Management
 - Reclamation for use inside or outside of building site

**MAKE
ORANGE
GREEN**



UT's
Sustainability
Program



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Environmental Organizations

- Office of Sustainability
- UT Recycling
- ISSE
- Center for Renewable Carbon
- Center for Ultra-Wide-Area Resilient Electric Energy
- The Institute for Environmental Modeling

Environmental Organizations

- Southeastern Regional Sun Grant Center
- Sustainable Energy, Education, And Research Center
- UT Institute for Smart Structures
- Howard H. Baker Center for Public Policy
- Center for the Study of Social Justice
- Agricultural Policy Analysis Center

Environmental Snapshot

- Game Day Recycling/Composting
 - 135.12 Tons recycled during 2014 season
 - 65% of Waste Stream (2nd in Nation)
- 36% of Energy Used on campus derives from Green Power
- From Coal sourced power to Natural Gas

Environmental Snapshot

- LEED Silver Buildings
 - Ayres
 - Haslam
 - Student Health Clinic
- LEED Standard Buildings
 - Fred Brown
 - Min Kao
 - Baker Center
- Two EV Charging Stations producing 18.5 MW/yr
 - New Solar Array going atop 11th St. Garage

QUESTIONS?