

Living Well, Living Green

IN SKAGIT AND WHATCOM COUNTIES

*Wise Choices for a
Warming World*



Publication Date 2009

Printed by Premier Graphics, Bellingham, WA,
on recycled paper using soy-based inks:
Cover stock: Exact Opaque Cover, 30% Post-Consumer Waste (PCW)
Text stock: Quinault, 100% PCW
FSC-certified, chlorine-free paper milled in Grays Harbor, WA,
using Green-e certified power from biomass wood waste.

Book layout and design by Sheila Powell, Graphic Concepts, Anacortes, WA

Grant funding from Northwest Clean Air Agency
1600 South Second Street, Mount Vernon, WA 98273

Cover photo by Vince Streano
Interior photos by local photographers Vince Streano, Vincent Alvarez, Dana Brandt, and
Carol Havens as well as from the *Climate Masters Handbook* and Whatcom file photos.

Skagit Beat the Heat gratefully acknowledges the University of Oregon Climate Leadership
Initiative for providing full access to their *Climate Masters Handbook*, which has been adapted
and revised for Skagit and Whatcom counties.

ACKNOWLEDGMENTS

Living Well, Living Green in Skagit and Whatcom Counties – Wise Choices for a Warming World
is a project of Skagit Beat the Heat (www.skagitbeattheheat.org)

Skagit Beat the Heat is a non-partisan, grassroots group of Skagit County citizens working to help local residents make changes toward living well and living wisely as we transition toward significantly less consumption of fossil fuels in a time of climate and energy uncertainty. We are dedicated to growing local resilience through community projects such as community gardens, lawn-to-garden conversions, a free lending library at Pelican Bay Used Books in Anacortes, interaction with local, state, and national leaders on issues of climate change and renewable energy, and presentations on a wide range of topics to help build a well-informed citizenry as we seek to make wise lifestyle choices for ourselves and future generations.

The dedicated book team members who worked diligently to make this publication possible are Evelyn Adams, Carolyn Gastellum, Joanna Idczak, Mira Lutz, Tim Minter, and Eric Shen. The book team is grateful to the Northwest Clean Air Agency for generous grant funding support; Sheila Powell, our talented graphic designer; Vince Streano, whose local photography underscores all the reasons we wish to live more carefully in this place we call home; Kristi Hein and Jan Hersey, for final review; and Joyce Jimerson, Carbon Masters Coordinator for WSU Whatcom County Extension, who provided Whatcom County resources and photos that make sharing this booklet across county lines a reality.

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INTRODUCTION

***It's time to step boldly into a new energy age,
one far less dependent on fossil fuels.***



Wisconsin file

In Living Well, Living Green we'll guide you into that future. After looking at the science behind climate change and the potential impacts on our local area, we won't leave you feeling helpless, but will show you how you can reduce your carbon footprint and step confidently onto a new and exciting road.

Instead of feeling numbed by the challenges of a changing world, we can embrace the possibilities they point us toward: a renewed sense of self-reliance, healthier food and bodies, a deeper connection with others and the natural world.

We can focus on building a robust economy here in the Northwest through the local production of energy, food, and goods. We can work toward energy security, which rests not on trying to increase supplies of finite resources such as oil, but on reducing our energy demands, maximizing energy efficiency, and investing in renewable energy.

The science on climate change is in. What we do in the next couple of years will reverberate through the ages and cause our children and future generations to either curse or bless us. The task is huge, more than what one person making every change in this book can possibly accomplish. But, as some wise folks have noted, "If ten million of us are asking what one person can possibly do, the question changes to what can ten million people do? Then the question becomes, what couldn't we do?"

We have the opportunity to re-energize not only our infrastructure but ourselves by doing the most important work imaginable – rebuilding our world.

***Living Well, Living Green
will help get you started.***

Climate Change 101

At a Glance

- **Greenhouse gases include CO₂, methane, and nitrous oxide.**
- **The Earth is warming due to the greenhouse effect.**
- **CO₂, methane, and nitrous oxide come from human activities (burning fossil fuels and agriculture practices).**
- **Climate is weather averaged over time.**
- **Urgent action is needed to prepare for and mitigate climate change.**

Although the scientific understanding of climate change is being updated every day, the general concepts are well understood.

This chapter looks at what causes climate change and what climate change, in turn, causes.

What might climate change mean here in the Pacific Northwest? We'll cover that, too.

The Basics

The sun shines on the planet. The planet heats up and reflects heat back into space. But not all of that heat escapes. Some of it gets trapped, thanks to the gases that make up our atmosphere. These are called greenhouse gases because of their ability to hold in heat, much like a greenhouse. Or, if you're not the gardening sort, like the windshield of a car baking in the sun traps heat inside the car. Without these gases, our planet would be too cold to inhabit, about -50°F .

Recent human activity has led to an increase in greenhouse gases. Scientists now recognize these gases are warming Earth's atmosphere and oceans and are causing more extreme weather conditions around the globe.

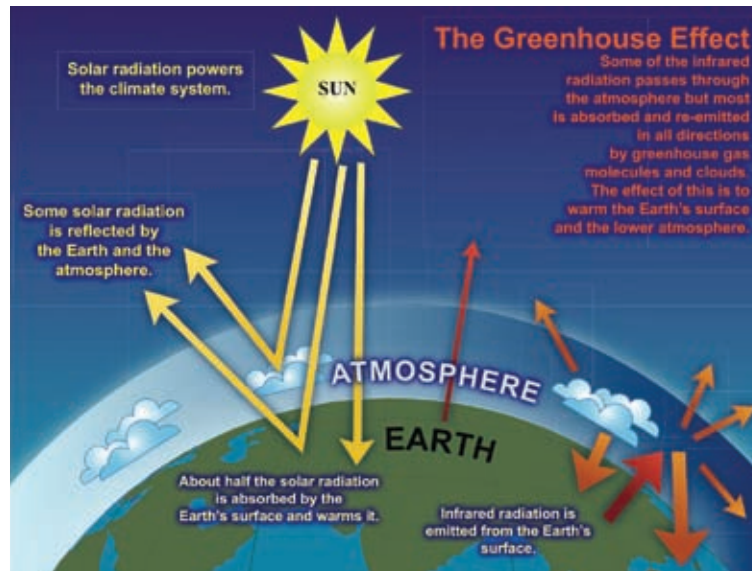


FIGURE 1.1
THE GREENHOUSE EFFECT

Greenhouse gases in the atmosphere absorb and radiate heat back into our atmosphere.

Source: Intergovernmental Panel on Climate Change Working Group I, "The Physical Science Basis," 2007. www.ipcc.ch/graphics/gr-ar4-wg1.htm.

Since 1750 and the onset of the Industrial Revolution, amounts of **greenhouse gases** such as carbon dioxide (CO₂), nitrous oxide (N₂O), and methane (CH₄) have increased significantly in the atmosphere (by approximately 36%, 18%, and 148%, respectively) as a result of human activity.¹ The increase in CO₂ is due primarily to the burning of fossil fuels from activities such as driving cars and heating homes, and to changes in land use, such as deforestation. **Nitrous oxide** is released when we use synthetic fertilizers and also when we burn fossil fuels. **Methane** is released in animal husbandry, especially from animals such as cows digesting their fibrous diet. It is also emitted from agricultural activities and fossil fuel use.

Global concentrations of all three of these greenhouse gases, measured in parts per million (ppm), now far exceed pre-industrial values. Scientists know this because they have been able to sample gases long trapped in ice cores from ancient glaciers and in ocean sediment cores hundreds of thousands of years old. The atmospheric concentration of CO₂, the most important greenhouse gas released by human activity, now far exceeds the natural range over the last 650,000 years (that natural range is 180–300 ppm; June 2005 levels reached 379 ppm).²

Evidence of Warming

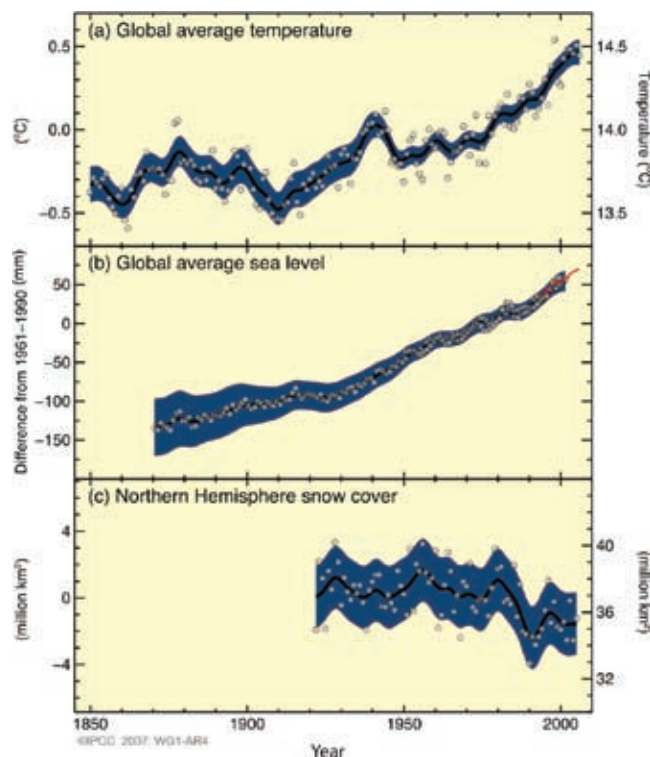
We know that the climate is warming because of direct observations of increasing average air and ocean temperatures, widespread melting of snow and ice, and rising sea levels. 2008 was one of the ten hottest years on record (since 1850), along with 1997, 1998, and every year since 2000.³ The global ocean has been absorbing more than 80% of this added heat, increasing the average water temperature to depths of more than 9,800 feet. When water warms, it expands and takes up more space. This means a rise in sea level around the world and in our neighborhood.

Along with warmer oceans, Arctic temperatures are rising, ice caps and glaciers are shrinking, wind patterns are shifting, and ocean salinity is changing. Finally, scientific observations show increases in the incidence of extreme weather, including droughts, heavy precipitation, heat waves, and intense hurricanes. Figure 1.2 shows recent increases in global temperature and global sea level alongside the decrease in snow cover in the Northern Hemisphere. For more details on observed changes, see the IPCC Summary for Policy Makers.⁴

FIGURE 1.2 OBSERVED PHYSICAL CHANGE

Observed changes in (a) global average surface temperature, (b) global average sea level, and (c) Northern Hemisphere snow cover for March–April. All differences are relative to corresponding averages for the period 1961–90. Smoothed curves represent decadal averaged values, while circles show yearly values. The shaded areas are the uncertainty intervals estimated from a comprehensive analysis of known uncertainties (a and b) and from the time series (c).

Source: Intergovernmental Panel on Climate Change Working Group I, "The Physical Science Basis," 2007. www.ipcc.ch/graphics/gr-ar4-wg1.htm.



The Bottom Line

The world's foremost authority on climate change is the Intergovernmental Panel on Climate Change (IPCC), a United Nations organization whose members are the most recognized climate scientists from around the world.⁵ One of the most important outcomes of the IPCC's 2007 meeting was a report that concludes it is "unequivocal" that the Earth's atmosphere and oceans are warming. The IPCC also stated it is "very likely" (*more than 90% likelihood*) that most of the increase in global average temperatures since 1950 can be attributed to human-caused emissions of heat-trapping gases. The report further states that greenhouse-gas emissions must peak by 2015 and decrease by 80 to 90% (of 2000 emissions levels) by 2050 in order to avoid dramatic temperature increases. The IPCC predicts greater greenhouse-gas emission levels will also cause severe economic, social, and environmental impacts. According to the IPCC, making the shift to lower emissions requires action within the next two to three years at all levels of society around the world.

Predictions for the Future

Scientists have developed computer models that show the Earth warming by about 0.36° F every ten years, continuing a warming trend that started in 1990. Middle-of-the-road models predict a global average surface increase of between 3.2° F and 7.2° F by the end of the century. There is a small possibility that the full range for the century may be 2° F to 11.5° F. These are large temperature increases, when you consider that the weather and sea-level-related impacts we've already seen around the globe are caused by an average temperature increase of 1.3° F.

According to the IPCC, global average sea levels are projected to rise from 7 to 23 inches by the end of this century. However, an increasing number of scientists are very concerned that accelerated rates of melting seen in the Arctic and Antarctic regions will cause sea level rises much greater than those predicted. Dr. James Hansen, director of the NASA Goddard Institute of Space Studies, along with a number of other climate scientists, now believes that the sea level could rise by several meters within this century.

In the United States, the most severe initial impacts are expected to show up in the Southwest, because of reduced rainfall and higher temperatures. Across the West, the snow season is expected to shorten, and total snow pack is expected to shrink with each passing year as temperatures warm.

Climate and Weather

The climate is changing. This does not mean, however, that the weather is warmer on any given day. The weather changes day to day, sometimes hour to hour around the Pacific Northwest. We may have a 70° F day in February or a cold, wet week in August. That's weather. Can the planet truly be warming if we're having a damp and dreary summer? Yes, because climate is an average of weather over a long

period of time. The climate of north-west Washington typically consists of cool, wet winters that build snowpack in the Cascades, showery springs that last through June, and dry, warm-to-occasionally-hot summers that end about mid-October. Eastern Washington is colder in winter and hotter in summer, while the coast is the reverse, because the ocean keeps temperatures mild and mountains cause the clouds to build up and drop rain.

We can't use today's weather to judge in what ways climate change is already affecting us. Instead, we need to *look at the weather observed over a number of years* to see where the disturbing patterns of climate change are coming into focus.

Conclusion

Global climate change has the potential to cause the greatest transformation of life as we know it. The changes we have made to the climate are now being seen and felt around the world. Some changes will be unpredictable, but we have the power and creativity

to prepare for them and to work toward slowing the warming. Much of this work is on an individual basis, through simple choices we make each day. With over 300,000 people in Skagit and Whatcom Counties, this adds up to a lot of choices – and a lot of change.



This book will guide you to make choices that will help decrease greenhouse gases by focusing on:

- *What and how much we buy*
- *Ways to reduce our use of electricity*
- *Ways to decrease the number of miles we travel in our vehicles*
- *How we build our homes and buildings*
- *How we can reuse or recycle items*
- *What types of foods we eat and where they come from*

Additional Resources

Climate Leadership Initiative – Economic and greenhouse-gas assessments:
www.climateleadership.org

Intergovernmental Panel on Climate Change (IPCC), 2007. Fourth Assessment Report:
www.ipcc.ch

Climate Crisis Coalition – Climate change news feed:
www.climatecrisiscoalition.org

University of Washington Climate Impacts Group – Interdisciplinary research on climate change impacts on the Pacific Northwest:
www.cses.washington.edu/cig

Real Climate – Climate change science blog:
www.realclimate.org

Environmental Protection Agency Glossary of Climate Change Terms:
www.epa.gov/climatechange/glossary.html

Setting the Record Straight – Responses to common challenges to climate science:
<http://climlead.uoregon.edu/publicationspress/publicationspress.html>

IMPLICATIONS FOR WASHINGTON⁶

IPCC FINDINGS SPECIFIC TO WESTERN NORTH AMERICA

- *Greatest warming will occur at high northern latitudes.*
- *Snow cover (and snow-water equivalency) will contract.*
- *Snow cover will melt earlier, leading to higher spring flows and lower late-summer flows.*
- *Extreme weather (heat waves, drought, and heavy precipitation events) will increase.*
- *Oceans will become more acidic.*

It's getting warmer, on average, and it's getting warmer faster. Computer models project a warmer climate for the Pacific Northwest during the twenty-first century, with temperatures increasing at a rate of 0.5° F per decade (slightly higher than the global-average warming) at least through 2050. This rate is two and one-half times faster than the warming observed in this region during the twentieth century.

Models show less summer precipitation and more winter precipitation. Because of warmer winter temperatures, we are likely to see more precipitation fall as rain and less as snow during winter, especially at lower elevations. The reduced snowpack and reduced rainfall in the spring, summer, and fall will cause water stress during the growing season.

Sea-level rise will affect coastal Washington, but the effects are expected to be gradual over the next several decades. Some areas will see more sea-level rise, because the land is sinking. In other areas where the land is rebounding from the last ice age, the effects of sea level rise will be less. In Washington, the Tacoma area will be the most affected.

Research on forest fires by the Climate Leadership Initiative estimates that compared to an "average year" during the twentieth century, an average year in the 2020s could see a 50% increase in the number of acres burned, and an average year in the 2040s is likely to see a 100% increase in the number of acres burned.⁷ Fires are likely to become a major destructive force in our area.

Energy Efficiency at Home

At a Glance

- **Save dollars and reduce greenhouse-gas emissions by eliminating wasted energy in your home.**

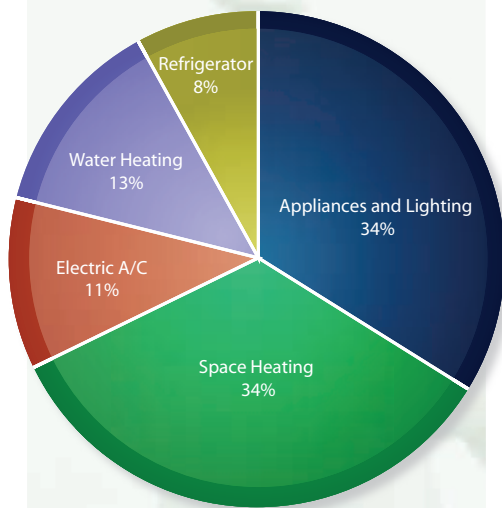


FIGURE 2.1 TYPICAL ENERGY USE FOR U.S. HOUSEHOLDS
Heating accounts for the biggest chunk of a typical utility bill.

Source: U.S. Department of Energy, Energy Efficiency and Renewable Energy, based on 2005 Building Energy Data Book. www1.eere.energy.gov/consumer/tips/appliances.html.

What's a kilowatt?

Electricity use is measured in kilowatt-hours (kWh), or the amount of work done at a rate of 1,000 watts for one hour.

You use one kWh by turning on a 100-watt incandescent light bulb (those inefficient relics our parents used) for ten hours.

Energy Use Creates Greenhouse Gases

Remember when your science teacher told you that energy can't be created or destroyed, only transferred from one form to another? She was right! The energy you use at home comes from somewhere else, like from a coal plant that produces greenhouse-gas emissions.

In 2007, home heating and cooling alone emitted a combined 492 million tons of carbon dioxide (CO₂) in the U.S.¹ Even here in western Washington, where we enjoy lots of clean hydroelectric power thanks to dams (note: salmon may not share our gratitude), we too use fossil fuels. Coal-fired power plants in Montana supply 34% of PSE's energy; 17% comes from burning natural gas. Burning coal and natural gas to move electrons makes CO₂. Here's the math: using less energy at home equals burning less coal in Montana.

We use energy at home perhaps more than anywhere else. Staying warm, washing, cooking, bathing, chilling leftover salmon, catching up on e-mails, watching reruns, and so much more add up to produce our monthly utility bills. The typical home in our region uses an average of 1,000 kilowatt-hours of electricity per month or 12,000 kilowatt-hours per year. If you're a PSE customer that means about \$100/month or \$1,200/year.

WANT TO PAY LESS?

READ ON FOR BRIGHT IDEAS ON CUTTING WASTED ELECTRONS YOU'LL NEVER MISS. SAVING MONEY IMMEDIATELY IS FUN AND THE LONG-TERM BENEFITS MEAN YOUR KIDS' KIDS WILL THANK YOU FOR IT.

Heating and Cooling

The amount of energy used for heating a home depends on five things:

- 1) the desired room temperature,
 - 2) the length of time the house is heated,
 - 3) the amount of space being heated,
 - 4) the efficiency of the heating or cooling system, and
 - 5) maintenance.
- Follow these steps to improve efficiency in each of these areas.

TEMPERATURE

Keep your house at 67° F or less. Each degree over 67° F adds 3% to the heating portion of your utility bill. Jacking up your thermostat to a higher-than-necessary temp won't heat your house faster, but it could result in unnecessary expense.

Thermostats are a switch, not an accelerator. Too chilly? If there's one thing Northwesterners know how to do, it's layer. Put on a sweater!

TIME

How many hours out of 24 do you heat? Save money by allowing your home to get cooler when you're asleep or away from home. For example, set your thermostat back 10–15° F for eight hours to cut your annual heating bill by 5–15%. That's an annual savings of up to one percent for each degree of a setback that lasts more than eight hours, according to the U.S. Department of Energy. Longer and larger setbacks save more energy, while shorter and smaller setbacks save less. Installing a programmable

thermostat will make it simple to turn down the temperature at nighttime and turn up the heat before you awake the next morning.

SPACE

How big a space do you heat?

How is your space set up? Room-by-room or “zoned” heating systems allow you to heat only those areas of the house that you use most, saving energy and money. For unused areas, heat them only enough to prevent moisture, mold, and condensation. (Note: many whole-house furnace systems are not designed to shut off individual room vents because it decreases overall efficiency and may damage the system.)

EFFICIENCY

FANS

Spread heated air without greatly increasing your power use by installing a ceiling fan, or simply use a floor fan pointed diagonally and upward across the room. This will make the room feel more comfortable without turning up the heat.

CURTAINS

Close curtains to insulate your home more effectively (at night in winter, during the day in summer). If your heat source is under a window, tie curtains back to the wall at the bottom to ensure heat warms the room, not the window space. You can tuck the curtains behind a string pinned to each side of the window for a simple fix.

INSIDE STORM WINDOWS

Install storm windows (insider windows) on the indoor side to create an insulating air pocket and cut down on drafts coming through the cracks. Insiders will greatly increase the comfort of a home in winter by cutting drafts and eliminating that “cold window” feeling (especially noticeable with single-pane windows). Inside storm windows are easily made with a simple wood frame cut to fit the window. The outside of the frame is covered with self-adhesive foam tape (used to seal doors). A window

is formed by covering the opening with a clear vinyl (found at hardware or fabric stores) that is attached with double-stick tape or double-stick foam tape.

MAINTENANCE

CLEANING

Dust and vacuum thermostats, heating coils, fins, and fan blades on your furnace regularly to maximize efficiency.

DUCTS

Seal and insulate ducts. Heating air ducts typically run through unheated portions of your home, such as attic and crawl spaces. If you have heating ducts that leak at the joints, you’re paying money to heat the great outdoors. Similarly, an uninsulated

heat duct is losing heat into the unheated space, which means colder air is coming out the register.

FILTERS

Check, change, or clean your air filters every one to two months. A clean filter maintains the efficiency of your furnace.

REGULAR SERVICE

Furnaces should be serviced optimally every year, but at least once every three years.

WINTER AIR CONDITIONING

Cover your wall unit in the winter and remove window units during the colder months to reduce heat loss.

For less than \$50, I reduced my winter gas bill by a good 30%.

My house is an old drafty place that started out being a much smaller house when first built. Along came a couple of additions, skylights, glass doors, and a beautiful open stair to replace the narrow steps built in the thirties. All those changes made the house lots more livable and lots harder to heat.



When I learned about “insiders” at an Energy Conservation Workshop, I decided to try them out. “Insiders” create a clear plastic barrier to the cold on the inside of windows and are very simple to make. Local crates and pallets provided the lumber for my experiment. The frame stock is approximately 1” x 2” depending on the size of the frame and is arranged with the 2”-side flat to the window casing. The frames are 1/2” smaller than the window casing. I used the simple half-lap glue joint because it’s easier to make and stronger than a miter joint. I applied shrink plastic to the wooden frame and then glued foam weather-stripping to the outside of all four sides of the 2”-side of the frame. The insiders simply press into the window or skylight casing. There is no sticky tape, no staples, nails or screws. The foam around the outside of the frame compresses and provides enough friction to hold the insider securely in the casing. The other great thing about foam is that it allows a square insider frame to fit an old casing that isn’t very square. Installation of the insiders transformed the windows from a source of glacial air to a clear spot in the wall admitting no drafts. The house was suddenly warmer and the noisy furnace a smaller part of our lives.

Now for the best part: I estimate that the ten insiders I made for less than \$50 reduced my winter gas bill by a good 30%. That is the best return on an investment I have ever had!

– Erica, Anacortes

WOOD STOVES AND FIREPLACES

Wood stoves and pellet stoves are at least five times more efficient than fireplaces. Fireplaces waste a tremendous amount of energy as warm air is drawn out the chimney. A roaring fire can exhaust as much as 24,000 cubic feet of air per hour to the outside, which must be replaced by cold air coming into the house from outside.² Your furnace heating system must warm up this air, which is again exhausted through your chimney. Wood stoves and pellet stoves are sealed and draw their combustion air from the outside. Use a fan to distribute the heat evenly throughout the room or house.

FIREPLACE

Your fireplace is one of the most inefficient heat sources. It sucks warm air from your entire house up the chimney. A few tips to reduce energy losses:

- Keep your fireplace damper closed unless you have a fire. Keeping the damper open is the same as keeping a window open in the winter.
- Install and use tempered glass doors.
- When you use the fireplace, reduce heat loss by opening dampers in the bottom of the firebox (if provided) or open the nearest window slightly, approximately one inch, and close doors leading into the room. The fire needs oxygen to burn and will suck cold air through all the cracks in your house to get it.
- Lower the thermostat setting to 50–55° F when using the fireplace.

Building “Envelope” Improvements

Warm air leaking out of your home during the winter can waste a lot of your energy dollars and send your emissions through the roof. One of the quickest dollar-saving tasks you can do is caulk, seal,

and weather-strip all seams, cracks, and openings around your doors and windows. Be sure to check the condition of weather-stripping around doors and windows, as they tend to wear out over time. Look for penetrations to the outside for plumbing, cable and telephone wiring, electrical wiring, and outlets. These are often locations where cold air leaks into the house from the outside. You can use fiberglass insulation, expanding spray foam, etc., to seal up those openings. By finding and sealing openings to the outside, you can save as much as 10% on your heating bill.³ You’ll also want to make sure the insulation in your walls, ceiling, and floor is in place and as close to building code requirements as possible. The U.S. Dept. of Energy recommends the following insulation levels for our area:⁴

- Ceiling: R-38
- Walls: R-18
- Floors: R-13

SWITCH AND OUTLET SEALERS (FOAM)

Foam pads keep the cold outside air from entering through light switches and plug-in outlets inside your home. Pads are available at any home improvement center. Take care to use them only on outside walls, not walls between rooms. Remove the switch or plug plate with a screwdriver, install the pad, and screw the plate back on.

GARAGE

Using a light bulb or bulbs as a heat source instead of a portable heater can reduce energy costs and help keep moisture problems at bay. A portable heater can cost \$20 a month to operate (1,500 watts for five hours per day average).

LITTLE (AND BIG!) THINGS COUNT
IN AND AROUND THE HOUSE:

DON'T LEAK HEAT.

USE SUNSCREEN ...ON YOUR HOUSE!

REACH FOR A STAR –
AN ENERGY STAR.



Vince Striano

Solar screens install easily, preserve your view, and keep your house cool in the summer.

OUTBUILDINGS AND RVs

Follow the same efficiency practices you would at home.

Energy consumption in an outbuilding or RV can be as much as in a small house.

HOUSE TOO HOT IN SUMMER

Use solar screens on the outside of windows to block up to 90% of incoming light and heat from the sun. Using solar screens will allow you to see out, but still block out most of the heat coming in. The benefit is you remain comfortable in your house without having to keep the curtains closed during the day.

Appliances

Buying a new appliance? It's important to understand there are two costs to appliance purchases. The first is the initial purchase price; the second is the ongoing cost to run the appliance. Though energy-efficient models can cost more than other less energy-conserving units, the cost to operate a less efficient appliance can be dramatic. It's common to see the reduced energy usage of an Energy Star appliance pay for the additional cost of purchase in just a few years. Look for the Energy Star label and an energy use guide when buying to find the most energy-efficient models. Check with Puget Sound Energy at www.pse.com for rebates and incentives, state and federal tax credits, and manufacturers' rebates.

REFRIGERATOR

(Energy Hog of the Appliance World)

The refrigerator is almost always the single largest user of electricity in the home. If your refrigerator is older than ten years, consider replacing it. The new energy efficient models can use half the electricity. Find the energy usage of your refrigerator by visiting the Home Energy website at www.homeenergy.org/consumerinfo/refrigeration2refmods.php and typing in the model number.



Other ideas for reducing the energy consumed by your refrigerator:

- Maintain your refrigerator temperature optimally at 38–42° F. Measure by putting a thermometer in a glass of water and placing the two in your refrigerator overnight. If the temp is too low, turn the thermostat to a warmer setting. If it's too high, dial it colder.
- Locate the refrigerator away from heat sources and away from items or walls that could block airflow to the coils.
- Cleaning: Unplug the refrigerator at least once every three to six months to clean the dust off the coils (often located underneath, or on the back in older models). When the coils are dirty, the refrigerator works harder and runs longer, which wastes energy.
- Gaskets: Clean the gasket and the face of the cabinet. Test for fit by placing a dollar bill between the gasket and the cabinet. If you can slide it out with the door closed, you need to replace the gasket.
- Cool food before you place it in the refrigerator.
- Keep it full – even if only with water jugs. Less air will be exchanged each time you open the door and therefore less warm air will have to be cooled.
- Unplug and get rid of your second refrigerator. By eliminating an older, energy-inefficient refrigerator or



Set your refrigerator between 38–42° F to keep food cold and keep energy costs down.

freezer, you can save \$10–\$20 a month.

- When buying a new refrigerator, reduce emissions by buying only the size you need and choosing a model with the freezer on top or underneath.

FREEZER

- Set the thermostat between 0–10° F for product, not air temperature. Test by packing a thermometer tightly in frozen foods.
- Keep the freezer full. Use water jugs if needed to fill space.

STOVE

- Use small appliances when suitable, e.g., a toaster oven or microwave instead of a stove or oven.
 - Preheat the oven only for five minutes or less.
 - Cooking in the oven: Use glass pans; you can set the temperature 25° lower than normal.
- Use a timer and don't peek! Opening the door can easily drop the temperature by 25° F and wastes power.
- Turn off your oven 15 minutes before the end of baking time.
- Cook more than one thing at a time.
- Use the self-clean function sparingly (if at all).

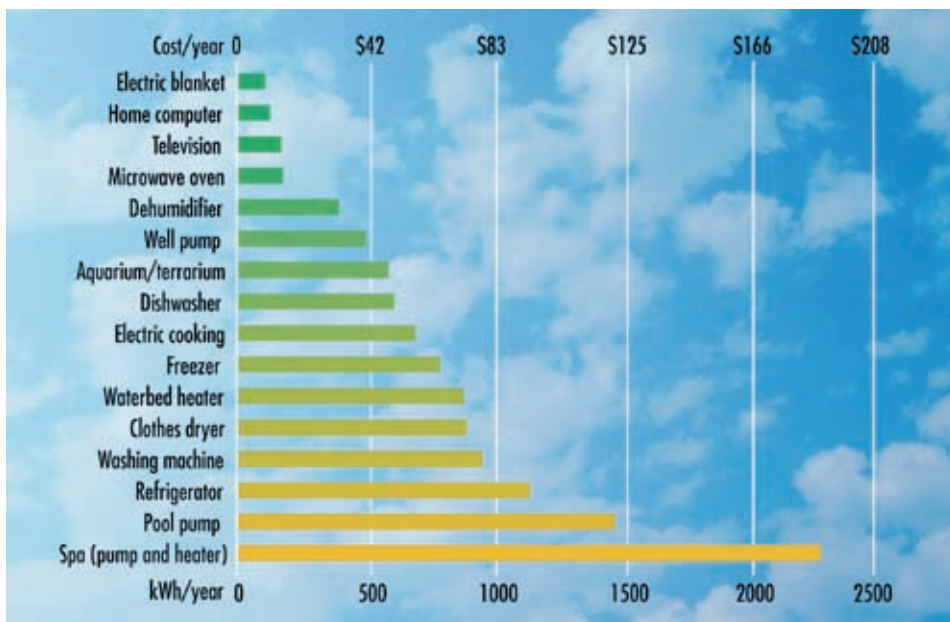


FIGURE 2.2 AVERAGE ANNUAL APPLIANCE USE
This figure excludes space and water heating. A refrigerator uses about five times the energy of the average television. New Energy Star-rated refrigerators use 40% less energy than their conventional counterparts sold in 2001.

Source: U.S. Department of Energy, Energy Efficiency and Renewable Energy, "Energy Savers." www1.eere.energy.gov/consumer/tips/appliances.html.

- On the stove: Cover pots and pans with lids to use a third less energy.

Use pots and pans with flat bottoms and tight lids, and use the same size burner as the pan.

Don't use foil on the burner pans or in the oven of electric units. It decreases efficiency and shortens the life of the elements.

DISHWASHER

- Use the "air dry" selection or turn the dishwasher off and open the door at the end of the wash cycle. This can save 40% of the energy cost.
- Wash full loads only.

WASHER

- Wash clothes in cold or warm water. Using cold water reduces your washer's energy use by 75%. Always rinse in cold water.
- Try to wash full loads only and don't overload. If you don't have a full load, adjust the water level to fit the size of your load.
- Minimize the amount of detergent used. The washer's motor works harder with more suds.



ECO-EXTREMIST

TAKING A LONG, HOT BATH? USE THE WATER FOR THE WASHING MACHINE'S FIRST CYCLE. THIS SAVES ABOUT 20 GALLONS OF WATER IN A TOP-LOADER, AND THE ENERGY TO HEAT IT.

DRYER

Using a dryer costs approximately 25 cents a load (using 2,500 watt-hours for 30 minutes). You can save energy and money if you follow these tips:

- Clean the lint trap. This can reduce energy use by 5–10% as it improves air flow.
- Replace the vent cover with a louver-type cover. This will increase air flow by 20–50%.
- Don't overload the dryer.
- Sort loads by clothing weight and material type. For instance, dry towels and heavier cottons in a separate load from lighter-weight clothes.
- Use an extra spin cycle in your washing machine to get as much water out as possible.
- Use the sun and line-dry your clothes, which is recommended by clothing manufacturers for some fabrics.

KILL-A-WATT AND EXORCISE YOUR PHANTOMS

- Unplug small appliances and electronic devices, or put them on a switched outlet or power strip that you can click off when not in use. Many TVs, DVD players, computer peripherals, and chargers use electricity (often called "phantom loads") even when they are switched off. For instance, the phantom load from a TV with a VCR and/or DVD player can easily cost \$10 a year, even if it's never turned on. Anything with a light or a clock is using energy.
- Curious about how much electricity your devices are using? Buy an energy monitor. These are inexpensive meters that monitor how much electricity is being used by an appliance or electronic device instantaneously and over time.



Lighting

- Use fluorescent instead of incandescent lights. Compact fluorescent light bulbs (CFLs) are three to five times more efficient and last ten times longer than incandescent. Although early fluorescents made you and your friends look like pale gray zombies, today's CFLs produce a warm, natural glow. And please remember to recycle your CFLs, as they contain a minute amount of mercury. See Chapter 7.
- Use task lighting to focus light where you need it, rather than brightly lighting an entire room.
- Take advantage of daylight by using light-colored, loose-weave curtains to allow outside light in while preserving privacy.
- Turn off the lights in any room you're not using, or consider installing occupancy sensors to

Dry clothes for free and a few moments of peace

Pausing for a few moments at dawn and dusk to hang out a load of laundry and then retrieve it fresh and crisp from the line is a blessed break in a busy day. Bird song, pear blossoms, and billowing cloud formations that might otherwise escape my notice are brought into focus during those brief recesses in a hectic life. I've hung out clothes on sparkling summer mornings, on blustery gray afternoons, even on breathtaking 20-below-zero days in Maine. I've hung clothes in basements and garages, under covered balconies and behind wood stoves during dank northwest Novembers when dry days are few and far between. I've never lost the sense of satisfaction of getting something for nothing: dry clothes for free and a few moments of peace in the process.

— Marcia, Anacortes





Energy monitors tell you how much electricity is being used by your plug-in devices.

reduce the amount of time your lights are on. For outdoor lighting, photo sensors ensure the lights are on only when it's dark.

Water Heating

Your water heater is keeping water warm 24 hours a day, 365 days a year. Keeping this water warm uses about 13% of the household energy budget. Chill out with these tips:

- **Temperature:** Lower your thermostat to 120° F. Every ten-degree reduction in temperature will save you approximately \$10 a month on your electricity bill, or \$8 a month if you use a gas water heater.
- **Timer:** Use a timer on your water heater, or manually use the circuit breaker to turn off your electric water heater while you're asleep or away from home. The cost of a \$20 timer can be recouped in just two or three months of use.
- **Turn it off:** When you leave the house for three days or more, be sure to turn off your electric water heater, or turn your gas heater to the pilot or vacation setting.

- **Insulation:** Insulate the first six feet of the hot and cold water pipes connected to the water heater.
- **Keep the tank clean:** Periodically drain off the sediment in the bottom of the tank. Sediment buildup can insulate the water from the heating element. Open the drain valve or faucet at the base of the tank and drain a gallon or two into a container until it runs clean (see your manufacturer's instructions).



Insulating your hot water tank is inexpensive and easy to do. The money you save will reward your efforts.

- **Stop leaks:** Cold water leaks cost you money in water and sewer fees. Hot water leaks are even more costly, since you pay not only for the lost water, but also for the electricity or gas to heat its replacement. Replace washers in faucets to prevent and repair leaks.

MEASURING HOT WATER TEMPERATURE

- Use a thermometer with a temperature range up to 150° F (try to find one that has an upper range no more than 250° F) to measure the temperature of your hot water. Pencil-type thermometers available at automotive stores are ideal.
- Measure the water temperature at the sink closest to the water heater. (If you are not sure where your water heater is, use any sink.)
- Turn on the hot water and let it run until it is at its maximum temperature.
- Put a container in the sink under the stream of hot water. Place the thermometer in the container as the hot water is collecting and overflowing under the stream of hot water in your sink. When the dial on the thermometer stops rising, note the temperature. This is the temperature of your hot water.
- The ideal temperature is 120° F. If the temperature level of your hot water is 130° F or more, turn down the thermostat on your water heater. It's wasting energy and could scald or burn you.

ADJUST THE THERMOSTAT ON YOUR ELECTRIC WATER HEATER

- Turn off the water heater at the breaker in your electrical panel.
- Using a screwdriver, remove the small doors on the side of the tank that houses the thermostats (there are two on most electric water heaters).
- Move aside the fiberglass insulation. You will see a small dial with numbers indicating temperature: 110, 120, 130, 140, and so forth. Insert a screwdriver into the groove and adjust the temperature to 120° F. Repeat for the second thermostat. (Some water heaters use A, B, C or high, medium, low settings instead of degrees.) Make sure to change both thermostats to the same temperature.
- Replace the fiberglass and the metal covers, then turn on the water heater at the breaker to resume operation of your tank.
- Once you've allowed the temperature in the water tank



to adjust (wait overnight), check the water temperature using the same procedure. Readjust as needed to achieve a 120° F reading.

- If you have a **gas water heater**, adjust the thermostat mounted near the bottom of the tank to the middle of the warm setting. Check the water temperature using the same procedure. Readjust as needed to achieve a 120° F reading.

Not using compact fluorescent bulbs (CFLs) because you're worried about the mercury inside?

CFLs contain only five milligrams (mg) of mercury – about as much as the ball point of a pen. The average coal-fired power plant spews about 13.6 mg of mercury to power an incandescent bulb, but only 3.3 mg to power a CFL, according to the Union of Concerned Scientists. Add that to the five mg in the CFL and you still use less mercury if you make the switch. In fact, if everyone in the U.S. switched to CFLs, the Earth Policy Institute notes that we could shut down 80 coal-fired plants!

But what about the mercury if the bulb breaks?

There's more risk of getting cut by glass than being harmed by the tiny amount of mercury in the bulbs. Simply open the room's windows, sweep up broken shards and place in a sealed plastic bag, wipe the area with a damp paper towel, and put the used towel into the sealed bag. Bring the sealed bag to your local household hazardous waste collection site.

What about disposal of burnt-out CFLs?

Some retailers offer free recycling services at their stores. In Skagit County, contact the Solid Waste Transfer Station, (360) 424-9532 for disposal info; in Whatcom County, call (360) 380-4640. In Anacortes, CFLs can be taken to the City Operations Facility (360) 293-1921, ext 24.

Additional Resources

Do-It-Yourself Home Weatherization Guide
Bonneville Power Administration:
www.bpa.gov/energy/n/energytips/weatherization

A Consumer's Guide to Energy Efficiency and Renewable Energy, U.S. Department of Energy's Energy Efficiency and Renewable Energy website. Useful information about selecting doors, windows, and other energy-efficiency measures:
www.eere.energy.gov/consumer

City of San Jose Home Energy Saving Hints:
www.sanjoseca.gov/esd/natural-energyresources/ER-Tips-home.htm

EERE: Energy Savers Home Page
Good site for a broad range of ideas on how to conserve energy:
www.energysavers.gov

U.S. Department of Energy "Energy Saver\$" Tips:
www.eere.energy.gov/consumer/tips/pdfs/energy_savers.pdf

Information on compact fluorescent lights:
fcgov.com/conservation/lighting-faq.php

A Greener Way to Go

At a Glance

- **Simple ways to save big on both emissions and money.**
- **Purchasing a vehicle? Consider alternatives.**
- **Leavin' on a jet plane? Reflect first.**
- **Local public transportation resources.**

Did You Know?

- We average 55 minutes each day behind the wheel.
- Nearly a fifth of household income is spent on transportation.
- In the U.S., 65% of households own two or more vehicles.
- The \$6,214 that a household spends annually on an average car does not account for the full social and environmental costs of driving (see Table 3.1).²

The Addiction

Transportation makes up more than one quarter of U.S. greenhouse-gas emissions. Vehicle manufacturing, road construction and maintenance, and the extraction and refining of fuel add more emissions. Transportation is the fastest-growing sector of greenhouse-gas emissions in the country.¹

It's pretty clear – we've got an addiction. The carbon dioxide (CO₂) emissions that result from our constant moving about are on the rise, with CO₂ emissions making up 80% of total U.S. greenhouse-gas emissions.

The Side Effects

In the U.S., the average vehicle emits about one pound of CO₂ per mile. The Rocky Mountain Institute writes, "The average American personal vehicle uses 570 gallons of gasoline per year, which results in the emission of 11,400 pounds of CO₂. Since, on average, each household owns 1.85 vehicles, this means that the average household emits 21,000 pounds of CO₂ annually." Most of us find it hard to accept decreased mobility, but we really don't have to go cold turkey. Simple changes can result in significant emission reductions.

REMEMBER:

A GALLON SAVED IS 20 POUNDS OF CO₂ KEPT OUT OF THE ATMOSPHERE.



Whatcom Transportation Authority bus with colorful art by local children

The Treatment

Driving choices make a difference – for the pocketbook and the planet.

- Carpooling cuts per-person emissions at least in half, depending on how many people you fit in the car. The more the better!
- Choose the most efficient vehicle for the task each time you drive.
- For short trips, leave the car at home and hop on a bike or a bus, or just walk for zero emissions, zero cost, a breath of fresh air, and some good recreation too.
- Combine errands. Try to visit the grocery, bank, and library in one trip.
- If you can, live close to where you work and shop.

Improve Efficiency and Save Money

- Keep tires at the recommended pressure – this can save up to 3% of fuel costs, or \$38, and 305 lb. of CO₂.
- Changing air filters saves up to 10% of fuel costs or \$128, and 1,018 lb. of CO₂.
- Keeping the engine tuned saves up to 4% of fuel costs or \$51 and 407 lb. of CO₂.

Drive Smarter

- Idling! We’ve all done it. Waiting at a bank window, picking up the kids from school, sitting at a long red light.

Unless you know your car may not start if you switch it off, there’s really no point to leaving it on.



Vince Striano

NO IDLING
 IDLING GETS ZERO MILES PER GALLON, SO IF YOU’RE STOPPING FOR MORE THAN 30 SECONDS, TURN OFF THE CAR.

- Warm up the car by driving – not idling in the driveway. Most cars run better when warmed up by driving.³
- A rooftop storage container adds weight and drag and thus more cost to each trip. Take it off when you don’t need it.
- Fuel economy plummets at speeds higher than 60 mph. Leave extra time to travel and enjoy a slower, safer drive.
- Excessive acceleration and braking cuts fuel efficiency by about a third on the highway, and 5% in town.

Rent/Share a Car to Save Money

The American Automobile Association (AAA) estimates \$7,015 as the total annual cost of driving 12,500 miles, including operating and ownership costs. In some cases, renting or sharing a car can make a lot of financial sense. *Imagine what you could do with an extra \$7,000 in your pocket each year!*

DRIVING COSTS <i>Total Cost per Mile (if gas costs \$3.45/gal)</i>	Small Sedan per year	Medium Sedan per year	Large Sedan per year	Average per year
10,000 miles per year				
Cost per mile x 10,000 miles	\$1,240	\$1,490	\$1,620	\$1,450
Cost per day x 365 days	\$4,357	\$5,636	\$6,950	\$5,648
Decreased depreciation*	-\$550	-\$950	-\$1,150	-\$883
Total cost per year	\$5,047	\$6,176	\$7,420	\$6,214
Total cost per mile**	\$0.505	\$0.618	\$0.742	\$0.621

TABLE 3.1 DRIVING COSTS (See source for the costs used to calculate cost per mile and per day.)

*Decreased depreciation for mileage under 15,000 annually.

**Total cost per year ÷ total miles per year.

Source: American Automobile Association, “Your Driving Costs” (2007 edition). www.aapublicaffairs.com/Assets/Files/20073261133460.YourDrivingCosts2007.pdf.

Buying A Car? Buy Smart

Emissions and age are connected.

When you pick your new ride, consider the energy and emissions involved in manufacturing new vehicles. Multiple studies have determined that keeping a new, generic sedan for at least 18 years minimizes life-cycle energy use (energy used in manufacturing, driving, and disposal) and CO₂ emissions. However, older cars also put out more regulated pollutants like carbon monoxide and oxides of nitrogen.⁴

ONE OPTION IS TO BUY A USED, FUEL-EFFICIENT VEHICLE. IF YOU'RE STILL INTERESTED IN BUYING NEW, CONSIDER FUEL ECONOMY, ALTERNATIVE FUEL OPTIONS, AND EMERGING FUELS, SUCH AS BIODIESEL AND ETHANOL MADE FROM CELLULOSE.

VISIT

WWW.FUELECONOMY.GOV
TO COMPARE FUEL EFFICIENCIES.

Electric Avenue

In Bellingham and the Skagit Valley these days, it's becoming more common to see hybrids, a few all-electric vehicles, and some especially small cars.

Drivers of these vehicles just don't look as stressed at the gas pump no matter what the price, and of course, all-electric cars never go there in the first place! "The G-Wiz is one such car that's quickly gaining popularity in the UK, with more than 900 on the streets of London. In the U.S., General Motors has pledged to build a commercially viable electric car by the year 2010, with its Chevy E-Volt prototype now in testing."⁵

Fuel Options

BIODIESEL

If you own a vehicle that runs on diesel fuel, you can run it on biodiesel. Biodiesel is cleaner



Vince Striano

burning, has less emissions, and smells a whole lot better. Minor changes may need to be made in the engine, such as the type of hoses, but just check with your dealer or trusted diesel mechanic to set you on the right path. If you go all the way to waste veggie oil (again, check with the mechanic), the folks behind you will enjoy the smell of french fries as you motor along. Consumer alert: possible side-effects include salivation and hunger pangs.

NEED TO REFUEL? Here are some local biodiesel sources:

SKAGIT FARMERS SUPPLY
1833 Park Ln., Burlington

REXVILLE GROCERY
1972 Best Rd., Mount Vernon

COLLEGE WAY FOODS
2120 E. College Way, Mount Vernon

ANDERSON'S GENERAL STORE
Guemes Island

DEMING QUICK STOP GROCERY
4945 Mount Baker Highway, Deming

BELLINGHAM SHELL STATION
4240 Meridian St., Bellingham

ETHANOL

Another option is to go for a dual-fuel vehicle that can run on E85

(a blend of 15% gasoline and 85% ethanol). Although the exact emissions from biofuels depends on the feedstock and the refining process, using 85% ethanol generally results in 18% fewer greenhouse-gas emissions than gasoline. However, its use is highly contingent on the existing infrastructure. If there's nowhere to fill up on E85, then fossil fuels are your only option.

Visit the National Ethanol Vehicle Coalition, www.e85fuel.com/e85101/flexfuelvehicles.php, or the EPA's Alternative Fuels and Advanced Vehicles Data Center, www.eere.energy.gov/afdc/afv/afdc_vehicle_search.php, to find biofuel-compatible vehicles. See Chapter 5 for more on biofuels.



Vince Striano

I love the Tommy Thompson!

I work in Oak Harbor and would catch the SKAT bus or drive to March's Point, then catch the Island Transit bus for the rest of my commute. I speculated about riding my bike to March's Point but the highway looked so scary. A woman on the bus told me about the Tommy Thompson Trail. It's a separate bike path that follows the shoreline on a former railroad easement. She pointed out how it crossed the end of the bay on an old trestle. The next weekend I tried it out. I got my old bike out of the shed, pumped up the tires and went for a ride. It was beautiful, flat and easy, even for a novice like me!

From my house to March's Point is about five miles one way. It took about the same amount of time as driving or taking the bus. I also got a gentle workout during my commute so it saved me money on a gym membership and medical bills, without taking any more time. Now and then I'd have enough energy at the end of the day to extend my ride around the March's Point peninsula. I fell in love with my bike commute and rode it almost every week day. I didn't buy another bus pass until late last fall when the rains and darkness got the best of me. Now I'm looking forward to spring weather and can't wait to start biking to work again. I love the Tommy Thompson!

– Maribeth, Anacortes



Vince Striano

Leavin' on a Jet Plane? Reflect First

Air travel has a heavy environmental impact compared to other forms of travel.⁶ Short-haul flights result in greater emissions per mile due to the extra energy needed for takeoff and landing. *Check out these comparisons.*

AIRPLANE TRAVEL

About 1.26 lb. of CO₂ equivalent per passenger mile. (More than 2.5 tons CO₂ for a round-trip flight, coast-to-coast.)

AVERAGE U.S. VEHICLE

1 lb. per passenger mile (less when you carpool).

BUS

0.42 lb. per passenger mile.

TRAIN

0.35 lb. per passenger mile.

Altogether, the Intergovernmental Panel on Climate Change (IPCC) estimates that the total climate impact of flying is about two to four times that of CO₂ emissions alone due to the additional release of other greenhouse gases like nitrous oxide, sulfur oxides, and water vapor.

Air travel takes us coast to coast in just a few hours, but speed has a hidden cost. If you drive cross-country, you generate slightly less CO₂ per passenger mile but it will take you 4–5 days to do it. If you fly, you have lots of extra time to ramp up the CO₂ with additional flights or car trips. Bottom line: carefully consider every flight. Try to make the most of each journey and cut out those that are not top priority. You'll save money, the stress of delayed or

anceled flights, and literally tons of greenhouse-gas emissions. As much as possible, book direct routes with few landings and takeoffs. And, if you can travel during daylight hours during the brighter times of the year, there will be a surprisingly big reduction in spewing greenhouse gases, according to a 2006 study of flights across southeast England, published in the journal *Nature*.⁷

BOTTOM LINE:

WHENEVER POSSIBLE, TRAVEL BY BUS, TRAIN, OR A FUEL-EFFICIENT CAR FULL OF PEOPLE. EACH FLIGHT YOU AVOID TAKES A MAJOR BITE OUT OF YOUR PERSONAL EMISSIONS AND IS SOMETHING TO BE PROUD OF.





SKAT bus – Skagit Transit

The guilt is gone

For several years I drove a Ford F-150 pickup for all of my errands and general honking around. The mpg for this kind of driving is 14 and on the highway about 17. I love driving my F-150 but the guilt was too much (and gas was \$4.00/gal.).

I decided to buy a small car, a 1993 Ford Escort hatchback. I am somewhat larger than average and did have trouble getting in and out of this car, but one of my sons took out the driver seat, cut part of it away, and lowered it 1.5 inches, enough to make it easier to enter and exit. The cost of this car with new tires and a brake job was \$1,500. The fuel consumption is 30 mpg honking around and 40 mpg highway at 55 mph. It is probably a problem to the truck drivers, but I stay clear to the right. My longest trip was on the freeway to Kalama [WA] and back, 408 miles. It took 1.6 hours longer at 55 mph rather than 70 mph and it was worth it. The car will be amortized in about two years, somewhat longer than when gas was \$4.00/gal...but the guilt is gone.

– Dick, Mount Vernon

Additional Resources

Fueleconomy.gov contains information on driving efficiently, vehicle mileage, biofuels, and hybrids:
www.fueleconomy.gov

The U.S. Environmental Protection Agency's Green Vehicle Guide has the stats on the latest fuel-efficient vehicles and provides hybrid advocacy, information about the fuel efficiency of various vehicles, and calculators:
www.40mpg.org

G-Wiz:
www.goinggreen.co.uk

Puget Sound Trip Planner:
www.northsoundconnections.com

SKAGIT COUNTY RESOURCES

Skagit Transit (SKAT) (360) 757-4433:
www.skat.org
 or (360) 299-2424 in Anacortes

Community Bus Service including County Connector to Whatcom and Island counties, Commuter Service to Everett, and Van Pool Service:
Vanpool@SkagitTransit.org
 or (360) 757-8801

North Sound Transit Guide
 A helpful planner for city-to-city transportation in NW Washington:
www.northsoundtransitguide.com/home.php

Amtrak: 105 E. Kincaid St.,
 Skagit Transportation Center,
 Mount Vernon (800) 872-7245

Airporter Shuttle/Bellair Charters:
 (866) 235-5247

Greyhound Bus: (360) 336-5111

WHATCOM COUNTY RESOURCES

Whatcom Transit Authority:
ridewta.com

SMARTTRIPS for local bicycle resources:
www.everybodybike.com/resources.aspx

Community Car Share of Bellingham:
<http://communitycarshare.org>

Whatcom Smart Trips including "Emergency Ride Home" for all Smart Trips participants and WTA bus pass holders, providing a taxi ride home from work if you arrived at work by bus, biking, walking, or ridesharing. Call (360) 676-RIDE (671-7433) or visit www.ridewta.com or <https://www.whatcomsmarttrips.org>

Whatcom Community Transportation Advisory Group:
 A citizen-based group that advises the Whatcom Regional Transportation Policy Board on community concerns to help reach a collaborative vision for Whatcom County's transportation system.
www.transportationtown.com/index.php

Transportation Town is owned and managed by the Whatcom Council of Governments, the Metropolitan Planning Organization, and the Regional Transportation Planning Organization for Whatcom County.

BELLINGHAM TRANSPORTATION FACTS

- Nearly 60% of all car trips are less than three miles.
- 80% of all trips are in a car; 57% of those are driver-only.
- The average Bellingham resident makes 3.3 trips per day and travels about 16 miles.

Green from the Ground Floor Up

At a Glance

- **Build or remodel for energy efficiency.**
- **Be aware of embodied (life-cycle) emissions in building materials.**
- **Think of your home as a complex, interactive system.**

Buildings Account For:

- **30% of greenhouse-gas emissions**
- **36% of total energy use**
- **65% of electricity consumption**
- **30% of raw materials use**
- **30% of waste output (13.6 million tons annually)**
- **12% of potable water consumption**

Does greening your home mean sacrificing personal comfort? Not at all!

Emissions from building and living can be reduced while increasing efficiency and comfort in our homes. Check to see if any of the following ideas could apply to your home or workplace.

Build or Remodel for Energy Efficiency

The largest portion of a building's emissions comes from operation and maintenance.

- Think about where to build your new home. Choose a south-facing site to maximize passive solar heating and light.
- Place windows and reflective surfaces to most effectively use daylight.
- Use sufficient insulation for an energy-efficient and comfortable home.
- Install energy-efficient heating and cooling systems, and ensure that ducts are well-insulated and sealed.
- Use well-placed overhangs, awnings, or blinds to cut the need for summertime cooling.
- Reduce summer heat absorption with a light-colored roof.
- Install a "living roof" (a roof covered with soil and live plants) to provide extra insulation and reduce solar heat gain and storm water runoff. Goats optional!
- Consider having your new home built and certified to Energy Star, LEED for Homes, or Built-Green standards. These programs provide guidelines for building an efficient and environmentally friendly structure.
- Set up plumbing and wiring to be compatible with solar hot water and photovoltaics – this will simplify potential installation later.



Use of solar panels on homes is increasing in Skagit and Whatcom counties.



Several stores in Whatcom and Skagit counties sell used building materials.

AN EASY WAY TO SAVE MONEY AND INCREASE COMFORT IS TO CAULK, SEAL, AND WEATHERSTRIP ALL CRACKS TO THE OUTSIDE.

Lower-Cost Energy-Efficiency Opportunities

There are many cost-effective ways to improve energy efficiency. Here are a few to get you started:

- **Heating and cooling systems.** If you're installing a new system, efficient options include air-source heat pumps, geothermal heat pumps, high-efficiency gas furnaces, electric heating with separate room thermostats, and low-intensity infrared space heating. Programmable thermostats automatically control temperature for time of day and season. A 2° F adjustment to the thermostat (lower in winter, higher in summer) can reduce heating bills by 4–6% and prevent, on average, 500 pounds of CO₂ from entering the atmosphere each year.
- **Weatherization.** Warm air leaking into indoor spaces during summer and out during winter can waste a lot of energy. The cumulative effect of small leaks can be equivalent to leaving a door open. An easy way to save money and increase comfort is to caulk, seal, and weatherstrip all cracks to the outside.
- **Insulation.** Adding insulation reduces heating and cooling needs. There are many options for both new construction and retrofits. The most effective types also seal against air leaks. With insulation, the greater the “R” value, the better.
- **Doors and windows.** Energy-efficient doors are insulated and seal tightly to prevent air from leaking through or around them.

Size Matters

Bigger buildings require more materials and more heating and cooling, and provide more rooms to furnish and maintain.

- **Reuse.** Several stores in Whatcom and Skagit counties sell used building materials. Using these instead of new materials can result in better quality construction.
- **Reduce.** Reduce construction waste. Paying attention during construction will save both materials and labor.
- **Think life-cycle emissions.** Seek out materials with low embodied emissions and low toxicity. Use local materials to reduce transportation-related emissions. “Rapidly renewable” materials such as cork, straw, and bamboo quickly convert CO₂ into biomass.
- **Go for durability.** Save money in the long run and decrease embodied emissions by avoiding frequent replacement and waste. For example, if roofing with asphalt composite, consider a 40-year roof instead of the standard 20-year. Metal roofs are durable, recyclable, and energy-efficient, though more costly up front than asphalt.

- **Optimize sunlight.** Orient the longer axis of the house east to west. When the sun travels low in the winter sky, the long southern face of the home will absorb heat through walls or, better yet, a good portion of the home's windows. Locate rooms where most activity takes place on the south side. Overhangs can shield against the summer sun.

Systems Thinking

Look at your home as a complex, interactive system. Then ask yourself these questions and base your home-changing decisions on the answers.

- *How will present and future occupants use the building?*
- *What does this site suggest about designing and locating my home?*
- *Do I value cleaner indoor air? Choose paints, flooring, and furnishings that reduce indoor air pollution.*
- *Is the building's general design and appearance consistent with its surroundings?*
- *How much more is given back to the community if I support local builders and retailers?*
- *What's the future economic value of energy self-sufficiency? Will investing in solar now pay off in a few years?*

Existing doors can be made more efficient: make sure they seal tightly and have door sweeps at the bottom to prevent air leaks. Installing insulated storm doors provides an additional barrier to leaking air.

Energy-efficient windows can be costly up front, but increase comfort and can save thousands of dollars in the long run. Look for low-E windows (heat reflective) with U-factors of 0.30 or less. (U-factor describes how much heat passes through the window. The lower the U-factor, the better.)

- **Electricity and appliances.** Look for the Energy Star label – your assurance that the appliance saves energy. Appliance manufacturers are required to display Energy Guide labels, which state the energy usage and operating cost. These labels are a useful way to compare appliances.

Additional Resources

The **Building Green** website houses the industry's often-used **Green Spec** guide, a sourcebook for green building materials, as well as articles on policy, siting, energy, materials, and more:

www.buildinggreen.com

The **U.S. Green Building Council** serves as a gateway to information on case studies, research centers, design and materials resources, and more:

www.usgbc.org

LEED for Homes (Leadership in Energy and Environmental Design) is a voluntary rating system that promotes the design and construction of high-performance green homes, including affordable housing:

www.greenhomeguide.org

Cascadia Region Green Building Council promotes the design, construction, and operation of buildings in **Alaska, British Columbia, Washington, and Oregon** that are environmentally responsible, profitable, and healthy places to live, work, and learn:

www.cascadiagbc.org

The **Green Home Guide:**

www.greenhomeguide.org

The **Northwest EcoBuilding Guild** is an association of builders, designers, homeowners, tradespeople, manufacturers, suppliers, and others interested in ecologically sustainable building. The **Guild's Green Pages** is the best way to find contractors, suppliers, and other green building service providers in the Northwest:

<http://ecobuilding.org>

Seattle City Green Building provides customized green building education, early design guidance, technical assistance, incentives, and project recognition:

www.seattle.gov/dpd/greenbuilding

Green building news, products, and books:

www.oikos.com

Built Green of Bellingham, part of the **Building Industry Association**, offers information on green building basics, permits, education programs, and local demonstration projects in Bellingham:

www.biawc.com/builtgreen

Sustainable Connections Green Building and Smart Growth Program:

<http://sconnect.org/greenbuilding>

The **RE Store**, 2309 Meridian St., Bellingham, (360) 647-5921, sells reusable building supplies and offers deconstruction services for salvaging materials:

www.re-store.org/bellingham

Skagit Building Salvage, 1011 West Division St., Mount Vernon, (360) 416-3399, sells used building materials:

www.skagitbuildingsalvage.com



Save energy; save the view.

Repower with Renewables

At a Glance

- Use renewable energy at home.
- Buy Green Power.
- Consider biofuels.



Vince Striano

The electric bill diminished noticeably

Two things we have done that I feel happy about are: replaced just about every incandescent light bulb with the energy-saving bulbs. The electric bill diminished noticeably. With the savings in the bill we are giving the electric company a few dollars for them to purchase green energy.

— Jim, Anacortes

An energy-efficient home is a big step in the journey to a low carbon footprint. Besides saving big emissions and eventually big money, using renewable energy at home can offer the bonus of bragging rights.

Renewable energy is energy transferred with minimal environmental impacts from natural resources such as sunlight, wind, rain, tides, and geothermal heat. These resources are naturally replaced at the rate they're being used, unlike coal, oil, or natural gas.

Renewable energy (RE) isn't just for eco-nerds. The easy way to use RE is to sign up for Puget Sound Energy's Green Power Program. This lets you purchase 100% RE for an additional 1.25 cents per kilowatt-hour. Sometimes called "green tags," this program ensures that the amount of power you use is generated by renewables such as wind and dairy cow manure in our area. PSE does not profit from these funds.



FOR THE AVERAGE HOME –
USING GREEN POWER PROVIDES THE SAME ENVIRONMENTAL BENEFIT AS TAKING ONE CAR OFF THE ROAD.

Generate Your Own

Creating your own renewable energy on site can be a rewarding adventure. The options include solar photovoltaic (PV) for generating electricity, wind for producing electricity and pumping water, and solar water heating.

Solar

If your home has potential sun exposure from 9 AM to 3 PM year-round, you probably have nice solar potential. This can be verified with a professional solar survey.

- Water heating is the most cost-effective way to capture the sun's energy. A solar water heater is usually mounted on the roof or on a south-facing wall and is commonly used to preheat water to your standard water heater.
- New PV panels will generate power for the next 20–40 years. With a grid-tied (no batteries required) system, any power that is produced but not used is sold back to the

power company. *With an energy-efficient house, you can actually produce more power than you use!* With federal tax credits of 30% of the system cost, a Washington State sales tax exemption, and PSE incentives of 15 to 54 cents per kilowatt-hour, a PV system in the right location might be a real moneymaker.

Backyard Wind

If you sail our local waters, live on a windy ridge or other exposed area, or have driven across Fir Island during a wind storm, you can easily understand the power of the wind. How tempting it is to harness that force of nature!

- Nothing compares to the romantic vision of a large, slow-turning windmill drawing from deep within the earth to provide water for animals and irrigation. However, a PV panel attached directly to a special pump is far less expensive, and much more common.

- Small wind generators provide more wattage in a smaller package than solar panels, and can also be grid-tied. However, they add to the noise of the wind and, compared to solar, county permitting requirements are more stringent. Also most locations have more sun than wind (even in cloudy Skagit and Whatcom counties!), and the incentives are not as generous. In most cases, wind generators are better suited to utility-scale production, although in some circumstances they can be a critical component of an RE system.

Biofuels

Biofuels are made from plant or animal material and used as alternatives or additives to fossil-based fuels. The most common biofuels are ethanol and biodiesel. Both types are commonly used for vehicles, usually in a blended form, and are available at some local gas stations, such as at the Bellingham Shell Station on Meridian Street or the Rexville Grocery in Mount Vernon. Some heating oil companies are experimenting with using a biodiesel blend for furnace fuel. Unlike fossil fuels, biofuels are renewable.

- **B20, E85?** These are mixtures of biofuel with petroleum fuels. B20 means 20% biodiesel, 80% diesel oil. E85 is 85% ethanol, 15% gasoline.

Biodiesel is made by removing the glycerine from animal or vegetable fats. Used cooking oil (smells like french fries); soy, canola, and palm oil; and animal tallow have all been used. Algae is a promising new source.

Ethanol, a form of alcohol, is made with a fermentation process from corn, sugar beets, wood waste, and straw.

- **Do biofuels reduce greenhouse gases?** The answer depends on the source of the fuel. Emissions can be less with biofuels because they release only the carbon that was sequestered during the growing period, they burn more cleanly, and produce less tailpipe pollution.

However, is this really so great if forests are being destroyed and grasslands tilled under just to get us a few more miles down the road? Several studies have shown an increase in greenhouse gases due to land use changes and because of the energy used to produce and transport the fuel. According to one researcher, clearing grasslands to grow biofuel crops releases 93 times the greenhouse gases that would be saved by burning the biofuels produced by the land. It would take over 90 years even to begin to see any savings from those crops.¹

- **Food for fuel?** Corn grown for ethanol has displaced the planting of soybeans, and now Brazilian farmers are deforesting the Amazon to grow soybeans. If this seems to you like a sound ecological answer to global climate problems, ask your local second-grader why it's not. And please return to Climate Change 101. In Indonesia and elsewhere, forests are being clearcut to make room for oil crops. Biofuels are blamed for increasing the price of corn and other commodities because crops are grown for fuel, not food.
- **"McFuel."** Used cooking oil is a very limited but renewable resource. Many local restaurants are now selling their old oil for conversion to biodiesel.
- **Biofuels are renewable.** Source crops can be grown in a few months. Fossil fuels could be renewed too, if only we'd wait a few million more years. Delayed gratification is a virtue.

Controversy rages over whether biofuels are good or bad for the environment. They're neither perfect nor emission-free. Their use must be balanced against the pollution and environmental damage caused by the extraction, processing, use, and disposal of petroleum products. But perhaps they can be one piece of the energy pie. There are few easy answers when dealing with complex ecosystems.



Vince Strano

Additional Resources

Database of State Incentives for Renewables and Efficiency offers local information on incentives and rebates across the nation:
www.dsireusa.org

The National Biodiesel Board, the trade association for biodiesel with information on location of biodiesel dealers:
www.biodiesel.org

U.S. Dept. of Energy's Efficiency and Renewable Energy site:
www.eere.energy.gov/

Source for solar contractors; some also install wind generators:
www.findsolar.com

Local biodiesel sources:
www.nearbio.com

Yards: Thinking Differently

At a Glance

- **Compost is wealth and health!**
- **Trees cool your home and absorb CO₂.**
- **Push mowers and rakes reduce CO₂ and keep you fit.**
- **“Eat Your Yard” by growing food!**

Did You Know?

CO₂ and other pollutants in your yard come from:

- **Fossil-fuel-based fertilizers, pesticides, and herbicides**
- **Gas and electric mowers, edgers, snow and leaf blowers**
- **Embodied emissions in yard furniture and tools**
- **Outdoor heaters**
- **Waste sent to a landfill, where it releases methane**

Compost Power

By composting food and yard waste, planting trees as well as native and drought-tolerant plants, using push mowers, scrapping the synthetic fertilizers, and growing more of our own food, we can reduce carbon dioxide (CO₂) emissions and other pollutants.

The healthy bacterial action in a home compost system eliminates methane that would otherwise be released in a landfill. (Methane has 21 times the warming potential of CO₂.) Compost can replace costly chemical fertilizers, which require large amounts of fossil fuels to produce and distribute. Also, the nitrous oxide released when chemical fertilizers break down in the soil is 310 times more potent than CO₂.

Using compost on your flower and vegetable beds makes for a bigger harvest and higher nutritional value. For those who live in an apartment, a worm bin can be a good way to treat organic waste and reduce your carbon footprint. Use the results to nourish a balcony garden and house plants.

THE HEALTHY BACTERIAL ACTION IN A HOME COMPOST SYSTEM
ELIMINATES METHANE THAT WOULD OTHERWISE
BE RELEASED IN A LANDFILL.

METHANE HAS 21 TIMES THE WARMING POTENTIAL OF CO₂.



Turn waste into wealth – compost!

Trees Save

Trees help keep temperatures comfortable in and around your home. Trees draw CO₂ out of the atmosphere and convert it to sugars, which store carbon for the trees. Softwood trees, such as cedar, can sequester 26 pounds of CO₂ annually, or about a ton over their lifetime. Plant evergreen trees, like western red cedar or western hemlock, on the north side to shield your home from winter winds and save on heating costs. Plant deciduous trees, like aspen or maple, on your home's south side to let in sun in winter and provide shade in summer. If you're eating your yard, make that deciduous tree a fruit or nut tree and reap extra benefits.

The Greener Green

Lawns use the most resources in our yards. An easy way to reduce energy and resource use is to change our standards. Mowing a little higher and accepting a lighter lawn color and the occasional weed can cut down on emissions with very little effort.

Instead of using gas lawn mowers, go electric or, better yet, build some muscles with a push mower. If you mow your lawn regularly (no more than three inches high), you can “grass-cycle” or mulch your yard clippings. Grasscycling and mulching garden beds reduce the need for chemical fertilizers and water. Reducing lawn size is another simple way to trim emissions. Grow fruits and vegetables where you used to have your lawn!

Native plants are adapted to regional climates and provide alternatives to grass, roses, and other needy plants in the landscaping. Once established, native plants require little or no care and provide habitat and food for local wild animals – a perfect option for the lazy gardener. If you're working with a landscaping company, ask them to use climate-friendly practices. Show them the resources at the end of this chapter.



Push mower too much for Mom? Perfect reason to finally hire that college student she's been asking for!

Eco BBQ

The primal urge to roast your favorite meat on the grill may be too much to overcome, but before you fire up the barb-e, consider the following:

Use gas, not coal. Burning natural gas and propane produces less greenhouse-gas emissions, particulate matter, and soot than burning charcoal (although they are still fossil fuels). Conventional charcoal briquettes may also contain coal dust, sodium nitrates, or other additives used as binding agents. Lump charcoal produced from sustainably managed forests offers an alternative to briquettes.

Use chimney towers. If charcoal is your fuel of choice, use a chimney tower instead of lighter fluids, which contain volatile organic compounds. These toxic compounds contribute to ground-level ozone pollution, which can cause health problems. The towers are easy to use, reduce the amount of time needed to prepare the coals, and require no lighter fluid.



It has given us a new “common experience”

My husband and I took the Skagit Beat the Heat class on turning our lawn into a vegetable garden. We are going to town! He has converted a large section of our lawn into raised bed gardens, adding blueberries, another row of raspberries to our one existing row, and three large vegetable beds. I have never seen him so involved with a project. It has changed the way we talk about things and given us a new “common experience” to add to our shared love of bird watching. It has given us “common ground” in the garden, a way to merge my love of flowers with our support of organic agriculture and with our interest in green technology – looking at water conservation and how we can make our home and property more reflective of our values. It helps us walk our talk. I love it!

– Thais, Bow



Bird-friendly backyard organic garden

Use a solar oven. For no-emission summer meals, consider building a solar oven for outdoor use or check online for a variety of choices available for purchase.

Northwesterners Know How to Layer

Outdoor patio heaters use propane gas, and not very efficiently. For every hour an outdoor heater is used, 495 compact fluorescent bulbs could be fired up instead. Wear a sweater or jacket instead of firing up your heater.

Eco Shop

The more new items we purchase to fill outdoor living spaces, the more embodied emissions we rack up from their manufacture, transport, and disposal. Buy used items and those made from recycled materials instead.



Additional Resources

COMPOSTING

Compost Guide:
www.compostguide.com

Cornell Waste Management Institute:
www.cwmi.css.cornell.edu/small-scale-composting.htm

Green Guardian.com (food waste):
www.rethinkrecycling.com/residents/throw-buy/materials-name/food-waste
www.CompostWashington.org

LANDSCAPING

Greenscaping Your Lawn and Garden, U.S. Environmental Protection Agency:
www.epa.gov/epaoswer/non-hw/green/owners.htm

Tree Planting and Backyard Conservation, Natural Resources Conservation Service:
www.nrcs.usda.gov/feature/backyard/treepgt.html

NATIVE PLANTS

Plant Native:
www.plantnative.org/index.htm

Moss Gardening:
www.mossacres.com

SKY Native Plant Nursery:
www.pnt.org/skynursery.html

Washington Native Plant Society:
www.wnps.org

Water Conservation Saving Water Partnership, an extremely useful website covering natural yard care, plant selection, composting, soil, rain barrels, and more:
www.savingwater.org/outside.htm

Drip Irrigation:
www.irrigation.org

www.rainbird.com

LOCAL RESOURCES/SKAGIT

Master Gardener Program (Skagit):
(360) 428-4270
<http://skagit.wsu.edu/mg/>

Master Gardener Program (Whatcom):
<http://whatcom.wsu.edu/mastergardener/index.htm>

Eat Your Yard! Why mow when you can grow?
(360) 293-4048
www.skagitbeattheheat.org

Fidalgo Backyard Wildlife Habitat:
(360) 299-2579

Local Resources/Whatcom WSU/Composting in Whatcom County:
<http://whatcom.wsu.edu/ag/compost/index.htm>

Whatcom County facilities that accept various types of yard waste. Some of these facilities require a fee based on the amount of refuse being disposed.

	BRANCHES Up to 7 inches	CLEAN WOOD SCRAPS	STUMPS	YARD DEBRIS
CITY ORGANICS (Bellingham only); (360) 671-YARD	X	X	X	X
"CLEAN GREEN" FACILITY North of Lakeway Dr. on Woburn; (360) 778-7700; 8:30-4 Sat & Sun	Up to 8 inches			X
GREEN EARTH TECHNOLOGY 774 Meadowlark Rd., Lynden; (360) 354-4936; 7-5 Mon-Fri	X	X	X	X
NOOKSACK VALLEY DISPOSAL 250 Birch Bay-Lynden Rd.; (360) 354-3400; 8-4 Mon-Fri; 9-noon Sat	X	X		X
POINT RECYCLING AND REFUSE Off Johnson Rd, Point Roberts; (360) 945-1516; 12-4 Tues, Thurs, Sun; May 1st-Sept. 30th; also open Sat	X	X		X
RECYCLING AND DISPOSAL SERVICES 4916 LaBounty Place; (360) 384-8011; 7:30-5:30 daily	X	X	X	X
SANITARY SERVICE COMPANY 1001 Roeder Avenue; (360) 398-2025 or (360) 734-3490; 8-5 Mon-Fri				X

Note: Before burning, check www.co.whatcom.wa.us/publicworks/solidwaste/yardwaste/burnban.jsp for burn ban maps.

Live Better with Less

At a Glance

- **Reduce consumption and waste.**
- **Reuse items – be creative!**
- **Recycle, of course. And buy recycled items.**
- **Regenerate soil by composting food and yard waste.**

Recycling Facts

30% of municipal solid waste is made up of packaging.³

Making paper from recycled fiber generates 75% less air pollution.⁴

Recycling 437,000 tons of paper reduces air emissions equivalent to that produced by 200,238 cars in a year. The total benefit from paper recycling in the United States is equivalent to taking 24 million cars off the road.⁵

The energy saved from recycling a glass bottle will light a 100-watt bulb for four hours, longer if the bulb is a CFL equivalent.

Producing a new glass bottle from recycled glass uses 30% less energy than if raw materials were used.⁶

If just one-fourth of U.S. households used ten fewer plastic bags per month, 2.5 billion fewer bags would go to landfills each year.⁷

It takes 95% less energy to make a can out of recycled aluminum than from raw materials.⁸

What a Mess! What an Opportunity!

In 2006, U.S. residents generated an average 4.6 pounds of waste per person per day, for a whopping 251.3 million tons of waste that year.¹ If we toss that much away, just imagine how much we consume overall and the energy needed to make all that stuff we think we need. And don't forget those greenhouse-gas emissions. For example, making just one ream of paper produces 35.7 pounds of carbon dioxide (CO₂) emissions.²

The Environmental Protection Agency estimates that:

- 55% to 65% of waste is from our homes.
- Industrial and construction waste also result from individual demand (United Nations Systemwide Earthwatch Initiative).
- Industrialized countries such as the U.S. account for only 20% of world population, but consume 86% of all aluminum, 81% of paper, 80% of iron and steel, and 76% of timber produced globally.
- In a lifetime, the average American uses 540 tons of construction materials, 18 tons of paper, 23 tons of wood, 16 tons of metal, and 32 tons of organic chemicals.

Sure, we're recycling more, but we're also creating mountains of waste. It's still too easy to find those "convenience" items used just once and tossed. Pretty inconvenient if it means an increasingly burdened planet.

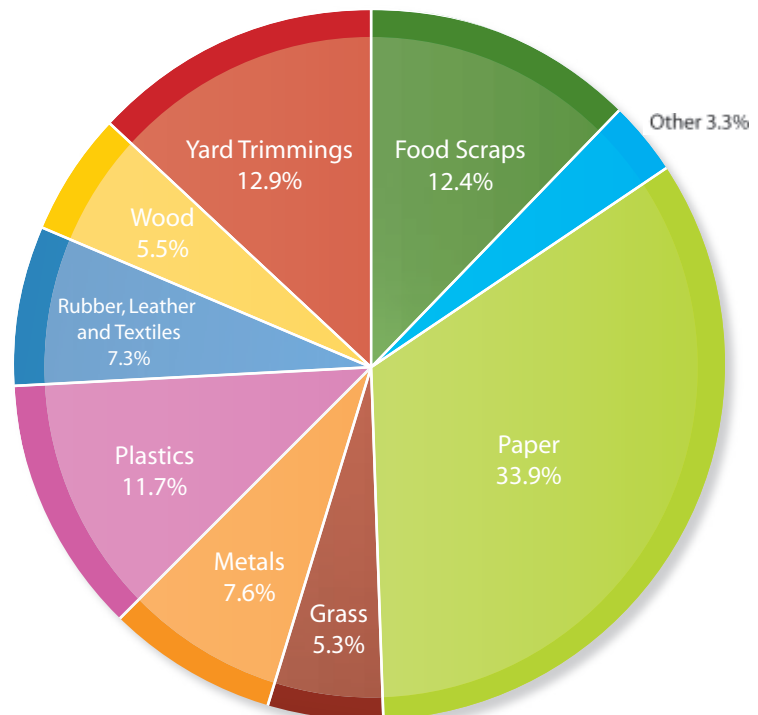


FIGURE 7.1: TOTAL MUNICIPAL SOLID WASTE GENERATION (BY MATERIAL), 2006
251 MILLION TONS (BEFORE RECYCLING)

The Good News

Much of what ends up in our landfills could be recycled (glass, metals, paper) in a process that requires less energy and far fewer resources than making new materials. All of the organics (food, wood, yard debris) could be composted, creating nutrient-rich soil.

Most of us already recycle household waste. That's great. But why not go a step further and think about creating less waste to recycle? Recycling requires fossil fuels to both process and transport our waste. Reducing our waste not only decreases greenhouse-gas emissions and other pollutants, but also saves energy and conserves natural resources and landfill space.

To curb emissions associated with waste, we can reduce the amount of waste we purchase in the first place. The next step is to reuse items we might normally throw away or recycle – like soft-drink bottles and yogurt containers. The final step is to recycle any items we can't reuse.

Reduce Waste

Here are some ways we can reduce waste, an idea known as source reduction:

- A no-brainer: buy less!
- When you must buy, consider:
 - Can I buy it secondhand or rebuilt? (Remanufacturing products uses 85% less energy.)
 - Is it available with post-consumer recycled materials?
 - Is it reusable?



Depot Market Square in Bellingham – beautiful beams and arches were salvaged from the old Highway 99 Skagit River bridge between Mount Vernon and Burlington.

- Is it durable and repairable? Can shoes be resoled? Can appliance parts be replaced?
- Does it contain toxic substances? Many toxic materials are petroleum-based and emit greenhouse gases.
- Can I avoid the packaging? If not, can the package be composted or at least recycled?
- Print on both sides of the paper and reuse paper.
- Rent or share items like tools, camping and recreation equipment, or books.
- Bring your own cup to the coffee shop and reusable cloth bags to the store.
- Meet your neighbors and have some fun! Host a clothing, book, or music exchange instead of going shopping.
- Many cleaning products are petroleum-based. Use nontoxic cleaners, varnishes, and paints to cut emissions and stop the flow of toxic waste from house to soil and water.

How to remember my bags...



If I get to the grocery store and have forgotten my reusable bags there is a way to deal with it and not use plastic/paper bags. I have my groceries put back into my cart loose, unbagged, and take them to my car that way. Then I load them into my car loose and drive home. Once home, I put my groceries into my reusable bags that I left at home and take them inside. After a few times of doing this, I do a better job of remembering my bags!

– Martha, Anacortes

- Stop junk mail! Sign up at www.41pounds.org to start the process, or send a postcard or letter to:

Mail Preference Service
Direct Marketing Association
PO Box 643
Carmel, NY 15012-0643

Include your complete name, address, ZIP code, and a request to “activate the preference service.”

Reuse – Get Creative!

- Donate gently used clothing, furniture, electronics, appliances, and magazines to churches, charities, and community groups.

“THE ENERGY SAVED BY RECYCLING ONE GLASS BOTTLE WOULD LIGHT A 100-WATT LIGHT BULB FOR FOUR HOURS. EVERY TON OF PAPER RECYCLED SAVES 4,100 KILOWATT HOURS OF ENERGY, ... 7,000 GALLONS OF WATER, AND REDUCES WATER POLLUTANTS BY AS MUCH AS 35 PERCENT.”

— Lane County Recyclers Handbook

- Instead of buying a new electronic item, consider a used or refurbished product and reduce emissions associated with manufacturing.
- Use those prepared-food containers to bring your lunch with you to work or school. Or use them to store food in the fridge or freezer.
- Glass jars make great containers for small household items such as nails, screws, push pins, and sewing supplies.
- If you plan to remodel your home, donate wood, windows, cabinets, and fixtures to a place such as a recycling center that resells these materials.

Recycle, Of Course!

Recycling reduces methane emitted from waste decomposing in landfills as well as the raw material used to make new goods. In the case of paper products, recycled paper preserves forests that store CO₂, both in the trees and in the soil beneath the trees.

Composting and “grasscycling” are two other ways to reduce the methane emissions associated with landfills. Put your organic waste (veggie trimmings, grass clippings, etc.) into your yard or garden and not into landfills! The resulting compost will enrich your yard and garden, reducing your need for fertilizers that are often fossil fuel-based.

Did You Know?

The Aluminum Can

Excerpted from Lean Thinking by James P. Womack and Daniel T. Jones

The aluminum can is more costly and complicated to manufacture (from virgin material) than the beverage.

Typically, bauxite is mined in Australia and trucked to a chemical-reduction mill where a half-hour process purifies each ton of bauxite into a half ton of aluminum oxide. When enough of that is stockpiled, it is loaded on a giant ore carrier and sent to Sweden or Norway, where hydroelectric dams provide cheap electricity.

After a month-long journey across two oceans, it usually sits at the smelter for as long as two months. The smelter takes two hours to turn each half ton of aluminum oxide into a quarter ton of aluminum metal. These are cured for two weeks before being shipped to roller mills in Sweden or Germany. There, each ingot is heated to nearly 900 degrees Fahrenheit and rolled down to a thickness of an eighth of an inch. The resulting sheets are wrapped in ten-ton coils and transported to a warehouse, where they are rolled tenfold thinner, ready for fabrication. The aluminum is then sent to England, where sheets are punched and formed into cans, which are then washed, dried, painted with a base coat, and then painted again with specific product information. The cans are then palletized, fork lifted, and warehoused until needed.

The pallets are then shipped to the bottler, where they are washed and cleaned once more, then filled with soda. The filled cans are sealed with an aluminum “pop-top” lid at the rate of fifteen hundred cans per minute. Palletized again, the cans are shipped to a regional distribution warehouse, and shortly thereafter to a supermarket where a typical can is purchased within three days. Drinking the soda takes a few minutes; throwing the cans away takes a second.



THE UNITED STATES STILL GETS THREE-FIFTHS OF ITS ALUMINUM FROM VIRGIN ORE, AT TWENTY TIMES THE ENERGY INTENSITY OF RECYCLED ALUMINUM, AND THROWS AWAY ENOUGH ALUMINUM TO REPLACE ITS ENTIRE COMMERCIAL AIRCRAFT FLEET EVERY THREE MONTHS.

Additional Resources

U.S. Environmental Protection Agency, Municipal Solid Waste, Source Reduction, and Reuse:
www.epa.gov/msw/sourcred.html

Columbia University, Environmental Stewardship website:
www.columbia.edu/cu/environment/docs-wycd/reuse-recycle/index.html

The Story of Stuff

Watch this 20-minute, fast-paced, fact-filled look at the underside of our production and consumption patterns:
www.storyofstuff.com

SKAGIT COUNTY WASTE AND RECYCLING:

Skagit County Public Works Surface Water Management and Solid Waste
1800 Continental Place
Mount Vernon, WA 98273
Phone: (360) 336-9400
E-mail: pw@co.skagit.wa.us

Master Composter/Recycler Program
Callie Martin, Reduction/Recycling Educator
E-mail: calliem@co.skagit.wa.us

Skagit County Recycling and Transfer Station
14104 Ovenell Road, Mount Vernon
(360) 424-3873
Hours: 8:30 AM – 6:00 PM
(closed on major holidays)
Includes: Household Hazardous Waste Collection Facility

Sauk Recycling & Transfer Station
50796 Sauk Landfill Road, Concrete
Phone: (360) 853-8810
Hours: 9:00 AM – 5:00 PM Thursday – Sunday (closed on major holidays)

Clear Lake Recycling & Compactor Site
23159 Howey Road, Clear Lake
Phone: (360) 856-5083
Hours: 8:00 AM – 6:00 PM M/W/Fri/Sat/Sun (closed on major holidays)

Skagit River Steel and Recycling
1265 S. Anacortes St.
Burlington, WA
(360) 757-6096 or (800) 869-7097

Household Batteries/Fluorescent Light Bulbs Disposal in Anacortes:

Operations Facility, 2201 37th Street, and City Hall, 901 6th Street – drop boxes available to accept small household, lithium, and cell phone type batteries. Large vehicle, boat, or motorcycle batteries cannot be accepted. Fluorescent bulbs can be disposed of at the Operations Facility. Please check in at the Operations office to drop off the bulbs. Hours for drop-off are Monday – Friday, 8 AM – 5 PM. For more information, contact Shelly Jensen at (360) 293-1921, ext. 24.

WHATCOM COUNTY WASTE AND RECYCLING:

Solid Waste Division:
www.co.whatcom.wa.us/publicworks/solidwaste/index.jsp
In Whatcom County, garbage and recycling services are provided by private companies. The county government coordinates and oversees these services. If you have a question about waste reduction, recycling, composting, or household hazardous waste that isn't addressed on this website, call the Recycling Hotline at (360) 676-5723. The Recycling Hotline operates weekdays 9:00 AM – 5:00 PM.

Curbside garbage and recycling service in Whatcom County:
Blaine Bay Refuse (360) 332-5443
Nooksack Valley Disposal (360) 354-3400
Point Recycling & Refuse (360) 945-1516
Sanitary Service Company (360) 734-3490

WSU Whatcom County Extension Master Recycler Composter website. The site provides many fact sheets on composting and recycling, such as how to build and maintain compost bins, rain barrels, and worm bins:
<http://whatcom.wsu.edu/ag/compost/index.htm>

RE Store – The RE Store serves the greater Puget Sound region with used building materials and mobile removal services. Two retail stores in Seattle and Bellingham offer an economical, green-building option for remodeling supplies:
www.re-store.org

Disposal of Toxics (DoT): A Whatcom County facility that accepts hazardous waste from households and from small businesses that qualify. Businesses need to be pre-approved before bringing in waste. Disposal of toxics is located at 3505 Airport Drive, Bellingham (one block west of the airport entrance), and is open weekdays from 9 AM – 4 PM and the first Saturday of every month from 9 AM – 4 PM; (360) 380-4640.



Learning to not buy

I get a lot of clothing and “stuff” secondhand; learning to not buy just because it is a bargain is challenging and rewarding. Walking away from a store empty-handed is a pleasure now, not a disappointment.

– Killeen, Anacortes

Shrinking Your Foodprint

At a Glance

- Industrialized agriculture releases greenhouse-gas emissions.
- Go organic.
- Reduce food transportation.
- Minimize food processing.

Eating with a small “food-print” may sound like a challenge when you consider that the average American meal has traveled 1,500 miles before it arrived on a plate.

Some food savvy will help free us from that fossil-fuel addiction.

Modern industrialized agriculture uses about 17% of all commercial energy in the U.S. and accounts for 7.4% of emissions, including production, processing, and delivery.¹ Large volumes of fossil fuels are needed for each step of the industrial food process.

First, the fertilizers, pesticides, herbicides, and fungicides used in conventional farming are made from fossil fuels and release nitrous oxide (a greenhouse gas) into the soil.

Second, machinery is used for plowing, irrigation, and harvesting, creating emissions with every turn of the key.

Finally, even more energy is used to process the food and to get it from the farm to your table. At every stage of this process, food is thrown away. Industrial agriculture now uses from 2 to 15 calories of energy to produce just one calorie of food.²

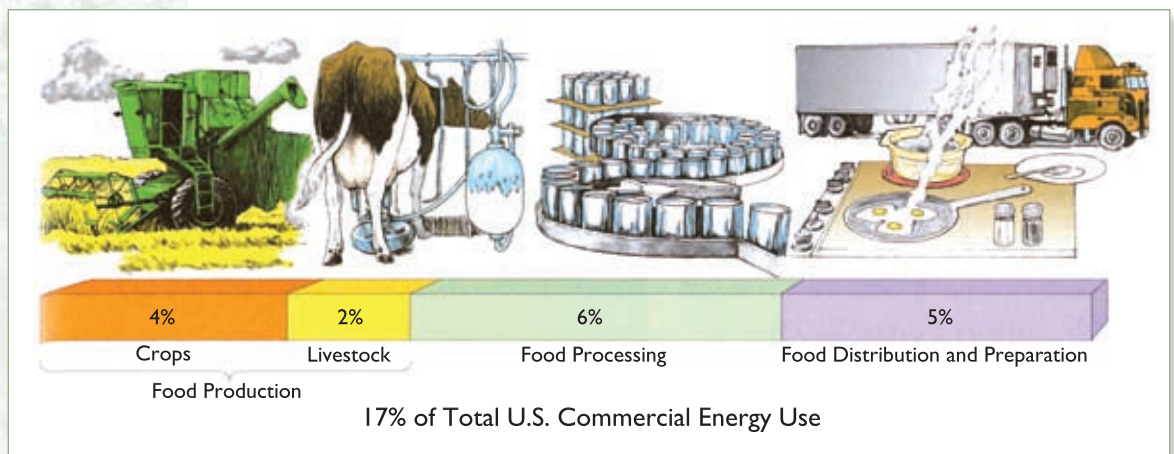


FIGURE 8.1 MODERN INDUSTRIALIZED AGRICULTURE ENERGY USE

Source: From Miller, *Living in the Environment*, 15E. © 2007 Brooks/Cole, a part of Cengage Learning, Inc. Reproduced by permission. www.cengage.com/permissions

LUCKILY, CHANGING OUR EATING HABITS CAN REDUCE OUR GREENHOUSE-GAS IMPACT. HERE ARE SOME STEPS TO LIGHTEN THE SKAGIT AND WHATCOM LOAD. IT'S AS EASY AS 1, 2, 3.
WHERE TO BEGIN? AT THE FARM.

Support Organic Agriculture

- **On the farm.** Organic farmers rely less on machinery and more on labor-intensive practices to weed and harvest fields. They eliminate much of the need for fossil fuels with practices such as weeding, companion planting, biological pesticides use, crop rotation, and cover-cropping to reduce soil depletion.
- **In the market.** The USDA organic label assures that foods have been raised without the use of synthetic pesticides and fertilizers, hormones, bioengineering, or irradiation. Also, the farmer must use certain soil and water preservation techniques. This is good. Certification, however, is an intensive, expensive process that many small, local farms cannot afford, although they practice organic methods. This is bad, but only if you don't know your farmers. A little research and some good old asking around will tell you who grows what in our fertile valleys. Then look for their labels in the stores or buy direct and save some cash. No time to research?

The organization Slow Food Skagit has done it all for you. Just visit www.slowfoodskagit.org to find your local farmers or farmer's market.

- **In your garden.** There's nothing like walking out your kitchen door to pick a fresh meal. It's even nicer knowing that it's all natural. Engaging in the natural cycles on your property, including growing and harvesting food, composting leftovers, and attracting natural

A 22-YEAR STUDY FROM THE RODALE INSTITUTE SHOWED THAT CONVENTIONAL FARMING METHODS REQUIRE 3.7 BARRELS OF OIL PER HECTARE OF CROP PRODUCTION, WHILE ORGANIC FARMING METHODS NEEDED ONLY 2.5 BARRELS OF OIL TO PRODUCE THE SAME CROP YIELD.

IN ADDITION, FIELDS FARMED ORGANICALLY STORED UP TO THREE TIMES MORE CO₂ THAN FIELDS FARMED CONVENTIONALLY.³

predators to control pests is easy enough to do on a city lot, or even a balcony. See Chapter 6 for gardening tips.

Decrease Food Transportation

There are many ways to lower the carbon footprint of the food we eat.

- **Grow your own or "Eat Your Yard" as we like to say on Fidalgo Island.** Growing fruits and vegetables is the tastiest and lowest-emission form of eating.

Grow more than enough and preserve the extra for the lean Northwest winter.

- **How far did it travel?** Choose foods that had minimal processing and didn't require a passport to get here. Buy local, in-season produce as directly from the farmer as you can. When a farmer's market isn't open, choose a market that carries local farm produce.
- **Tomatoes in January?** Local doesn't always mean low CO₂. Food grown locally, but out of season, can require additional energy for production in heated greenhouses. Eating with the seasons increases your chances of finding food produced locally, in-season. Still want winter tomatoes? Clean out the farmer's markets in September and learn to can.
- **To market!** When your preserves are gone and you can't think of another way to prepare kale, shop you must. When choosing market food, consider both the mode of transportation and the distance the product has traveled to reach you. The difference in how



Vince Sreano

Organic garden on Fidalgo Island

Chickens: natural rototillers, weed and pest eaters and fertilizers...

My classroom hatched chicks that my seven-year-old son raised and now we have backyard chickens in town. They are natural rototillers and weed and pest eaters, and the fertilizer can't be beat. They are so much help that the fresh eggs are just a bonus.

– Mira, Anacortes



we transport our food (air, truck, rail, and barge in descending order of fuel efficiency) means that closer doesn't always equal fewer emissions.

And according to a study from Great Britain, organically grown produce shipped by barge from more than 1,000 kilometers away from the country had fewer associated greenhouse-gas emissions than conventionally grown local produce.⁴

- **Coffee and chocolate and sugar, oh my.** Possibly the three most difficult tropical (and so well-traveled) foods to quit! If you can't, there's still a way to cut carbon: Fair Trade. Purchasing goods that are certified Fair Trade supports small-scale farms, maintains biodiversity, helps protect rainforests, decreases use of chemicals on crops, cuts down on transportation, and ensures fair prices for farmers. For instance, Fair Trade coffee farmers receive U.S. \$.26 per pound of coffee, while the international rate for coffee is U.S. \$1 a pound. When middlemen are put in the picture, the coffee-bean farmer may actually receive as little as 50 cents per pound of coffee. Look for the label in our local food co-ops and supermarkets. For more, visit www.transfairusa.org/content/about/index.php.

- **Bring it home.** So, if we shift our produce consumption to in-season, local produce, we can drastically cut our food-related greenhouse-gas emissions. That's a start. Now it gets personal. Quick trip to the store? Here's a reason to think that through.

That trip from supermarket to home can be the greatest energy guzzler and greenhouse-gas producer in your tomato's or milk's "foodprint."

The reason is that a truck carrying tomatoes will be packed to the brim, using one engine to carry pounds and pounds of tomatoes, whereas we might carry just two bags of groceries in our otherwise empty vehicle. Or worse, "run to the store" for just one item. Most of the fossil fuels burned are used to move the hulking body of the vehicle, rather than to move our groceries. If you're thinking how silly this is, you're right. Here are some solutions:

- **Shop with friends.** Haul more groceries, leave a car at home, and have more fun!

ACCORDING TO THE U.S. DEPARTMENT OF TRANSPORTATION, ONE GALLON OF FUEL CAN TRANSPORT ONE TON OF FOOD 59 MILES BY TRUCK, 202 MILES BY RAIL, 514 MILES BY BARGE, BUT ONLY SEVEN MILES BY AIR.⁵

ALTHOUGH MOST FOOD IS TRANSPORTED BY OTHER MEANS (BARGE TO TRUCK, FOR EXAMPLE), TRANSPORTING FOOD BY AIR IS ON THE RISE. FLYING FOODS INCLUDE ASPARAGUS, AVOCADOS, CHERRY TOMATOES, CITRUS, LETTUCE, SPECIALIZED AND PROCESSED MEATS AND FRUITS, STRAWBERRIES, AND SEAFOOD.

- **Stock up.** If you must drive alone, make it count. Buy for the long term and pack your car full.

- **Combine trips.** Shop for food on your trip to the bank, post office, or whatever else is near.

- **Get fit.** Grab your bike, hook up the old bike trailer, and pedal to the store or farmer's market.



FIGURE 8.2 CAN OF COLA CARBON FOOTPRINT
This chart from the Carbon Trust illustrates the carbon footprint of a can of cola, from production to disposal, and its intensive fossil fuel requirements.

Source: Carbon Footprints in the Supply Chain: The Next Step for Business (2006).



Organically grown vegetables are offered at area farmer's markets and in several grocery stores.

Minimize Processing

- **Eat whole foods.** If you know exactly what's in it by looking at it, chances are it's a whole food. Processing and packaging foods are energy-intensive practices, and we're surrounded by a multitude of highly processed, packaged products. If we shop for whole foods like fresh vegetables, meats, and grains, instead of the packaged and processed foods that are often high in calories and low in nutrition, we reduce energy use. Of the 16% of U.S. energy that goes to food production, nearly a third is used for processing.⁶ You just can't go wrong at farmer's markets for whole foods. In grocery stores, avoid the inner aisles and stick to the perimeter. That's where you'll find breads, dairy, meat, and produce.
- **A diet for health.** A vegetarian or vegan lifestyle can reduce our emissions dramatically. Even cutting one meat meal a week makes a difference. A high-meat diet has been compared to the emissions of a Chevy Suburban; a vegetarian diet,

including dairy and eggs, to the emissions of a Toyota Prius.⁷

Why? Because cows raised for dairy and meat belch methane (which has 21 times more warming potential than CO₂) as their four guts digest the fibrous grains that make up their diet.

Cows raised on corn belch even more methane than grass-fed cows. According to the Worldwatch Institute, this methane makes up 16% of the overall methane emissions produced per year. Data from the U.S. Department of Energy supports that statistic: 94% of total methane emissions from agriculture are directly related to livestock.⁸

Feedlots (a type of confined-animal feeding operation) rely on antibiotics and grain production to increase meat yields, further increasing demands for fossil fuels.

Much large-scale meat production occurs in areas that have been recently clearcut to make way for beef. That means fewer trees to absorb (sequester) CO₂ through photosynthesis.

SHIFTING LESS THAN ONE DAY PER WEEK'S WORTH OF CALORIES FROM RED MEAT AND DAIRY PRODUCTS TO CHICKEN, FISH, EGGS, OR A VEGETABLE-BASED DIET REDUCES MORE GREENHOUSE-GAS EMISSIONS THAN BUYING ALL LOCALLY SOURCED FOOD.

It takes many pounds of grain or corn to produce one pound of beef, which actually yields less energy for us than eating the grain itself.

This means more cleared land and more fossil fuels to grow the grain or corn that feeds most cows.

Beat Heat with Local Meat

When you do choose meat, choose wisely. Local small-scale ranchers are here to help. Here are a couple:

- Northwest Homegrown Ranch Meats, 13400 D'Arcy Rd., Bow. (360) 766-4273. Grass-fed, free-range cooperative.
- Skagit River Ranch, 28778 Utopia Road, Sedro Woolley. (360) 856-0722.

SKAGIT POTATO LEEK SOUP

- 1-1/2 pounds small boiling potatoes, Hedlin Farms Red Bliss
- 2 Uprising Organics leeks, white and tender green parts
- 3 T unsalted Golden Glen Creamery butter
- 1-1/2 quarts water
- Sea salt to taste
- 2 T Golden Glen heavy cream
- Handful snipped parsley from your herb garden

Quarter, rinse, and drain the potatoes. Trim roots off of leeks, cut lengthwise, rinse and soak in cold water for 5 minutes. Chop coarsely and set aside. Melt 2 T butter in soup pot, add leeks, and cook until tender, 3 minutes. Add the water, salt, and potatoes. Cover and simmer for 35 minutes. Puree soup in blender or food processor and return to pot. Bring to a boil. Turn off, add the cream and remaining butter and the parsley. Serve.

That's Fishy

Although many focus on the impact of red meat on the global climate, deep-sea fishing also requires large amounts of fossil fuel in catching, storing, and transporting fish from sea to market. In fact, a University of Chicago study found that a diet rich in fish nearly equaled the emissions associated with a red-meat diet.⁹

In addition, because many of the world's fisheries have collapsed due to overfishing, fishing methods have become increasingly invasive and destructive on marine ecosystems.



Local fishing boats in Skagit Bay

A clever little card you can stick in your wallet will help you choose your fish wisely. Monterey Bay Aquarium's Seafood Watch Pocket Guide lists sustainably caught fish. Check with your nearest People for Puget Sound, Nooksack Salmon Enhancement Group, or Skagit Fisheries Enhancement Group to pick one up, or download one to cut and fold from the following site: www.montereybayaquarium.org/cr/cr_seafoodwatch/download.aspx.

Your Health = Planet Health

You may have noticed that all of these suggestions are not only good for the planet, they're good for your health!

All of the top diseases, in our counties and our country, are diet-related. Heart disease, cancer, diabetes, and allergies are nonexistent in 14 cultures untouched by processed, sweetened, salted, homogenized, hormone-added, genetically modified, artificially colored and preserved western foods, regardless of how much meat is eaten there.¹⁰

IN A NUTSHELL, PRESERVE YOUR HEALTH AND THE PLANET'S BY:

- *Buying only what you need; wasted food equals pointless emissions*
- *Supporting organic agriculture*
- *Buying local foods in season and learning about food distribution in your area*
- *Leaning toward a vegetarian lifestyle*
- *Avoiding processed and packaged goods*
- *Cutting shopping emissions by biking, walking, using public transport, or combining errands*
- *Cooking efficiently*
- *Knowing the source of your meat and fish*

Additional Resources

Slow Food Skagit:
www.slowfoodskagit.com

Leopold Center for Sustainable Agriculture
www.leopold.iastate.edu

Earth Save International (plant-based diets)
www.earthsave.org

Local Harvest Community-Supported Agriculture:
www.localharvest.org/csa

The Omnivore's Dilemma: A Natural History of Four Meals by **Michael Pollan**. An excellent book that examines many facets of food-related issues.

Christopher L. Weber and H. Scott Matthews, "Food-Miles and the Relative Climate Impacts of Food Choices in the United States." *Environ. Sci. Technol.*, 2008, 42 (10), 3508–3513.

Nooksack Salmon Enhancement Group:
www.n-sea.org



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2 Ibid.

3 Reported by the scientists at the Met Office's Hadley Center in Exeter, England, Dec. 16, 2008 Global Temperature, www.metoffice.gov.uk.

4 IPCC 2007, op.cit.

5 The World Meteorological Organization and the United Nations Environment Programme established the Intergovernmental Panel on Climate Change in 1988 to provide credible assessments of scientific knowledge of global climate as a backdrop for international agreements concerning climate change. The body's first report, issued in 1990, served as a foundation for the U.N. Framework Convention on Climate Change. Subsequent reports were published in 1995 and 2001. One of the largest scientific enterprises in history, the new Fourth Assessment Report (AR4) presents the work of 1,200 scientific authors and 2,500 scientific expert reviewers from 130 countries. AR4 provides "a comprehensive and rigorous picture of the global present state of knowledge of climate change."

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“Let us accept the current challenge – the next great energy transition – as an opportunity to re-imagine human culture from the ground up, using our intelligence and our passion for the welfare of coming generations and for the integrity of nature’s web as our primary guides.”

— Richard Heinberg,
Author and educator

***We believe the citizens of
Skagit and Whatcom counties have
the ability to make the sustainable
lifestyle choices that will lead
to a healthier, happier world.***

***We need to do this for ourselves,
for all future generations,
and for the other living beings who share
this unique and beloved place called Earth.***

***To that end, we give you this book
to use and to share. Choice is powerful.
Together, let’s choose wisely and help lead
the way toward a more resilient future.***

The time to begin is now!



“Let ours be a time remembered for the awakening of a new reverence for life, the firm resolve to achieve sustainability, the quickening of the struggle for justice and peace, and the joyful celebration of life.”

— The Earth Charter, 2001
An international declaration of sustainability principles

