Hopewell Township Living Greener Resource Guide

Introduction

The *Living Greener Resource Guide* was prepared by the Rutgers Center for Green Building to help inform residents of Hopewell Township about green living practices that are easy to implement in typical residential settings. This guide is broken down into five sections including Energy Resources, Water Conservation Resources, Waste Reduction Resources, Lawn and Garden Care Resources, and Healthy Home Indoor Environment Resources.[1]

Energy Resources

The positives associated with energy, which enables home appliances, lighting, heating and cooling, are indisputable, but energy is often wasted as a result of outdated appliances and practices leading to preventable pollution and expense. Modern technology has supplied us with new, innovative appliances that are lighter, faster, cleaner and more efficient. Although some of these technologies have an added up-front cost, they pay for themselves over time, sometimes by a large factor. Additional opportunities to make efficient financial and environmental decisions are found in simple changes to routine habits and design decisions taken when renovating a home. Examples of these follow.

10 Easy-to-Implement Energy Saving Tips

1) Conduct a home energy audit to determine the largest savings potential.
2) Use a programmable thermostat to control the heating and cooling in your home.
3) Turn down the water heater thermostat to 120º F.
4) Use energy-saving settings on refrigerators, dishwashers, washing machines, and clothes dryers.
5) Dry your laundry on a clothes line or drying rack.
6) Save 100-kilowatt hours (and $12) a month by plugging appliances and electronics into power strips and turning them off when they are not in use.[2]
7) Change your computer setting to power save mode when not in use. Better yet, turn it off!
8) Install energy efficient lighting such as compact fluorescent light bulbs (cfl) the next time light bulbs burn out. You'll save electricity and replace bulbs less frequently.
9) Turn off incandescent lights when leaving a room and cfls when not returning for more than 15 minutes.
10) Lower the amount of gas or electricity used to heat and cool your home. In summer, open windows at night to let in cool air and close both windows and shades during the day to keep out

[1] The ideas presented in this guide are considered best practices and easy-to-implement actions that by and large were deemed a good fit for residents of Hopewell Township. However, the suggestions are in no way intended to be a substitute for seeking professional advice. In some cases, users should check with Hopewell Township to make sure that actions comply with local land use codes and regulations.

[2] www.popularmechanics.com

heat. During winter, do the opposite. Open shades in the morning to capture sunlight and close them at night to retain the heat.

Appliances

In a typical U.S. home, appliances and home electronics are responsible for about 20% of the energy bill. These appliances and electronics include clothes washers and dryers, computers, refrigerators and freezers, home audio equipment, room air conditioners, televisions, dvd players, and water heaters.[3] When purchasing an appliance, cost considerations include both the up front cost of the purchase and the operating cost through its lifetime, which can be many times greater than the initial purchase cost.

The best way to reduce energy consumption by home appliances is to look for the EnergyGuide and ENERGY STAR® labels. The Federal Trade Commission requires EnergyGuide labels on most home appliances, but not stove ranges and ovens or home electronics, such as computers, televisions, and home audio equipment. EnergyGuide labels provide an estimate of a product's energy consumption or energy efficiency. They also show the highest and lowest energy consumption or efficiency estimates of similar appliance models. ENERGY STAR labels appear on appliances and home electronics that meet strict energy efficiency criteria established by the U.S. Department of Energy and U.S. Environmental Protection Agency. The ENERGY STAR labeling program includes most home electronics and appliances except for water heaters, stove ranges, and ovens.

For more information on purchasing energy efficient appliances visit the following websites:

- *U.S. Department of Energy, "A Consumer's Guide to Energy Efficiency and Renewable Energy"*
  http://www.eere.energy.gov/consumer/
- *American Council for an Energy Efficient Economy, "Home Energy Checklist for Action"*
  http://www.aceee.org/consumerguide/checklist.htm
- *Energy Star Appliances*
  http://www.energystar.gov/index.cfm?c=appliances.pr_appliances
- *Alliance to Save Energy*
  http://www.ase.org/content/article/detail/4050
- *New Jersey Clean Energy Program- Online Home Energy Analysis (Energy Audit)*
  http://www.njcleanenergy.com/residential/tools-and-resources/home-energy-analysis/online-analysis/online-home-energy-analysis

[3] US DOE, *Appliances and Home Electronics.*
http://www.eere.energy.gov/consumer/your_home/appliances/index.cfm/mytopic=10020

Lighting

Lighting upgrades are a high-return, low-risk investment. Residents can improve the lighting efficiency of their homes by installing dimmer switches, motion sensor lights, compact florescent lights (cfls), solar powered lights, and light-emitting diodes (LEDs). In order to save the most energy and money, the most frequently used fixtures or the light bulbs in them should be replaced with energy-efficient models. The five highest use fixtures in a home are typically kitchen ceiling lights, living or family room table and floor lamps, and outdoor porch or post lamps. ENERGY STAR qualified lighting fixtures and replacement bulbs can be found at home improvement and hardware stores, lighting showrooms, and other retail stores, including on-line outlets. You can also find retailers in the Mercer County area by visiting the official ENERGY STAR website listed below.[4]

Residents can also improve lighting efficiency by considering implementing more daylighting techniques when renovating a home. When properly designed and effectively integrated with the electrical lighting system, daylighting can offer significant energy savings by offsetting a portion of the electric lighting load. A related benefit is the reduction in cooling capacity and use by limiting internal heat sources. Windows also provide visual relief, contact with nature, time orientation, opportunities for ventilation, and emergency egress.[5]

For more information on energy efficient lighting visit the following websites:

- *U.S. Department of Energy, "A Consumer's Guide to Energy Efficiency and Renewable Energy"* http://www.eere.energy.gov/consumer/
- *Energy Star Lighting* http://www.energystar.gov/index.cfm?c=lighting.pr_lighting
- *Edison Electric Institute* http://www.eei.org/industry_issues/retail_services_and_delivery/wise_energy_use/programs_and_incentives/progs.pdf
- *U.S. Department of Energy, "Daylighting"* http://www.eere.energy.gov/buildings/info/design/integratedbuilding/passivedaylighting.html

[4] Energy Star, *Light Bulbs and Fixtures*. http://www.energystar.gov/index.cfm?c=lighting.pr_lighting
[5] US DOE, *Building Technologies Program.* *http://www.eere.energy.gov/buildings/info/design/integratedbuilding/passivedaylighting.html*

Heating and Cooling

According to the U.S. Department of Energy (DOE), heating and cooling collectively account for about 56% of energy use in a typical U.S. home, making it the largest energy expense for most homeowners. Heating and cooling systems in the United States together emit 150 million tons of carbon dioxide into the atmosphere each year, adding to global climate change. They also generate about 12% of the nation's sulfur dioxide and 4% of the nitrogen oxides, the primary ingredients in acid rain.

No matter what kind of heating, ventilation, and air-conditioning system installed, homeowners can save money and increase comfort by properly maintaining and upgrading equipment. This, combined with appropriate insulation, air sealing, and thermostat settings, residents can cut energy use for heating and cooling, and reduce environmental emissions, by 20% to 50%.[6]

Heating and Cooling Tips[7]

- Set thermostat as low as is comfortable in winter and as high as is comfortable in summer.
- Clean or replace filters on furnaces once a month or as needed.
- Clean warm-air registers, baseboard heaters, and radiators as needed; make sure they're not blocked by furniture, carpeting, or drapes.
- Bleed trapped air from hot-water radiators once or twice a season.
- Turn off kitchen, bath, and other exhaust fans within 20 minutes after use; when replacing exhaust fans, consider installing high-efficiency, low-noise models.
- During the heating season, keep drapes and shades on south facing windows open during the day to allow sunlight to enter and closed at night to reduce chill.
- During the cooling season, keep window coverings closed during the day to prevent solar gain.
- Select energy efficient products when buying new heating and cooling equipment. Contractors should be able to provide energy fact sheets for different types, models, and designs for energy usage comparison. Look for high Annual Fuel Utilization Efficiency (AFUE) ratings on furnaces. The national minimum is 78% AFUE, but there are ENERGY STAR models on the market that exceed 90% AFUE.
- Look for high Seasonal Energy Efficiency Ratio (SEER) air conditioners. The current minimum is 13 SEER for central air conditioners. ENERGY STAR models are 13 SEER or more.

For more information on reducing energy consumption related to heating and cooling visit the following websites:

- *U.S. Department of Energy, "A Consumer's Guide to Energy Efficiency and Renewable Energy"*
  http://www.eere.energy.gov/consumer/
- *American Council for an Energy Efficient Economy, "Home Energy Checklist for Action"*
  http://www.aceee.org/consumerguide/checklist.htm
- *Energy Star, "Heat and Cool Efficiently"*
  http://www.energystar.gov/index.cfm?c=heat_cool.pr_hvac

[6] US DOE, Energy Savers http://www1.eere.energy.gov/consumer/tips/heating_cooling.html
[7] US DOE, Energy Savers http://www1.eere.energy.gov/consumer/tips/heating_cooling.html

Renewable Energy

The United States currently relies heavily on *nonrenewable* fossil fuels like coal, oil, and natural gas for its energy. Burning of fossil fuels is a significant source of carbon dioxide, sulfur dioxides and nitrogen oxides in our atmosphere, and their production draws on finite resources that will eventually dwindle, becoming too expensive or environmentally damaging to retrieve. In contrast, *renewable energy* resources—such as wind, biomass, geothermal, hydroelectric, and solar energy—are constantly replenished and will never run out.

Solar Energy- Most renewable energy comes either directly or indirectly from the sun. Sunlight, or solar energy, can be used directly for generating electricity and heating water.

- **Solar water heaters.** Solar water heating is a reliable and renewable energy technology used to heat water. Sunlight strikes and heats an "absorber" surface within a "solar collector" or a storage tank. Either a heat-transfer fluid or the actual potable water to be used, flows through tubes attached to the absorber and "absorbs" heat. The heated water is stored in a separate tank or a conventional water heater tank until needed. If additional heat is needed, it is provided by electricity or fossil-fuel energy by the conventional water-heating system. Home solar water heating systems cost on average $3000 to $6000 and can cut the average family's energy costs to heat water by 20% to 40%.

  For more information, see *Whole Building Design Guide: Solar Water Heating* http://www.wbdg.org/resources/swheating.php

- **Solar panels.** Solar cells convert one form of energy (sunlight) into another form of energy (electricity). When the sunlight is reduced or stopped, for example, when a cloud passes in front of the sun or when the sun goes down in the evening, the conversion process slows down or stops completely. When the sunlight returns, the conversion process resumes. Solar cells do not store electricity and therefore, when the conversion process slows, a solar electric system needs some form of energy storage, usually batteries, to draw upon instead of the solar cells.

  While solar rebates are no longer being offered for residential projects in New Jersey due to overwhelming demand, registrations are still being accepted for the Solar Renewable Energy Certificate (SREC) Program through 2008. All solar system owners in New Jersey with grid-connected generators can participate in the SREC program. Each time a solar system generates10000kWh (1MWh) of electricity, an SREC is issued which can then be sold or traded, helping individuals finance and invest in clean, emission free solar power.

  For more information, visit the *NJ Clean Energy* website (http://www.njcleanenergy.com/) and click on the *Solar Renewable Energy Certificate Program link (SREC)* or email njsrec@cleanpowermarkets.com

Wind Energy- The terms "wind energy" or "wind power" describe the process by which wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity.

- **Small wind systems.**[8] Homeowners have the option to purchase a small wind system. "Small wind" refers to wind-powered electric systems sized for homes, farms, and small businesses. These turbines are defined as 100 kilowatts in capacity and below.

  For more information, see the *New Jersey Anemometer Loan Program*
  http://www.rowan.edu/colleges/engineering/clinics/cleanenergy/anemometer_homepage.htm

Geothermal Energy- The Earth's heat, which constantly flows outward from its core, provides an enormous source of energy called *geothermal energy*.

- **Geothermal heat pump.** Geothermal heat pumps (sometimes referred to as GeoExchange, earth-coupled, ground-source, or water-source heat pumps) have been in use since the late 1940s. Geothermal heat pumps (GHPs) use the constant temperature of the earth as the exchange medium instead of the outside air temperature. According to the EPA, geothermal heat pumps can reduce energy consumption and corresponding emissions up to 44% compared to air-source heat pumps and up to 72% compared to electric resistance heating with standard air-conditioning equipment.

  For more information, see:
  - *U.S. Department of Energy: Consumer's Guide to Energy Efficiency and Renewable Energy- Geothermal Heat Pumps.*
    http://www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12640
  - *Energy Star Geothermal Heat Pumps*
    http://www.energystar.gov/index.cfm?c=geo_heat.pr_geo_heat_pumps
  - *PATH (Partnership for Advancing Technology in Housing) Technology Inventory*
    http://www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=754

Biomass Energy- Energy that is stored in green plants and other organic matter is referred to as biomass. Biomass facilities burn wood, agricultural wastes and/or methane gases from landfills to spin a turbine that generates electricity. Using biomass in this way helps reduce the amount of material that goes to landfills and reduces the amount of greenhouse gases that would otherwise be released into the atmosphere. Before the 20th Century, 90% of Americans burned wood to heat their homes. Today, residents can choose from a new generation of wood- and pellet-burning appliances that are cleaner burning, more efficient, and powerful enough to heat many average-sized, modern homes.

[8] Residents should consult Hopewell Township Land Use Code to see if an ordinance to allow small wind turbines has been passed. In 2007, NJ Board of Public Utilities' New Jersey Small Wind Working Group developed a NJ Small Wind Model Ordinance for use by NJ municipalities.

- **Pellet burning appliances**.[9] Pellet stoves burn small pellets made from compacted sawdust, wood chips, bark, agricultural crop waste, waste paper, and other organic materials. Some pellet fuel appliances can burn a wide variety of biomass fuels, including nutshells, corn kernels, small wood chips, barley, beet pulp, sunflowers, dried cherry pits, and soybeans. They are more convenient to operate and have much higher combustion and heating efficiencies than ordinary wood stoves or fireplaces. As a consequence of this, they produce very little air pollution. In fact, pellet stoves are the cleanest of solid fuel-burning residential heating appliances. With combustion efficiencies of 78% to 85%, they are also exempt from United States Environmental Protection Agency (EPA) smoke-emission testing requirements. Pellet stoves have heating capacities that range between 8,000 and 90,000 Btu per hour. They are suitable for single family homes, apartments and condominiums.

  For more information, see *U.S. Department of Energy: Consumer's Guide to Energy Efficiency and Renewable Energy- Wood and Pellet Burning Stoves.* *http://www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12570*

Hydroelectric Energy- The energy produced from flowing water, called hydropower or hydroelectric power, is the oldest and most readily available form of renewable energy. Residents that have access to flowing water on their property may be able to use a microhydropower system to generate their own electricity.

- **Microhyropower systems**. Microhydropower systems usually generate up to 100 kilowatts (kW) of electricity. Most of the hydropower systems used by homeowners, including farmers, qualify as microhydropower systems. A 10-kilowatt microhydropower system can generally provide enough power for a large home.

Renewable Energy Providers- Residents can support renewable energy in New Jersey without installing their own solar panels, microhydropower systems, or wind turbines by signing up for the CleanPower Choice Program from the New Jersey Board of Public Utilities' Office of Clean Energy. The program allows residents to choose a clean, renewable energy provider that supplies energy from sources including solar, wind, geothermal, and sustainable biomass.

For more information on renewable energy and purchasing renewable energy and systems for your home, visit the following websites:

- *New Jersey's Clean Energy Program* http://www.njcleanenergy.com/residential/programs/
- *National Renewable Energy Laboratory* http://www.nrel.gov/learning/
- *U.S. Department of Energy, "Renewable Energy"* http://www.eere.energy.gov/consumer/renewable_energy/

[9] Before purchasing and installing a pellet stove, refer to the 2006 International Residential Code New Jersey Edition under sections R1003.11.6 and R1003.11.1 for information on proper installation for pellet burning appliances.

Water Conservation Resources

Global water consumption rose almost tenfold in the last century, and many parts of the world are now reaching the limits of their supply. Populations continue to increase while water supplies dwindle. To highlight this growing problem, the United Nations (U.N.) declared 2003 The International Year of Freshwater. According to the U.N., if current trends continue, "two out of every three people on earth will suffer moderate to severe water shortages in little more than two decades from now. Globally, one in six people still have no regular access to safe drinking water, and more than twice that number (2.4 billion people) lack access to adequate sanitation facilities."

The problem is local as well as global. Water is in demand for a myriad of uses: recreation, mining and industry, irrigation, and riparian habitat preservation, among others. In the U.S., almost 90 gallons per day of drinking water are used per capita.[10] Residents can do their part to conserve water by making changes to some of their routine habits. Examples of these follow.

10 Easy–to-Implement Water Conservation Tips

1) Conduct a Home Water Audit at www.wateruseitwisely.com
2) Test toilets for "invisible leaks" by placing a few drops of food coloring or a dye tablet into the toilet's tank. Wait a few minutes and if the coloring appears in the bowl, the toilet is leaking and needs to be fixed.
3) Fix leaky faucets.
4) Retrofit your house with high-efficiency toilets, which use 60% less water than pre-1994 models and can save you roughly $100 a year.[11]
5) Don't run water when brushing your teeth. Every minute you reduce your faucet use saves 3 gallons of water.
6) Use your dishwasher and washing machines only for full loads.
7) Use a broom instead of a hose to clean your driveway or sidewalk.
8) Designate one glass for your drinking water each day to cut down on dishwasher cycles.
9) Install low-flow fixtures such as faucets and showerheads.
10) Use the air dry option on dishwashers.

For additional suggestions about conserving water at home visit the following websites:

- *City of Cambridge Water Department*
  http://www.cambridgema.gov/CWD/
- *Greener Choices, Consumer Reports*
  http://www.greenerchoices.org/products.cfm?product=watersaving
- *Water Conservation, Energy Star*
  http://www.energystar.gov/index.cfm?c=products.pr_protect_water_supplies

[10] EPA. Water on Tap- what you need to know http://www.epa.gov/safewater/wot/pdfs/book_waterontap_full.pdf page 10
[11] www.popularmechanics.com

Waste Reduction Resources

According to New Jersey Future, New Jersey's solid waste generation has steadily increased from 11.4 million tons in 1985 to 21.5 million tons in 2005.[12] To put that number in perspective, New Jersey generates enough trash to fill 5,600 garbage trucks per day. On a per-capita basis, New Jersey residents produce about 5.4 pounds of trash per day—more than twice the daily output of most industrialized countries.[13] Trash poses significant costs to the environment, no matter how it is disposed of. While burning it in one of the state's five incinerators produces energy, it also increases air pollution and greenhouse gas emissions. Alternately, dumping trash in one of the state's 12 active commercial landfills poses a series of adverse long-term impacts on water and air quality. For instance, biodegradation can emit hazardous gases for centuries, among them methane—a greenhouse gas 21 times more potent than carbon dioxide.[14] Preventing generation of waste in the first place is the most preferred method of waste management and residents can do this by practicing the 3 Rs: Reduce, Reuse, and Recycle. Examples of these follow.

10 Easy–to-Implement Waste Reduction Tips

REDUCE

1) Avoid products that are packaged for single use. Buy items in bulk and transfer the products to your own reusable containers.
2) Carry a mug with you wherever you go for takeout beverages.
3) For small purchases, skip the shopping bag. For larger purchases, bring your own.

REUSE

4) Switch from disposable to reusable products: food and beverage containers, cups, plates, writing pens, razors, towels, shopping bags, batteries, etc.
5) Buy products that will last and take care of them.
6) Join in with neighbors to purchase infrequently used products such as lawn mowers, ladders, etc.
7) Buy, sell or donate used goods instead of throwing them out.

RECYCLE

8) Create designated holding "bins" for each type of recycled product and place in convenient locations in your home/garage.
9) Select products made from recycled materials.
10) Compost yard trimmings and food scraps.

For more information on how to reduce, reuse and recycle, see:

- *Mercer County Improvement Authority*
  http://www.mcia-nj.com/recyclingcurbside.html
- *EPA's Consumer Guide for Reducing Solid Waste*
  http://www.epa.gov/epaoswer/non-hw/reduce/catbook/problem.htm
- *Freecycle*
  http://www.freecycle.org/

[12] New Jersey Future (2007). New Jersey Facts, Oct 16, 2007. www.njfuture.org
[13] New Jersey Future
[14] U.S. Environmental Protection Agency: Methane http://www.epa.gov/methane/scientific.html

Composting Resources

Backyard composting is an easy and inexpensive way to dispose of yard waste such as grass clippings, fallen leaves and small prunings. [15] By mixing yard waste in a pile with enough air and water to start the natural decaying process, compost with valuable nutrients for plants is formed.[9]

In season, leaves may account for over half the municipal solid waste collected and on a yearly basis may comprise 5% to 30% of the total municipal solid waste stream.[16] From an environmental perspective, composting saves valuable landfill space, reduces costs and concerns associated with incineration, and produces compost which can be used to improve soil.

Follow these simple steps to establish a compost pile:

1) Collect fall leaves in a pile.
2) Keep pile moist but not soggy.
3) Mix pile periodically.

For more information on composting visit the following websites:

- *Sustainable Princeton: Starting a Compost Pile*
  http://njssi.org/princeton/green_challenge.asp?Level2ItemID=2
- *Rutgers Backyard Leaf Composting*
  http://njaes.rutgers.edu/pubs/publication.asp?pid=fs074
- *Mercer County Compost Center*
  http://www.mgofmc.org/compostbins.html
- *US EPA, "Compost"*
  http://www.epa.gov/compost/
- *The Lazy Composter*
  http://www.guvswd.org/compost

[15] NJSSI, *Sustainable Princeton*. http://njssi.org/princeton/green_challenge.asp?Level2ItemID=2
[16] NJ DEP. Leaf composting manual for NJ municipalities. http://www.nj.gov/dep/dshw/rrtp/compost/intro.htm

Green Purchasing

Green purchasing includes the purchase of products that have a lesser or reduced effect on human health and the environment when compared with competing products that serve the same purpose. Many factors are taken into account when making these comparisons, such as:

1) Raw materials, including energy and water, used in the manufacture of the product
2) Type of production, (i.e., use of cleaner production processes)
3) Packaging and method of distribution
4) Distance of transport/local production

Price and performance are also important factors to consider and are critical determinants for consumers.[17] Green purchasing practices can be incorporated into your buying habits by researching products and following some simple suggestions listed below.

1) Buy recycled
2) Buy in bulk or multi-packs
3) Buy used
4) Trade with friends
5) Use canvas shopping bags
6) Look for the ENERGY STAR label when purchasing electronics

For more information on green purchasing visit the following websites:

- *Building Green, "Green Products"*
  http://www.buildinggreen.com/menus/index.cfm
- *EPA, "Green Purchasing"*
  http://www.epa.gov/epaoswer/osw/specials/funfacts/shopping.htm
- *New American Dream*
  http://www.newdream.org/buy/
- *Green Seal*
  http://greenseal.org/
- *Green Purchasing: A Guide for Local Governments and Communities*
  http://www.state.nj.us/dep/dsr/bscit/epp.pdf
- *National Geographic: The Green Guide*
  http://www.thegreenguide.com/

[17] NJ DEP, *Green Purchasing: A Guide for Local Governments and Communities*, http://www.state.nj.us/dep/dsr/bscit/epp.pdf.

Lawn and Garden Care Resources

All residents can have a profound impact on the environmental health of Hopewell Township. By making smart decisions about lawn maintenance and landscaping techniques, water quality and local habitat can be improved. Environmentally responsible landscaping increases native plant diversity, provides food, cover, and nesting areas for wildlife, and reduces stormwater runoff that dumps sediment and pollutants into local rivers and streams.[18]

Easy–to-Implement Lawn and Garden Care Tips

1) Plant native species and/or plants.
2) Plant bushes, shrubs and trees that bear berries or other fruits for birds.
3) Don't use herbicides and pesticides.
4) Use companion plants in your vegetable plot.
5) Choose plants that thrive in local soil conditions and therefore do not need fertilizers or extra watering to survive.
6) Use mixed grasses or herbs such as chamomile for your lawn.
7) Keep a compost pile.
8) Grasscycle, i.e. leave your grass clippings on the lawn.
9) Mulch flower beds and trees with 3 inches of organic material.
10) Plant a tree and save energy and money by shading your houses in the summer.

Conventional Lawn Alternatives and Organic Lawns

Environmental concerns across the nation have spurred the movement to reduce the size of lawns or replace grass with other plants. Non-native grasses put an unnecessary strain on water resources while synthetic fertilizers and pesticides used to keep grass green and weed-free are degrading water quality and harming non-target animals and plants.

There are a number of viable strategies that can be employed to reduce the negative environmental impacts of a conventional lawn. To begin, native meadow and prairie plantings can be logical substitutes for conventional turf grass because they require less water. They can still be mowed at a low height to preserve the accepted neat appearance of a lawn or create a soft playing surface. Residents can also consider reducing the size of their lawns by allowing part of the yard to return to natural habitat and still maintain a small area as a conventional lawn.[19]

Many residents enjoy maintaining a conventional lawn however, and may not want to reduce its size or replace the vegetation with an alternative grass. These residents can still help to reduce some of the

[18] Chesapeake Bay Foundation, *In Your Backyard: Bay-Friendly Lawns.* http://www.cbf.org/site/PageServer?pagename=act_sub_yourpart_yard_landscaping.
[19] Brooklyn Botanic Garden, *Easy Lawns.* http://www.bbg.org/gar2/topics/sustainable/handbooks/lawns/index.html

negative environmental impacts of lawn care by employing the following organic lawn maintenance techniques:[20]

1) Mow high – The simplest way to help lawns grow up healthy and dense is to adjust the cutting height to the highest setting and cut grass to a height of 3-4 inches.
2) Leave clippings on the lawn - As grass clippings decompose, they contribute valuable nitrogen to the soil - almost 2 pounds of nitrogen per 1,000 square feet of soil each season or about half of the lawn's annual fertilizer needs. They also add organic matter and provide a variety of other benefits to the soil and grass.
3) Forgo fertilizers – There will be no need to use fertilizers if grass is mowed often (but not too low) with a sharp blade and grown in soil that's rich in organic matter and biological activity.

For more information on organic lawn best management practices visit the following websites:

- *Brooklyn Botanic Garden - "Easy Lawns"* http://www.bbg.org/gar2/topics/sustainable/handbooks/lawns/index.html
- *Organic Gardening - "Organic Lawn Care"* http://www.organicgardening.com/feature/0,7518,s1-4-77-142,00.html
- *NOFA Guide to Organic Lawn Care* http://www.ctnofa.org/documents/OrganicLandCareGuide_000.pdf

Water Efficient Landscaping and Native Plants


Although New Jersey has relatively abundant water, fluctuations in precipitation do cause periodic shortages. In addition, the demands of a growing population are straining some water supplies. In rapidly growing communities, summertime water shortages are no longer uncommon and restricted water use, particularly outdoors, is increasingly familiar. New Jersey's most easily exploited water supplies have already been developed. Understandably, concerns about the environment and rising labor and capital costs have delayed additional development. For these reasons, water conservation looms ever more important, and our use of water to irrigate landscaping becomes an appropriate subject for examination. Experts agree that properly designed and managed landscaping can save large amounts of water. By wisely using water outdoors, we can reduce peak water demand, prevent drops in water pressure that endanger a community's fire-fighting ability, eliminate watering restrictions, and save energy needed to pump water into storage areas around town.[21]

One way to improve the water efficiency of landscaping is to use native plants, which not only require minimal watering, but are also better acclimated to the local environment, reduce the need for fertilizers and pesticides, and eliminate the problems associated with the introduction of invasive species. Because native plants require minimal maintenance, these species limit the need for upkeep with fossil fuel powered equipment, saving valuable natural resources and funds.

[20] Organic Gardening, *Organic Lawn Care.* http://www.organicgardening.com/feature/0,7518,s1-4-77-142,00.html
[21] NJ Agricultural Experiment Station, *Landscaping for Water Conservation.* http://njaes.rutgers.edu/pubs/publication.asp?pid=E080

For more information on water efficient landscaping and native plants visit the following websites:

- *Landscaping for Water Conservation: A Guide for New Jersey*
  http://njaes.rutgers.edu/pubs/publication.asp?pid=E080
- *Native Plant Society of New Jersey*
  http://www.npsnj.org/

Backyard Habitats

Wildlife habitat restoration is especially needed in locations where commercial and residential development has degraded natural ecosystems. Creating habitat benefits the entire community of people, plants and wildlife through the creation of sustainable landscapes that require little or no pesticides, fertilizers and excess watering. These landscapes help keep water and air resources clean and are healthier for people and the environment. Residents are able to create backyard habitats for local wildlife by providing the four basic elements that all wildlife need: food, water, cover and places to raise young. In order to create a backyard habitat, follow the steps below.[22]

1) Make a map of your backyard, showing:
   a. plants that might provide food (such as acorns, nuts, berries, seeds, buds, or nectar) for wildlife
   b. birdfeeders
   c. birdbaths or other water sources
   d. plants that provide shelter (such as dense shrubs, evergreens, brush piles)
   e. places for birds and wildlife to raise their young (trees, shrubs, birdhouses)
2) Think about what types of wildlife you want to attract to your yard. Research the types of plants and trees that will attract them (i.e., provide food, shelter, and/or places to raise young). The National Wildlife Federation's (NWF's) Backyard Habitat web site is a good place to start: www.nwf.org/backyardwildlifehabitat.
3) If you don't have them already, plant some of your favorite wildflowers, shrubs, and/or trees that will attract wildlife and provide food, shelter, and places to raise young.
4) Make sure that your backyard has a year-round source of water. This can be as simple as the bottom of a clay pot (for the summer) and a basic heated birdbath for winter months.

For additional information on this topic and to find out how to certify the entire Township as a Community Wildlife Habitat under the National Wildlife Federation, visit the following websites:

- *National Wildlife Federation's Backyard Wildlife Habitat*
  http://www.nwf.org/backyard/
- *Burlington Community Wildlife Habitat Initiative*
  http://www.burlingtongardens.org/Burlington_Habitat_Initiative.html

[22] Friends of Burlington Gardens and the Vermont Community Garden Network. *Burlington Community Wildlife Habitat Initiative*. http://www.burlingtongardens.org/Burlington_Habitat_Initiative.html.

Integrated Pest Management

Pesticides, including insecticides, herbicides, rodenticides, and fungicides, are poisonous chemicals designed to kill a variety of plants or animals. Both the active chemical compounds and inert ingredients in pesticides may ultimately be toxic to humans and wildlife.

In general, pesticide use can impose many health and environmental risks. Continued dependence on pesticides has caused the evolution of strains of insects with a high resistance to pesticides. Outbreaks of secondary pests due to the destruction of their natural controls and damaging impacts on wildlife have occurred because of concentrations of pesticides in various food chains. During routine residential applications, pesticides can drift and settle on ponds, laundry, toys, pools and furniture among other household items. They can also make their way into homes when family members and pets pick up toxic residues and track them inside.

Integrated Pest Management (IPM) minimizes environmental impacts by using environmentally friendly methods to control pests. IPM's preventative, monitoring, and controlling techniques serve as an alternative to routine, indiscriminate spraying of chemical pesticides. IPM techniques enhance sustainability of vital natural systems and help promote lawns, trees and shrubs that are more resistant to insects and disease. IPM protects beneficial insects since it uses little or no pesticides. IPM also reduces threats to wildlife and water quality by lessening the amount of chemicals that will reach our drinking and recreational water resources.[23]

For more information on integrated pest management techniques visit the following websites:

- *ANJEC Integrated Pest Management*
  http://www.anjec.org/html/ipm.htm
- *Beyond Pesticides*
  http://www.beyondpesticides.org/
- *Northeastern IPM Center*
  http://northeastipm.org/
- *Pest Management Office of Rutgers Cooperative Extension*
  http://www.pestmanagement.rutgers.edu/
- *IPM Institute of North America*
  http://www.ipminstitute.org/

[23] ANJEC, *Integrated Pest Management.* http://www.anjec.org/html/ipm.htm.

Porous Paving Materials

Impervious surfaces significantly impact water quality because as storm water runs off an impervious surface, it carries pollutants into local water bodies and groundwater sources. Impervious surfaces collect particulate matter from the atmosphere, nitrogen oxides from car exhaust, rubber particles from tires, debris from brake systems, phosphates from residential and agricultural fertilizers, and dozens of other pollutants.

Porous paving materials used for driveways and landscape construction projects can help mitigate the problem of storm water runoff. There are different types of porous paving materials and techniques, which include open-jointed pavers that can be filled with turf or aggregate, "soft" paving materials such as wood mulch and crushed shell, and traditional decking. Other families of porous materials include porous concretes and asphalts, which still provide solid, safe surfaces for foot and vehicle traffic, but allow rainwater to percolate down into subsurface soils.[24]

For more information on the issue of storm water runoff and porous paving materials visit the following websites:

- *Paving Paradise: The Peril of Impervious Surfaces*
  http://www.ehponline.org/members/2005/113-7/ehp0113-a00456.pdf
- *New Jersey Stormwater Best Management Practices Manual*
  http://www.state.nj.us/dep/watershedmgt/DOCS/BMP_DOCS/bmpfeb2004pdfs/feb2004chap9_7.pdf
- *Research Links for Permeable Paving*
  http://www.plantsf.org/Research_PermPavers_0511_Friedel.pdf

[24] Environmental Health Perspectives, *Paving Paradise: The Peril of Impervious Surfaces*.
http://www.ehponline.org/members/2005/113-7/ehp0113-a00456.pdf

Healthy Home Indoor Environment Resources

Indoor environmental quality refers to the quality of the air and environment inside buildings, based on pollutant concentrations and conditions that can affect the health, comfort and performance of occupants - including temperature, relative humidity, light, sound and other factors. Improving indoor environmental quality in an existing home involves renovating and maintaining a house in ways that reduce pollution sources and remove indoor pollutants while ensuring that fresh air is continually supplied and properly circulated.[25]

10 Easy–to-Implement Healthy Home Tips

1) Use non-toxic, biodegradable cleaners.
2) Use low or no volatile organic compound (VOC) paints in home improvement projects.
3) Use renewable materials such as bamboo flooring and non-toxic furniture to avoid off-gassing.
4) Use organic fertilizers and pest control to cut down on the pollutants tracked into your home by pets and people.
5) Use plants to improve indoor air quality.
6) Keep your home well-ventilated by leaving doors between rooms open, opening windows to allow for a good supply of outdoor air, and installing exhaust fans in bathrooms to remove moisture and chemicals from the house.
7) Test your home for radon. www.epa.gov/radon/zonemap/newjersey.htm
8) Test your home for lead. www.nj.gov/dca/dcr/leadsafe/index.shtml
9) Burn only wood in your fireplace--never garbage, plastic, petroleum products or charcoal.
10) Use stainless steel, cast iron and enameled cast iron cookware instead of non-stick pans that when heated above 680 degrees, release toxic fumes.

Green Cleaning

Many standard cleaning products contain and emit harmful chemicals and volatile organic compounds (VOCs). This can be especially dangerous due to the proximity to occupants and the frequency in which these products are used. There are many options for safe, non-toxic cleaning products from environmentally responsible companies. These natural cleaners are free of chemicals, phosphates, artificial colors, fragrance, harsh fumes, and clean well. Concentrated products save on packaging and can save you money. By making informed choices, exposure to unhealthy chemicals and the impact on the environment can be limited.[26]

Further information on these techniques and products can be found by visiting the websites below.

- *Green Home Cleaning Tips* http://www.newdream.org/newsletter/greencleaning.php
- *"Greening the Cleaning"* http://www.dienviro.com/index1.aspx?BD=17793
- *Green Seal Certified Products* http://www.greenseal.org/findaproduct/index.cfm

[25] US EPA, *Green Indoor Environments*. http://www.epa.gov/iaq/greenbuilding/index.html.
[26] USGBC *REGREEN Draft*. Strategy Library, "Indoor Environmental Quality-Use."

- *Seventh Generation*
  http://www.seventhgeneration.com/living_green/toxic_cleaning/cleaning_tips.html
- *NC State University Family and Consumer Sciences*
  http://www.ces.ncsu.edu/depts/fcs/index.html

Low-emitting Materials Selection

Many materials and furnishings found inside the home emit odorous, irritating, or harmful contaminants that cause discomfort to installers and occupants. Some of these materials include paints, coatings, adhesives, carpets, and wood paneling products. When planning home renovation projects, low-emitting products can be chosen to control the level of indoor pollution.

Paints and Coatings: Paints and coatings fall into the following categories: Architectural paints and coatings, anti-corrosive and anti-rust paints, and clear-wood coatings, finishes and stains. Paints and coatings should meet the minimum low volatile organic compound limit established by Green Seal standards.[27]

Carpet Systems: All carpets and carpet cushions should meet testing and product requirements of the *Carpet and Rug Institute's Green Label Plus Program.* In addition, all carpet adhesive should demonstrate a volatile organic compound limit of 50g/L.[28] All carpet suppliers and installers should be aware of these characteristics and able to answer questions about the materials they are selling or installing.

Wood Paneling Products: Ensure that particleboard, medium-density fiberboard (MDF), and hardwood plywood substrates are certified to low formaldehyde emission standards ANSI A208.1, ANSI A208.2, and ANSI/HPVA HP1, respectively. Select composite wood/agrifiber panel products that either contain no added urea-formaldehyde resins or are third-party certified for low formaldehyde emissions.[29]

For more information on purchasing low-emitting materials visit the following websites:

- *Green Seal Certified Products*
  http://www.greenseal.org/findaproduct/index.cfm
- *Building Green, "Green Products"*
  http://www.buildinggreen.com/menus/index.cfm
- *Carpet and Rug Institute's Green Label Plus Program*
  http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/green-label-plus/index.cfm
- *EPA, "Indoor Air Quality for Homes"*
  http://www.epa.gov/iaq/homes/
- *Energy Star, "Indoor Air Package"*
  http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_iap

[27] LEED New Construction 2.2, Low-emitting materials: Paints and Coatings.
[28] LEED New Construction 2.2, Low-emitting materials: Carpet Systems.
[29] NAHB Green Home Guidelines, Indoor Environmental Quality.