



# Green Remodeling

## Tips for Minnesota Homeowners



**R**emodeling an existing home provides an opportunity to reduce home energy demands, reduce home maintenance costs, and increase comfort efficiently and cost-effectively.

By the same token, remodeling, like any building activity, can create waste and pollution. Fortunately, there are a number of steps that can be taken to minimize the ecological impacts and maximize the resource efficiency of remodeling projects, while also creating a healthier and more economical environment in which to live.

Here are some suggestions for “greening” your home renovation efforts. Individuals with allergies and/or chemical sensitivities may want to seek additional or alternative expertise and information.

Inform your contractor (and other building professionals) early on that you want to renovate in an environmentally responsible manner.

**For information on green building**  
contact MPCA's green building specialists, Erin Barnes-Driscoll or Laura Millberg at 651-296-6300.



**Minnesota Pollution  
Control Agency**

### Guiding Principles

- **Plan ahead, plan early.** It's generally easier and less expensive to incorporate “green” materials and concepts during the early stages of project planning than to add them later in the process. Including green features upfront also lends itself more easily to an integrated design strategy, which considers a house as a “system”.
- **Consider a “no build” strategy.** Is additional space really needed? Or could current space be configured differently to meet your needs? Less construction results in less waste, pollution, and resource use.
- **Prioritize Needs vs. Wants.** Consider the condition of the home and its components (as well as your own budget). If it is an older house, structural upgrades or repairs may need to occur before other changes can (or should) be implemented. Involve someone with building science experience and knowledge early in the planning process to assess the condition of the house and make recommendations. Contact the Minnesota Building Performance Association for more information, [www.mbpa.us/existinghomes.htm](http://www.mbpa.us/existinghomes.htm)
- **Participate in Minnesota GreenStar Certified Homes & Remodeling,** a new, MPCA-funded program of the National Association of the Remodeling Industry—MN Chapter, the Builders Association of the Twin Cities, and the Green Institute. Program guidelines and information are now available at [www.mngreenstar.org](http://www.mngreenstar.org).
- **Consult with local officials** and/or encourage your contractor to do so, before initiating a “green” remodel. Building officials are more likely to be supportive if they are brought into the process early and are kept informed about the products and systems that are designated for the project.
- **Consider long-term costs.** Many green-building products are price-competitive with conventional products. Others cost more upfront but provide long-term energy, maintenance, durability, and/or health savings. As the green building industry continues to mature, look for continued improvements in product choice, price, and availability.  
  
Look for opportunities to make practical cost-tradeoffs to achieve maximum benefit. For example, spending more on insulation could be balanced by the need for a smaller furnace and/or air conditioner.
- **Seek out contractors and other building professionals who** know and understand “building science” and energy-efficiency as they relate to remodeling, and who are eager to apply “green” remodeling principles. Contact MN GreenStar for names of contractors who have completed program training.
- **A green home is only as green** as the materials and practices that are used to maintain it. Make a point of using nontoxic cleaners, low-VOC (volatile organic compound) finishes, and similar products; energy- and water-efficient practices and appliances; and environment-friendly lawn care/landscaping techniques.

# Green remodeling guide

When selecting “green” approaches, use common sense and work within your budget.



## Increase energy efficiency *and* incorporate renewable energy technologies and approaches

Older homes, though typically well constructed, can be dry and drafty in the winter and hot and humid in the summer. Homes with oversized heating or cooling systems can be uncomfortable and costly to heat/cool. A leaky duct can lose 30% or more of its air. Paying attention to these types of problems can reduce excessive energy use, which contributes to greenhouse gas emissions and fossil fuel depletion.

- Arrange to have an energy audit conducted to determine needed upgrades or improvements.
- Purchase Energy Star®-rated appliances, windows, heating, air conditioning systems, and similar products. Home appliances typically account for 21% or more of a home’s energy consumption.
- Replace incandescent light bulbs with energy-efficient compact fluorescents or residential LED (light emitting diode) lamps.
- Install programmable thermostats. If your home is large, consider adding multiple, “zoned” thermostats.
- When replacing home furnaces or air conditioners, make sure to size them correctly. Oversized systems can be inefficient and expensive to operate.
- Consider purchasing insulation that is formaldehyde-free, contains recycled content (such as cellulose or recycled cotton), is certified as low-emitting, and/or is free of HCFCs.
- If replacing windows, look for double (or triple) pane, low-e coated, Energy Star® labeled windows.
- Maximize natural light through strategic window placement, use of solar light tubes or skylights, and/or use of clerestory windows.

- Use overhangs (like awnings) on all but the north side of the house to minimize unwanted summer heat gain. Make sure to size them correctly so that winter heat gain is permitted
- Orient large windows toward the south. In northern climates, south-facing windows can help improve heat gain in the winter. West-facing windows, on the other hand, can result in excess summer heat build-up.
- Use shade trees on the east and west sides of the house to minimize summer heat gain. Consider evergreen trees, shrubs, or similar plantings on the north and/or northwest sides to buffer winter wind.
- Incorporate passive solar design into remodeling plans wherever possible.
- Consider installing other renewable and efficient energy systems, such as solar collectors or a solar hot-water heater.

## Build less

As compared to small houses, large homes can require more energy to heat and cool, more materials to construct, use more land, and create more pollution and waste through their construction and operation. Construction waste averages 3 to 5 pounds per square foot of space.

- Create small, flexible, more intimate spaces. Incorporate built-in-storage and similar techniques to maximize space.
- Minimize land consumption (the “footprint” of the home) by building “up” instead of “out.”

## Reduce, reuse, recycle materials

Discarded materials equal lost resources. Disposal costs can be high, and contaminants in building waste can contribute to pollution problems. The production of new building materials contributes substantially (11%) to global CO2 emissions.\*

- Consider “refreshing” instead of remodeling, for example, resurface existing cabinets rather than installing new ones.
- Use precut or prefab materials (such as structural insulated panels, engineered wood I-joists) to reduce construction-generated waste.
- Salvage and reuse items or donate usable materials to charities or salvage stores.
- Measure materials carefully to reduce unnecessary cutoff waste.
- Use recycled and recyclable products.
- Use alternative framing techniques. Advanced framing, for example, spaces studs 24” on-center instead of the conventional 16”, and bases a home’s design on 2-foot modules. It reduces wood waste and, by reducing thermal bridging (heat loss, for example, through the walls or roof of a structure), improves the insulating quality of a home.
- Ask your contractor for a waste management plan prior to job start. Require that it include recycle and reuse options for waste materials.

\*“Demolition Industry Trends: Early Recovery,” Construction & Demolition Recycling, July/August 2004, p. 47.



## Choose nonpolluting, “healthy” materials and indoor finishes

Conventional building products may “offgas,” contributing to poor indoor air quality. Offgassing is the process by which chemicals are released, through vaporization, from materials into the air. Some building products can offgas for days, while others may do so for years. Such fumes may be harmful to human health. In addition, the manufacturing process for many of these products can create pollution and health impacts for workers and communities.

- Select formaldehyde-free pressed-wood products, insulation, and similar items. Products containing phenol-formaldehyde (used in exterior-grade plywood) tend to offgas less than those containing urea-formaldehyde.
- Choose no-VOC paints and finishes. VOCs can create health impacts when vaporized, which typically occurs at normal temperatures. A number of building products (like many paints, solvents, adhesives, building materials, and furnishings) release or offgas VOCs.
- Look for products that have been certified by GreenGuard, an independent testing program for low-emitting products.

- Avoid PVC wallpaper, which can trap moisture that can lead to mold development.<sup>1</sup>
- When possible, avoid products that have to be glued down (glues typically emit VOCs).
- If adhesives are required, choose water-based ones. Avoid solvents.
- Avoid wall-to-wall carpeting, or use sparingly. If carpeting is a necessity, consider carpet tiles, recycled content carpet, or natural fiber carpet (like wool). Carpeting can trap and “release” contaminants over time (bacteria, dust, dirt, and more). Carpet (and especially its pad) can also offgas chemical pollutants. Purchase carpet that meets CRI Indoor Air Quality Standards (Carpet and Rug Institute “Green Label Plus” program).
- Install flooring that can be easily cleaned, such as wood, natural linoleum, cork, polished concrete, and ceramic tile.
- Install a sealed combustion furnace, stove, and other appliances.

## Choose sustainably produced, resource-efficient materials

The lifecycle costs of new construction materials can be high. By choosing sustainably produced, resource-efficient materials, you can avoid unnecessary use and depletion of scarce resources. “Embodied energy” (energy consumed in material extraction, product manufacture, and transportation to markets) of many conventional products can be high.

- Use certified-sustainable wood from ecologically managed forests. Look for the FSC-certified label.
- Avoid uncertified wood (like Luan) from tropical forests.
- Select biobased materials (such as strawboard or wheatboard) made from pesticide-free agricultural by-products.
- Buy recycled-content materials like recycled plastic decking and rapidly renewable materials like natural linoleum, bamboo, and cork.
- Purchase salvaged wood and other materials, which are often less expensive and of a higher quality than their virgin counterparts.
- Select durable, long-lasting materials.
- Buy locally produced products, which require less energy to transport to local markets.
- Avoid using large-dimension, virgin solid lumber.

## Protect/improve the site

Development activities may reduce ground absorption of rainwater, resulting in polluted runoff that can contaminate streams, lakes, and rivers. Runoff from chemicals in fertilizers, pesticides, and similar lawn products can also contribute to pollution.

- If remodeling activities will impact the site, cover it with mulch first to protect the topsoil.
- Preserve existing trees and other plants to the extent possible.

- Consider pervious (permeable) paving for driveways and other paved surfaces. A pervious surface, such as compacted gravel and permeable pavers, will allow absorption of water, reducing stormwater runoff and pollution.
- Consider a green (vegetative) roof.
- Plant a rainwater garden. Raingardens use small, shallow low spots, planted with native perennials and shrubs, to catch and hold flowing rainwater and snowmelt.

1. PVC (polyvinyl chloride) is a widely used plastic, especially in building construction. Typical uses are in flooring, piping, wall covering, wire sheathing, window frames, and external siding. According to the World Health Organization, vinyl chloride, the chemical used to make PVC, is a known carcinogen. The manufacture of PVC also creates dioxin, one of the most dangerous chemicals in existence. Plasticizers used to soften vinyl and make it more flexible can contribute to indoor air quality problems due to chemical offgassing.

## Improve ventilation

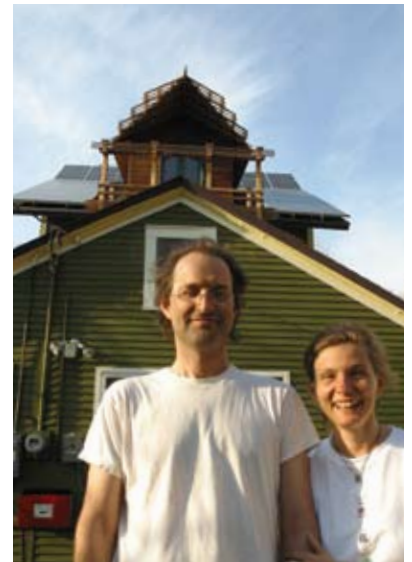
Well-insulated homes can trap pollutants and moisture, potentially leading to air quality problems, the development of mold, and sick building syndrome.

- Consider installing a mechanical air-to-air ventilation heat exchange system.
- Improve natural ventilation through operable windows. High windows can help exhaust hot air. Smart window placement can also help to increase cross-ventilation.
- Maximize open floor space to increase air circulation.
- Install exhaust fans in high moisture areas (bathrooms, kitchens).
- Eliminate or reduce exposure to remodeling dust and debris.

## Conserve water

Development, population growth, drought and pollution, to name a few, are taking a toll on the quantity and quality of water in Minnesota, the U.S., and globally.

- Install low-flow toilets, showerheads, and faucets.
- Install aerators (available at home improvement stores) on existing faucets.
- Landscape with native plants, which can absorb water effectively and require less water to maintain.
- Use rain barrels to collect and reuse rainwater on site for irrigation.
- Install water-conserving appliances.
- Use drip irrigation in place of conventional sprinkler systems.
- Look for products that have the WaterSense Label. (WaterSense is a partnership program of the U.S. EPA) [www.epa.gov/watersense](http://www.epa.gov/watersense)



Solar electricity is becoming increasingly affordable. For information on installing your own photovoltaic system, and on rebates you may qualify for, visit [solarminnesota.org](http://solarminnesota.org).

## Resources

### Addressing Indoor Environmental Concerns During Remodeling.

U.S. Environmental Protection Agency. Sensible advice on avoiding or minimizing the generation of pollutants during remodeling.

[www.epa.gov/iaq/homes/hip-concerns.html](http://www.epa.gov/iaq/homes/hip-concerns.html)

### A Consumer's Guide to Energy Efficiency and Renewable Energy.

Comprehensive information on renewable energy options and energy-efficiency for homeowners and small business. U.S. Department of Energy (DOE), *Energy Efficiency and Renewable Energy*.

[www.eere.energy.gov/consumer](http://www.eere.energy.gov/consumer)

**Efficient Windows Collaborative.** Site contains printable fact sheets and a wealth of other information relating to windows, including benefits of particular window types, descriptions of how they work, and recommendations for their selection and use.

[www.efficientwindows.org](http://www.efficientwindows.org)

**Energy-Star Home Improvement Guide.** Web-based resource identifies common energy problems, as well as solutions for remedying them.

[www.energystar.gov](http://www.energystar.gov)

**Energy Efficient Rehab Advisor.** Interactive tool from the U.S. Department of Housing and Urban Development provides guidelines for conducting energy-efficient housing rehabilitation.

[www.rehabadvisor.pathnet.org](http://www.rehabadvisor.pathnet.org)

**GREENGUARD Indoor Air Quality Certified® Product certification program** for low emitting interior building materials, furnishings, and finish systems. All products that receive the GREENGUARD certification have been tested for their chemical emissions performance.

[www.greenguard.org](http://www.greenguard.org)

**Minnesota Department of Commerce Energy Information Center.** Consumer-oriented site contains detailed, printable guides on a variety of home energy topics, as well as information on renewable energy and emerging technologies.

[www.energy.mn.gov](http://www.energy.mn.gov)

**Minnesota Pollution Control Agency.** Green Building web site. Residential section has a number of relevant and valuable materials and links relating to green building, both for consumers and builders.

[www.pca.state.mn.us/greenbuilding](http://www.pca.state.mn.us/greenbuilding)

**Read This Before You Design, Build, Or Renovate.** Updated version of 2001 building science primer. Provides guidance on remodeling and building practices that lead to reduced homeowner exposure to known health hazards while improving durability and reducing operating costs.

[www.buildingscience.com/doctypes/primer/](http://www.buildingscience.com/doctypes/primer/)

**REGREEN Residential Remodeling Guidelines.** A joint effort of the American Society of Interior Designers (ASID) and the US Green Building Council (USGBC), these user-friendly guidelines present best-green-practices for a variety of remodeling projects.

[www.regreenprogram.org](http://www.regreenprogram.org)

## Books

**Green Building Products: The GreenSpec Guide to Residential Building Materials.** Resource for homeowners and building professionals lists over 1,600 environmentally friendly products that are available for the residential building and remodeling markets. From the publishers of *Environmental Building News*. Order at

[www.buildinggreen.com](http://www.buildinggreen.com).

**Green Remodeling—Changing the World One Room at a Time,** David Johnston and Kim Master, 2004. Book for consumers and remodeling professionals provides comprehensive, practical guidance and advice on healthy, energy-efficient, environmentally friendly approaches to home remodeling.

[www.whatsworking.com](http://www.whatsworking.com)

**Natural Remodeling for the Not-So-Green House,** Carol Venolia & Kathy Lerner, 2006. Very well-organized and instructive book. Includes detailed diagrams and attractive photographs.

[www.naturalremodeling.com](http://www.naturalremodeling.com)

**No-Regrets Remodeling** from *Home Energy Magazine*, 1997. Addressing “building science” from a consumer point of view, this book offers sound advice on improving comfort, indoor air quality, and energy efficiency during the home remodeling process.

[www.homeenergy.org](http://www.homeenergy.org)