GREEN REMODELING HANDBOOK

The City of La Crescent

La Crescent MINNESOTA | Growing from River to Ridge

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Introduction

Thinking about tackling a home improvement project but unsure how to do it in a way that's kind to both your well-being and the environment? You're in the right place. This handbook is your go-to resource for making your remodeling journey as sustainable as possible—from planning to the final touches. Whether you're freshening up with a coat of paint or giving your exterior a full makeover, you'll find guidance on eco-friendly materials and how to get started.

Getting Started

When remodeling your home, there are several things to consider before you begin. Remodeling your house can be a great time to update some features that will, in the end, make your home more cost-effective and comfortable to live in.

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The 3 Rs: Reduce, Reuse, Recycle

The 3 Rs are a guiding principle for your home improvement and beyond to make your home living as sustainable as possible.

Reduce

When completing a home renovation, less is more. Use the least amount of materials necessary for your project. Opt for eco-friendly choices to reduce waste.

Reuse

Before buying new supplies, take a look at what you already have from past projects. Repurposing leftover materials, especially across multiple renovations, can reduce waste and save money.

Below are some reuse locations:

- Habitat for Humanity ReStore – La Crosse[1]
- Habitat for Humanity ReClaim – La Crosse[2]

Recycle

Properly sorting and recycling construction waste helps reduce environmental impact and keeps valuable resources in circulation. Many building supplies, like metal, wood, and concrete, can get a second life instead of heading to the landfill. Respect city guidelines for waste disposal—sort out recyclables, hazardous items, yard waste, and garbage accordingly.

Here are some recycling locations:

- Houston County Recycling Center[3]

1. https://www.habitatlacrosse.org/restore/
2. https://www.habitatlacrosse.org/what-we-do/sustainability/reclaim/
3. https://www.cityoflacrescent-mn.gov/refuse-recycling/

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Life Cycle Analysis (LCA)

A method for evaluating a product's or material's total environmental footprint—from the extraction of raw resources to manufacturing, transportation, use, and disposal. LCA identifies materials that are longer-lasting, locally sourced, recyclable, or made with fewer emissions.[4]

Consider:

- **Ask for Environmental Product Declarations (EPDs).** These labels outline a product's full life-cycle footprint.
- **Compare materials** beyond cost. Evaluate based on energy usage, efficiency, and recyclability.
- **Prioritize durability** to require less maintenance with minimal environmental footprints.
- **Local** products to reduce transportation emissions and encourage a circular economy.
- Can the material be **reused** or **recycled?** Avoid materials that are landfill-bound.

4. https://www.aia.org/resource-center/building-life-cycle-assessment-practice

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Green Home Certifications

Want to make sure your green remodel really delivers? Certifying your project confirms energy savings, better air quality, and a healthier home. Plus, certified green homes often sell quicker and for more.

Minnesota's Certification Options

MN Green Path[5]
This is the state's flagship residential green building program. It offers three levels: Energy Tested, Advanced Certified, and Master Certified, based on third-party energy testing and performance in areas like indoor air quality, water management, and resource use.

GreenStar Home[6]
This program is ideal for both new builds and remodels. It evaluates homes across five pillars: energy, health, water, materials, and place.

Energy Fit Homes[7]
A program developed by *Center for Energy and Environment (CEE).* It's designed for existing homes, focusing on cost-effective energy upgrades.

MN homeowners also use national programs like:

LEED for Residential[8] which is a widely recognized certification by the U.S. Green Building Council.

ENERGY STAR Certified Homes[9] is run by the EPA and certifies homes that meet strict energy efficiency standards.

5. https://www.mngreenpath.org/
6. https://greenhomeinstitute.org/home-certification-programs/greenstar-homes/
7. https://www.mncee.org/energy-fit-homes
8. https://www.usgbc.org/leed/rating-systems/residential
9. https://www.energystar.gov/newhomes

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Indoor airPLUS[10] is also from the EPA. It builds on ENERGY STAR by focusing on healthier indoor air through better moisture control, ventilation, and low-emission materials.

Zero Energy Ready Homes[11] is offered by the U.S. Department of Energy and certifies homes that are energy efficient.

Home Performance with ENERGY STAR

This is a national program developed by the U.S. Department of Energy and the EPA. It helps homeowners improve their home's energy efficiency, comfort, and indoor air quality through a whole-house approach.

Here's how it works:[12]

- A certified contractor performs a home energy assessment
- Based on findings, recommendations for targeted upgrades are given
- The work is completed by trained professionals for quality assurance

Since its launch in 2001, the program has helped upgrade over a million homes across the U.S.

10. https://www.epa.gov/indoorairplus
11. https://www.energy.gov/eere/buildings/zero-energy-ready-home-program?nrg_redirect=374918
12. https://www.energy.gov/eere/buildings/home-performance-energy-star

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Energy Efficiency

A remodel is the perfect time to boost your home's energy efficiency, saving you money for years to come. Start with a home energy audit to uncover air leaks, insulation gaps, or outdated appliances. Many utilities, like Xcel Energy, offer these audits for free. If yours doesn't, you may still qualify for a federal tax rebate of up to $150, depending on what you pay for the audit.

The Inflation Reduction Act makes energy-efficient upgrades more budget-friendly with tax credits, including:[13]

- 30% credit (up to $2000) on electric heat pumps
- 30% credit (up to $1200) for insulation and/or efficient doors and windows

The tax credits are set to expire in **Dec 31 2025.**
Residential Tax Credit is set to expire **Dec 31 2025.**
Commercial Tax Credit is set to expire **Dec 31 2026.**

Minnesota offers current and upcoming programs to support energy-efficient home upgrades:

- **HOMES Rebate Program** offers $2,000–$8,000 based on energy savings and income for whole-home improvements. [14]
- **Heat Pump Rebate** covers up to $4,000 or the full cost of a new heat pump, whichever is less.[15]
- **HEAR Program** helps to replace old appliances with efficient electric models and prepares your home for increased electric use.[16]

These programs are scheduled to launch **late 2025.**

For more guidance, the ***Center for Energy and Environment (CEE)*** and ***Clean Energy Resource Team (CERT)*** can connect you with additional resources.

And when shopping for new appliances, look for **ENERGY STAR®** certification to ensure efficiency—just be sure to find a model that suits your needs.

13. https://www.irs.gov/credits-deductions/energy-efficient-home-improvement-credit
14. https://mn.gov/commerce/energy/consumer/energy-programs/homes.jsp
15. https://mn.gov/commerce/energy/consumer/energy-programs/heat-pump.jsp
16. https://mn.gov/commerce/energy/consumer/energy-programs/hear.jsp

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Energy Audits

A review of a building's energy consumption aimed at uncovering potential upgrades and addressing safety issues. This process often involves examining energy bills to identify usage trends, checking insulation and windows for efficiency losses, evaluating HVAC systems, and locating air leaks.

The U.S. Department of Energy[17] offers guidance on finding certified home energy auditors and explains what to expect from a professional assessment. They also highlight the Home Energy Score program, which rates your home's efficiency.

If you're a customer of Xcel Energy, you qualify for a **Home Energy Squad** visit. The visit includes an energy audit, installation of energy-saving products, and expert recommendations all for $70 to $100. Some add-ons, such as smart thermostats, may come at an extra charge. Income-qualified households could receive a visit for free.[18]

Minnesota Energy Resources offers two levels of in-home audits. A standard audit for $75 and a performance audit for $150. Both include testing, safety checks, and installation of basic energy-saving products. Low-income households may qualify for free services.[19]

MiEnergy Cooperative offers both DIY energy audits and access to certified energy managers for more in-depth assessments. They encourage members to start with self-guided tools like the EPA's Home Energy Yardstick.[20]

While a professional energy audits is preferred, a Do-It-Yourself energy audits can be done. Below are great resources to get started:

- U.S. Department of Energy[21]
- GreenCitizen[22]
- MiEnergy Cooperative[23]

17. https://www.energy.gov/energysaver/professional-home-energy-assessments
18. https://www.electrifyeverythingmn.org/prepare-electrify-get-energy-audit
19. https://www.minnesotaenergyresources.com/savings/audits
20. https://www.mienergy.coop/
21. https://www.energy.gov/energysaver/do-it-yourself-home-energy-assessments
22. https://greencitizen.com/blog/home-energy-audit/
23. https://www.mienergy.coop/diy-energy-audits

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Energy Usage

Tracking your home's electricity, water, and gas use reveals how much energy you consume and what it's costing you. By monitoring usage, you can uncover opportunities to improve efficiency and reduce waste.

A **Home Energy Rating** is like a report card for your house's energy performance. It evaluates how efficient your home uses energy and provides a score, often on a scale like the Home Energy Rating System (HERS)[24] Index, where lower scores mean better efficiency.

- A score of 100 means your home uses the same energy as the reference home.
- A score of 0 means it's a net-zero energy home
- Most existing homes score between 100 and 130, while newer, energy-efficient homes can score below 70

Home Energy Tracking Systems are real-time monitoring tools that help you understand how much energy your home and even individual appliances are using.

- Sense Energy Monitor[25] tracks real-time electricity usage, identifies appliances, and provides insights into energy habits.
- Flume Water Monitor[26] attaches to your water meter and gives you real-time water usage data—great for spotting leaks or overuse.

The **ENERGY STAR Home Advisor**[27] lets you build a personalized profile of your home's energy features and provides tailored, high-impact recommendations to help you save energy and money.

Home Heating Index (HHI) measures how much heat energy a home needs in winter, based on climate and size. It's expressed in *BTUs* per square foot per heating-degree day. Lower HHI scores mean better energy efficiency, especially in colder regions.

NHSaves HHI[28] calculates your Home Heating Index (HHI) to benchmark heating efficiency, especially useful in colder climates.

24. https://www.hersindex.com/hers-index/what-is-the-hers-index/
25. https://sense.com/
26. https://flumewater.com/
27. https://www.energystar.gov/saveathome
28. https://nhsaves.com/learn/2023/07/calculate-your-homes-energy-efficiency-rating/

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Renewable Energy

A remodel is the perfect opportunity to explore whether switching to renewable energy makes sense for you. Even if your plans don't include a new roof, often the best moment to install rooftop solar, you can still transition away from fossil fuels and toward cleaner energy sources.

Rooftop solar offers the most immediate and direct benefits of solar energy. While it tends to be the priciest option up front, it often delivers the greatest long-term value. You may be able to sell surplus energy back to the grid, earning credits on your utility bill.

There are several solar tax credits available to help offset your investment:

- **Residential Clean Energy Credit** lets you claim 30% of the total cost of your solar installation on your federal taxes for the year it's installed. It is set to end in Dec 31 2025.[29]
- **Commercial Clean Energy Credit** is designed to support businesses/organizations' investments in clean energy technologies. Up to 30% of the investment cost for eligible projects. It is set to end in Dec 31 2026.[30]
- You may qualify for **bonus credits** that increase your savings by an additional 10% each if:[31]
  - solar equipment is made with domestic U.S. content
  - home is in a low-income community
  - project is located in a Justice40 initiative area

Xcel Energy Solar*Rewards Program offers annual payments for 10 years based on your solar system's energy output. In exchange, Xcel receives the system's *Renewable Energy Credits (RECs)*.

The program pays $0.03 per kilowatt-hour (kWh) of solar energy your system produces. Income-qualified homeowners may be eligible for a one-time upfront bonus of $3.00 per kWh. Enrollment is first-come, first-served, and funding is limited each year.

To qualify, you must:[32]

- Be an Xcel customer
- Own property where the system will be installed
- Install a solar array between 0.5 kW and 20 kW DC capacity

Refer to this Xcel resource[33] for more information.

29. https://www.solar.com/learn/breaking-congress-proposes-to-end-residential-solar-tax-credit/
30. https://www.greenlancer.com/post/solar-tax-credit-ending
31. https://www.irs.gov/credits-deductions/residential-clean-energy-credit
32. https://www.energysage.com/local-data/solar-rebates-incentives/mn/
33. https://mn.my.xcelenergy.com/s/renewable/solar-rewards

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MiEnergy Cooperative Member-Owned Generation supports members in connecting their own renewable energy systems using the C-MIP process (Cooperative Minnesota Distributed Energy Resources Interconnection Process). Members generate their own electricity and may even send excess power back to the grid.

MiEnergy encourages members to contact them early in the planning process to ensure their system qualifies and meets safety standards.

Key Considerations

Before installing a system, it is recommended to review:

- Equipment certification
- Installer qualifications
- Safety protocols
- Cost vs. benefit analysis
- Grid compatibility

MiEnergy also offers a guide for helping members make informed decisions. Refer to their page, MiEnergy.[34]

All applications are submitted through the NOVA Power Portal.[35]

For more information, contact
Audra Skalet
askalet@mienergy.coop
507-864-9253
Director of Member Services

34. https://mienergy.coop/index.php/member-owned-generation
35. https://www.novapowerportal.com/Home/Index/15

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If rooftop solar isn't the right fit, there are still great ways to support clean energy.

Community solar lets you subscribe to a nearby solar farm and cover part or even all of your electricity needs. If you generate more than you use, you'll receive bill credits. Ask your utility if there are open projects in your area.

MiEnergy offers members the chance to participate in its Renewable Rays community solar project.[36]

Green pricing programs allow you to pay a bit more on your utility bill to support renewable energy sources like wind or solar. While your home may not directly receive that power, your dollars help fund more clean energy on the grid.

Homeowners can harness **wind energy** by installing small wind electric systems. These typically include a wind turbine mounted on a tower, a charge controller, batteries or a grid connection to store and use the generated electricity. However, to be effective the wind speed has to be 10-12 miles per hour (mph).[37]

Geothermal energy is another powerful option for clean, direct home heating and cooling. By tapping into the steady underground temperature which stays cooler than the surface in summer and warmer in winter, geothermal systems can efficiently regulate your home's climate year-round.

MiEnergy also promote geothermal systems. They provides educational resources and links to federal guidance on these systems.[38]

36. https://www.energysage.com/about-clean-energy/wind/small-wind-turbines-overview/
37. https://www.mienergy.coop/index.php/renewables
38. https://www.mienergy.coop/renewable-energy

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Chapter 1: FAQ

Q: What kind of renovation materials can be recycled?

Common items include metal, wood, concrete, and even certain plastics.
Designate bins for recyclables vs. hazardous vs. trash to avoid contamination.
Read product labels or manufacturer websites to see if materials are recyclable.

Q: How can I reduce materials and waste during a project?

Plan carefully to buy only what's needed. Choose durable and sustainable materials. Consider low-impact designs.

Q: What exactly is Life Cycle Analysis (LCA)?

LCA assesses the environmental footprint of a material or product across its entire life cycle:

- Extraction: Sourcing raw materials
- Manufacturing: Energy and resources used in production
- Transportation: Emissions from delivery
- Use: Efficiency, performance, and maintenance during its lifespan
- End-of-Life: Whether the item can be reused, recycled, or goes to landfill

Q: What are Environmental Product Declarations (EPDs)?

EPDs are standardized labels that disclose a product's full life-cycle impact. Think of them as nutritional labels for sustainability:

- Highlight raw material origins
- Detail emissions from production and transport
- Share recycling and disposal info

Q: Why should I get a green home certification?

Benefits include verified energy savings, improved health outcomes due to better air quality, reduced carbon footprint, market advantages, eligibility for rebates or incentives.

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Q: What's the first step toward a more energy-efficient home?

Begin with a home energy audit, a diagnostic checkup that identifies where your house is leaking energy. Many utilities, like Xcel Energy, offer these at no charge. If yours doesn't, a federal rebate may cover up to $150 of the audit cost.

Q: What should I look for when shopping for appliances?

Always check for the ENERGY STAR® label, which certifies high energy performance. Some other tips, match appliance size to your household's actual needs to avoid excess energy use, compare estimated annual energy use, look up lifetime operating costs.

Q: Why should I monitor my home's energy usage?

Monitoring helps you identify areas of energy waste, make smarter decisions about upgrades or replacements, understand peak usage times and habits, take advantage of available incentives and rebates.

Q: What tools help track energy use?

The Sense Energy Monitor plugs into your electrical panel and gives insights into usage and patterns. The Flume Water Monitor attaches to your water meter, tracks water consumption and alerts you to leaks. The ENERGY STAR Home Advisor is an online tool that offers suggestions to save energy and money.

Q: Why consider rooftop solar?

Rooftop solar systems harness sunlight to generate electricity directly from your home. Though installation costs can be high up front, benefits include lower long-term utility bills, potential to sell extra electricity back to the grid via net metering, reduced carbon footprint.

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End of Chapter 1

La Crescent MINNESOTA

Growing from River to Ridge

Chapter 2: Home Exteriors

Your home's outer shell should be built to last and function well, keeping your living space comfortable, protected, sealed, and energy efficient. The landscaping around your house should look nice but also support drainage, safety, food-growing potential, and pollinators. Any exterior remodel is a big undertaking, so it's smart to think about how changes might affect the rest of the home. Using a whole-home strategy helps ensure everything works together.

Building Envelope

The building envelope is the outer shell of your home—think walls, roof, windows, and foundation. It acts as a protective barrier, keeping indoor air in and outdoor elements like heat, cold, wind, and moisture out. A well-designed envelope improves energy efficiency, indoor comfort, and helps prevent issues like drafts, leaks, or mold.

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Core Components

A home's core components are the essential building blocks that provide structure, protection, and functionality. They are thoughtfully designed to minimize environmental impact while maximizing energy efficiency and indoor comfort.

These include a well-insulated foundation and framing system that reduces heat loss, high-performance windows and doors that limit air leakage, and roofing materials that reflect sunlight or support vegetation.

Insulation

In winter, heat naturally escapes from your warm home to the colder outdoors. Insulation slows this heat loss, helping maintain comfort while using less energy.

Asbestos was once a go-to material in home construction due to its fire resistance, durability, and insulating properties—but it's now known to be a serious health hazard. If your home was built before 1980, there's a good chance it may contain asbestos.

Some common areas where asbestos might be lurking:

- *Roofing and siding shingles*
- *Vinyl floor tiles and adhesives*
- *Popcorn ceilings and textured paints*
- *Insulation around pipes, ducts, boilers, and furnaces*

If you suspect asbestos in your home, don't try to remove it yourself. Hire a certified inspector to handle removal.[40]

Insulation materials are specially designed to slow the transfer of heat, helping buildings stay warmer in winter and cooler in summer. They work by trapping air or other gases in pockets that resist heat flow.

Popular insulation types include fiberglass, which consists of fine glass strands; cellulose, typically made from recycled paper products; and mineral wool, formed from natural rock or industrial byproducts. Foam board varieties such as polystyrene and polyisocyanurate provide excellent thermal resistance in thinner layers. For eco-friendly construction, natural materials like sheep's wool, cork, and hemp are also favored for their sustainability and low environmental footprint.[39]

39. https://www.energy.gov/energysaver/insulation-materials
40.https://www.greenbuildingadvisor.com/article/how-worried-should-you-be-about-asbestos-in-older-homes

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Glossary Terms: *Italicized*
Links: Underlined

When selecting insulation, it's important to understand two key metrics: ***R-value*** and ***U-value***. *R-value* measures how well a material resists heat flow. The higher the *R-value*, the better the insulation performs at keeping heat inside during winter and outside during summer.

U-value, on the other hand, indicates how easily heat passes through an entire building element (like a wall or roof assembly). A low *U-value* means the assembly is a strong insulator, while a high *U-value* suggests poor insulation performance.[41]

Material Type[42][43]	***R-Value* (per inch)**	**Fire Resistance**	**Sustainability Features**	**Notes**
Cellulose	3.5 - 3.8	Moderate	Made from 75 - 85% recycled paper; low *embodied energy*	Fills building cavities tightly, block airflow and improve thermal performance.
Mineral Wool	4.0 - 4.5	Excellent	Made from recycled slag; mold-resistant and durable	Slag wool is created from blast furnace slag, a *byproduct* of metal production.
Fiberglass	2.2 - 2.7	Moderate to Good	Constraints 20 - 30% recycled glass; widely available	A popular insulation made from fine glass fibers. Loose-fill types are applied using a blowing machine.
Spray Foam	5.5 - 6.5	Good	High thermal performance; air sealing	Expands to seal gaps and cracks.
Sheep’s Wool	3.5	Good	Renewable, *biodegradable*, naturally moisture-resistant	Absorb up to 33% of its weight in moisture without losing insulating power.
Cork	4.0	Excellent	Renewable baark; recyclable; naturally fire-resistant	Dense structure helps absorb sound.

41. https://www.thegreenage.co.uk/article/thermal-conductivity-r-values-and-u-values-simplified/
42. https://www.epa.gov/greenerproducts/identifying-greener-insulation
43. https://www.greenbuildingadvisor.com/article/insulation-products-for-green-homes

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Glossary Terms: *Italicized*
Links: Underlined

Material Type[44]	R-Value (per inch)	Fire Resistance	Sustainability Features	Notes
Straw Bale	2.4 - 3.0	Poor to Moderate	Agricultural *byproduct*; excellent thermal mass	Straw can be composted or returned to the soil, unlike synthetic insulation.
Hempcrete	0.5 - 1.0	Moderate	*Carbon-negative* crop; moisture regulating	Resistant to rot and cracking, offers solid insulation and *thermal mass*.
Plastic Fiber	3.8 - 4.3	Requires treatment	Made from recycled bottles; long-lasting	Not widely stocked as insulation materials.

Choose insulation materials with recycled or bio-based content when possible, and compare their lifetime performance and environmental impact before selecting. Look into how different insulation types affect energy use, emissions, and sustainability.

Installations

It's smart to consult a home performance expert to identify the right insulation type and target *R-value*. Be sure to address air and bypass sealing to tighten your home, and ensure combustion appliances are safely ventilated.

When hiring a contractor, choose a certified installer for the specific product and request the *FTC insulation* fact sheet for details. If insulating attic spaces, ask for an "*attic card*" with installation specifics.

IMPORTANT:
Before starting any home improvement, always hire contractors carefully. For systems involving air sealing, drainage, flashing, or vapor barriers, correct installation and durable materials are essential—one failure can compromise the whole system and lead to energy loss, moisture damage, and material breakdown.

44. https://onecommunityglobal.org/most-sustainable-insulation/

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Depending on the material type, installation methods vary:

Batt & Roll: Fits between studs and joists. Ideal for DIY but must be snug to avoid gaps.
Blown-In: Requires mechanical equipment to fill cavities, good for retrofits and attics.
Spray Foam: Professionally applied, expands on contact to seal air gaps.
Rigid Foam Boards: Applied to walls or foundations. Must be taped or sealed at seams.
Natural Materials: May require specialized framing and moisture controls.

Blown-In Insulation
Courtesy to North Tarrant Heat & Air

Loose-fill materials such as cellulose, fiberglass, and mineral wool often require mechanical blowing equipment to evenly fill cavities and attics.[45]

WHERE TO USE INSULATION:
New Additions: Use bio-based spray foam, natural fiber batts or loose fill, or EPS rigid board.

Existing Enclosed Wall Cavities: Bio-based spray foam or natural fiber loose fill work best.

Attics: Suitable options include bio-based spray foam, natural fiber batts, or loose fill.

Basement Interiors: EPS rigid board insulation is recommended.

For more guidance, check the U.S. Department of Energy[46]

Batt Insulation
Courtesy to Lowe's Guide

Roll Insulation
Courtesy to Lowe's Guide

Spray Foam Insulation

Rigid Foam Board Insulation

45. https://insulationinstitute.org/tools-resources/resource-library/installation-application/
46. https://www.energy.gov/energysaver/where-insulate-home

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Roofing

A well-designed roofing system is a cornerstone of building performance, safeguarding the structure from external elements while improving energy efficiency, comfort, and property value. It serves as the primary barrier against precipitation, wind, and solar radiation, preventing moisture intrusion and ensuring long-term durability.

System Components[47]

A complete roofing system includes:

- **Decking** – structural base, typically made of plywood or oriented strand board
- **Underlayment** – waterproof or water-resistant layer installed over decking
- **Flashing** – critical for sealing transitions and preventing water infiltration at joints
- **Covering** – shingles, metal panels, tiles, or other surface materials that shed water
- **Ventilation** – promotes airflow to regulate temperature and moisture levels
- **Drainage** – gutters, drip edges, and downspouts that control runoff

Materials[48]

When selecting a roofing material, consider its durability, recyclability, and how it affects stormwater runoff. For instance, metal roofs typically outperform asphalt shingles in terms of longevity and environmental impact throughout their lifecycle. Below are some roof materials to consider.

Material	Lifespan	Pros	Cons
Asphalt Shingles	15–30 years	Affordable, easy to install, widely available	Shorter lifespan, less eco-friendly
Metal	40–70 years	Durable, recyclable, fire-resistant	Higher upfront cost, may dent
Fiber Cement Shingles	40–50 years	Low maintenance, eco-friendly, climate adaptable	Higher labor costs, heavy
Clay Tiles	50–100 years	Long-lasting, great for hot climates	Heavy, brittle, expensive

47. https://9to5civil.com/roof-system-components/
48. https://www.architecturecourses.org/build/roofing-systems#toc-introduction-to-roofing

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Material	Lifespan	Pros	Cons
Wood Shakes & Shingles	20–40 years	Natural, good insulation	Fire risk, high maintenance
Rubber	30–50 years	Great for flat roofs, impact-resistant	Limited aesthetics, may puncture
Synthetic Slate	50+ years	Lightweight, eco-friendly, durable	Higher cost, limited color options

Asphalt Shingles

Composed of fiberglass/organic felt mats saturated with asphalt, topped with mineral granules that shield against UV damage. The most common residential roofing choice due to affordability and easy installation. Asphalt shingles typically need replacing after 15 to 20 years despite warranties offering up to 30+ years. Their vulnerability to extreme weather such as wind, hail, and snow means they're often replaced more frequently than other materials, leading to greater lifetime costs.[49]

Metal

Durable, low-maintenance, and eco-friendly due to their recycled content. Options like standing seam panels or metal shingles offer aesthetic flexibility, with many colors and styles available. Highly reflective finishes help reduce cooling loads and snow slides off easily. Though high initial cost, metal roofing often proves more cost-effective over time due to longevity and minimal upkeep. One downside in poorly insulated homes, rain noise may be noticeable indoors.[50]

49. https://modernize.com/roof/materials
50. https://www.thisoldhouse.com/roofing/21345689/metal-roofs

Key
Glossary Terms: *Italicized*
Links: Underlined

Fiber Cement Shingles
Made from the same durable mix as fiber cement siding and designed to resemble materials like asphalt, slate, or shake. While they come with a higher upfront cost and require skilled installation, long warranties, often up to 50 years, make them a strong long-term investment. Sourcing is often local and recycling options are growing with waste material repurposed as road fill.

Clay Tiles
Durable option made from natural clay that's shaped and kiln-fired for strength. Known for its rich, earthy tones and curved profiles. Clay tiles offer resistance to fire, insects, and rot. With proper installation and maintenance, clay tile roofs can last over 100 years, making them one of the longest-lasting roofing materials available.[51]

Wood Shakes & Shingles
Wood shingles are thin, tapered pieces of wood used to cover roofs and walls. Wood shakes are split and have rougher surfaces. Both roofs are commonly crafted from decay-resistant species like cedar, cypress, or redwood. Thicker wood materials offer better performance, and they're typically unsuitable for low-slope roofs. Sealants help longevity but may release toxins and complicate disposal.[52]

51. https://www.thisoldhouse.com/roofing/clay-tile-roof
52. https://www.customshingles.com/wood-shingles-vs-wood-shakes

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Rubber

Durable, flexible, and eco-conscious solution primarily used for flat or low-slope roofs. Made from synthetic materials like Ethylene Propylene Diene Monomer (EPDM), Thermoplastic Polyolefin (TPO), or Polyvinyl Chloride (PVC). Rubber roofs are also resistant to UV rays, wind, hail, and standing water. Despite their benefits, rubber roofs can be vulnerable to punctures from sharp debris and may require professional installation.[53]

Rubber Shingles
Courtesy to Fixr: The Homeowner's Guide

Synthetic Slate

A modern roofing material designed to replicate the look of natural slate while offering improved affordability, ease of installation, and sustainability. It's typically made from recycled rubber, plastic, polymers, or composite blends, and molded to mimic the texture and color variations of quarried slate. However, the flexibility of rubber and plastic means curling and cracking can occur, sometimes allowing water to seep into attics.[54]

Green Roofs

A living roof or eco-roof is a rooftop system that incorporates vegetation and waterproofing layers to create a functional landscape atop a building. It helps manage stormwater, insulate the structure, reduce urban heat, and support biodiversity, all while transforming unused roof space into a vibrant, sustainable environment.

Refer to the EPA green roofs[55] for more information.

Solar Roofs

A roofing system that integrates solar energy technology directly into the structure of the roof, either through solar shingles, tiles, or panels. Unlike traditional solar panels mounted on top of an existing roof, solar roofs are designed to blend seamlessly with the building's architecture while generating electricity from sunlight.

Refer to this ENERGY STAR resource[56] for more information.

53. https://www.fixr.com/articles/guide-to-rubber-roofing
54. https://www.buildwithrise.com/stories/synthetic-slate-roofing
55. https://www.epa.gov/heatislands/using-green-roofs-reduce-heat-islands
56. https://www.energystar.gov/products/rooftop_solar

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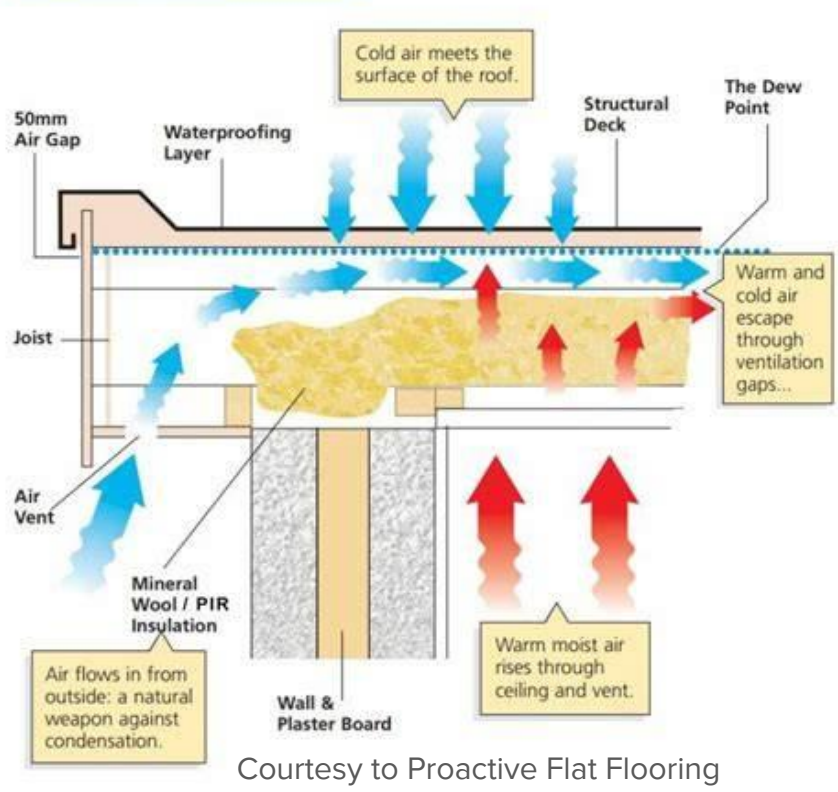
Cold Roofs

A cold roof places insulation above the ceiling, leaving a ventilated gap between it and the roof deck. This airflow prevent moisture buildup and condensation. By keeping the roof deck cold, snow melts evenly, lowering the risk of ice dams, making it especially useful in snowy climates like Minnesota.[57]

It's best to steer clear of mechanical roof ventilation systems for cold roofs, as they can frequently contribute to moisture problems.



Courtesy to Proactive Flat Flooring

Skylights

Brighten your home with natural light to improve indoor comfort and reduce reliance on electric lighting. To maximize their benefits, they should be high-quality, properly installed, and ideally placed on south or west facing roofs for optimal sunlight. Double-paned models with low *U-values* help minimize heat loss, and proper *flashing* is essential to prevent leaks. However, skylights don't insulate as well as solid roofing, so energy efficiency can be a concern. On flat roofs, they may worsen water ponding, making them less ideal. A more efficient alternative is a solar tube, which channels sunlight indoors with less heat loss.

More details on skylight installation.[58]
Use this resource[59] to find MN skylight contractors.

Chimneys and Vents

Vents and chimneys play a key role in safely ventilating appliances, but they must be properly installed to avoid air and moisture issues. They should extend well above the roof to prevent warm, moist air from causing snow melt and ice dams. As they pass through attic spaces, vents need to be sealed and insulated to prevent condensation and mold. *Flashing* should be durable and flexible to handle expansion and contraction without leaking.[60]

57. https://www.hpdconsult.com/what-is-a-cold-roof/
58. https://www.bobvila.com/articles/skylight-installation/
59. https://www.homeadvisor.com/c.MN.html
60.https://www.hartandcooleyinc.com/installing-an-efficient-chimney-ventilation-system-a-step-by-step-guide/

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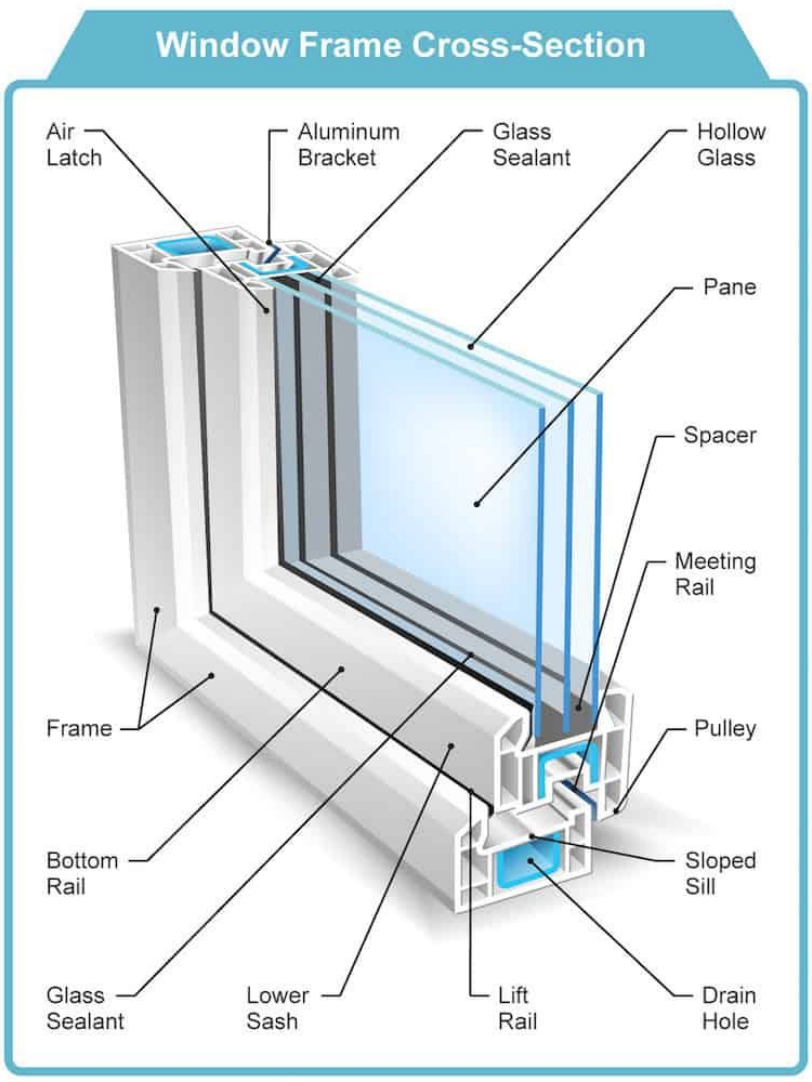
Windows

Natural light boosts mood and creates a more pleasant living environment. However, larger or more windows may decrease energy efficiency since windows don't insulate as well as walls. To minimize energy loss, choose high-quality windows and place them strategically. South-facing windows offer winter solar gain, while proper shading blocks summer heat.

Keep total window area between 15–18% of floor space, also known as the ***window-to-floor ratio***, to balance daylight, energy use, and cost.

Before investing in costly replacements, consider improving your existing windows. Unless the frames are rotting or leaking, you can repair damaged panes, replace sashes, seal gaps, and add storm windows.



For guidance, the Efficient Window Collaborative[61] offers advice.

Selecting Windows[62]

Before buying, it's important to understand window components and performance ratings. Key factors include frame material and glazing type, which together determine how well a window insulates and performs.

***U-Value*:** Indicates a window's insulation quality. Lower values mean better insulation and less heat loss.
Solar Heat Gain Coefficient (SHGC): Measures solar heat transmission. Lower suits cooling needs, higher works better in colder climates.
Visible Transmittance (VT): Reflects how much natural light enters. Higher means a brighter interior.
Air Leakage (AL): Reflects air flow through a window. Lower values reduce drafts and improve efficiency.
Condensation Resistance: Rates a window's resistance to moisture buildup on glass.

61. https://efficientwindows.org/window-replacement-options/
62. https://efficientwindows.org/window-ratings/

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Window Frames
Window frames vary in material and impact. For better efficiency, look for ones with *thermal breaks,* good insulation, and low *thermal conductivity*. Also factor in lifespan, maintenance, and environmental footprint when comparing options.

The common types of window frames are listed below:

Wood
Valued for their classic appearance and strong insulation. Due to wood's low *thermal conductivity,* these frames maintain comfortable indoor temperatures year-round. However, they do demand routine upkeep like sealing and repainting to guard against decay, warping, and pest damage. With proper care, wood frames are durable and can enhance your home's appeal and energy performance. Many manufacturers now use *FSC-certified* wood to promote sustainable forestry.

For a detailed overview, check This Old House[63] guide.

Vinyl
A popular choice thanks to their affordability, low maintenance, and solid energy performance. Made from polyvinyl chloride (PVC), these frames resist moisture, mold, and rot, making them ideal for humid climates. Many vinyl frames feature hollow chambers that improve insulation and reduce heat transfer. They're virtually maintenance-free but have a shorter lifespan. With few recycling options, most vinyl waste ends up in landfills or incinerators.

For a deeper dive, check WindowPro's[64] guide.

63. https://www.thisoldhouse.com/windows/21017715/all-about-wood-windows
64. https://www.windowpro.com/blog/what-is-a-vinyl-window-everything-you-need-to-know/

Key
Glossary Terms: *Italicized*
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Aluminum

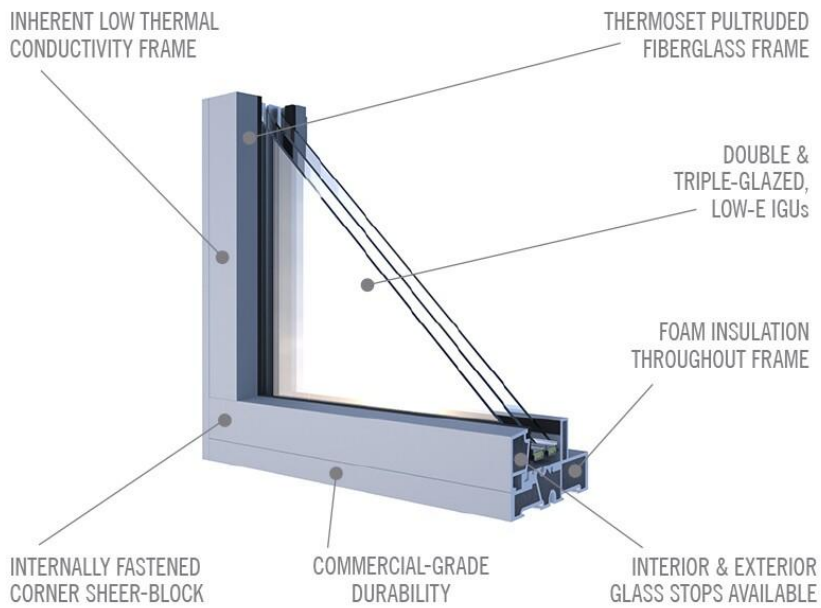
Known for their sleek design, durability, and low maintenance. They're lightweight, making them ideal for large window openings and modern architectural styles. Aluminum resists rust, warping, and decay, and its natural oxide coating provides corrosion resistance. However, aluminum has high *thermal conductivity*, which means it doesn't insulate as well as other materials unless it includes a *thermal break*—a barrier that reduces heat transfer between the inside and outside.

Check out ArchitectureCourses[65] for more information.

Fiberglass

Durable, low-maintenance, and energy-efficient. They resist warping and shrinking, hold a tight seal in harsh climates, and insulate well due to their stable structure. They can be paired with double or triple glazing. Though pricier than vinyl, their long lifespan and strong thermal performance make them a smart investment.

For more information, check This Old House.[66]



Courtesy to Cascadia Windows

Steel

Typically made from hot-rolled or cold-formed steel and can be formed into various styles such as casement, awning, hopper, fixed, and double-hung. Steel is highly recyclable and often manufactured using eco-friendly processes. These frames are valued for their structural strength, allowing thinner frames.

For more details, check out Portamet.[67]

65. https://www.architecturecourses.org/build/aluminum-window-frames
66. https://www.thisoldhouse.com/windows/21019052/all-about-fiberglass-windows
67. https://www.portamet.com/blog/everything-you-need-know-about-steel-windows

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Composite
Engineered from a mix of materials, typically wood fibers combined with polymers or metals, to give the frames the insulation of wood with the durability of aluminum or vinyl. They require little maintenance, but are *energy-intensive* to produce. Composite frames can be sourced from recycled materials, reducing their environmental footprint.

Check out Homebuilding & Renovating[68] for more information.

Glazing
Double-glazed windows are standard, but triple-glazed options are growing more accessible. They're heavier, costlier, and best suited for fully retrofitted, highly insulated homes. Ideal for passive solar design, they provide better heat gain without compromising efficiency.

Consider if the benefits outweigh the price, as investing in insulation or efficient equipment may be smarter. Emerging technologies like photochromic and electrochromic glass also offer automatic energy-saving responses to light and heat.

Although window glazing can last up to 30 years, these signs may signal it's time for an upgrade:[69]

- **Cracked or warped glass** reduces insulation performance
- **Fog between panes** indicates seal failure.
- **Drafts or air leaks** affect indoor comfort.
- **Unexplained energy spikes** could stem from poor window efficiency.

LOW-E (Low Emissivity) COATINGS:
Low-E coatings are ultra-thin layers of metal or metallic oxide applied to glass to reduce infrared heat transfer.

For cold regions like Minnesota, the coating should be placed on the innermost surface of the insulating glass unit (IGU). This setup helps retain indoor heat while allowing in warmth from the winter sun.

Many Low-E coatings also block harmful ultraviolet rays that cause fading in furniture and flooring.[70]

68. https://www.homebuilding.co.uk/advice/what-is-a-composite-window
69. https://todayshomeowner.com/windows/guides/what-is-window-glazing/
70. https://www.energy.gov/sites/prod/files/guide_to_energy_efficient_windows.pdf

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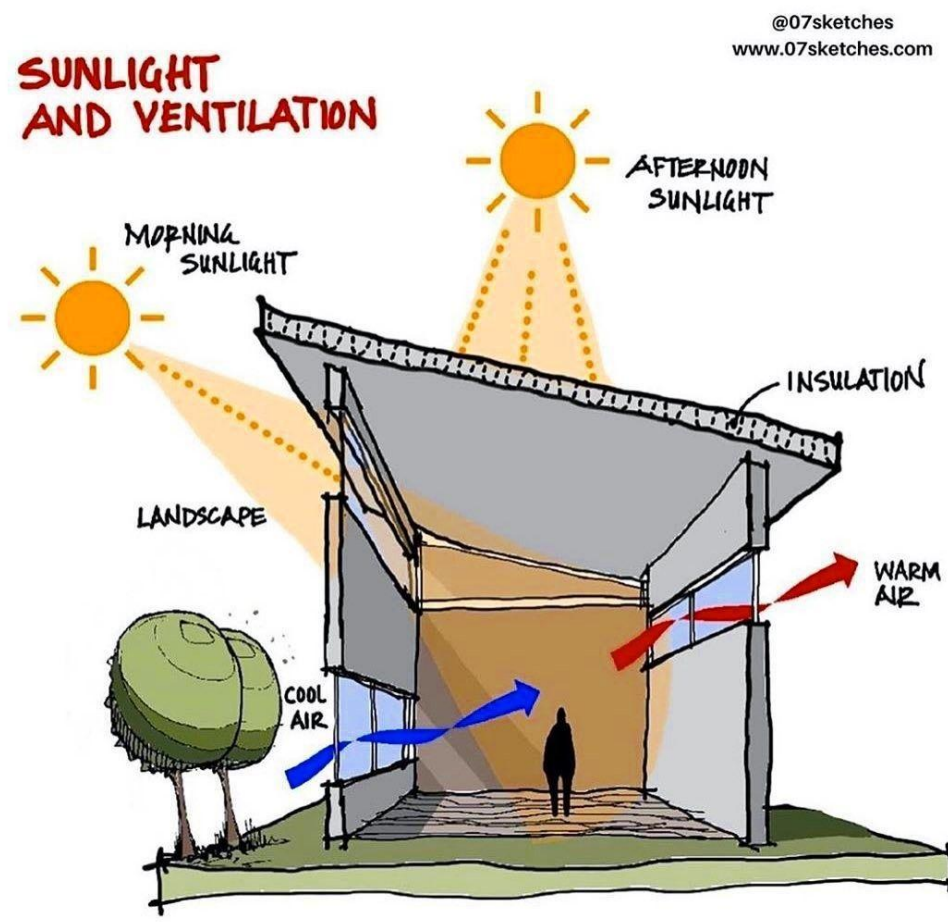
Window Location
In cold climates like Minnesota, placing large windows on south-facing walls helps capture warmth and daylight. While north-facing windows lose heat, they still provide soft, indirect light.

To maximize solar gain, use heat-absorbing materials such as brick or tile indoors, and choose windows with an SHGC of 0.4 or higher and a U-Factor of 0.32 or lower. East and west-facing windows may cause summer overheating due to the low sun angle, so shading solutions like overhangs or landscaping are essential to keep cooling costs down.

Installation
Windows must be flashed and sealed according to manufacturer instructions to maintain warranty coverage and prevent water intrusion. Installers should preserve the drainage plane created by housewrap and *flashing* to ensure moisture flows away from the building.

Choose a qualified contractor familiar with your window type, and always verify references, compare bids, and confirm they offer a workmanship warranty.

Refer to this NAHB guide[71] for further information.



Storm Window
Storm windows are secondary windows installed either inside or outside of your home's existing windows to improve insulation, reduce drafts, and protect against harsh weather. They're especially useful for older homes with single-pane windows that lack modern energy efficiency.

To ensure performance, choose models with weatherstripping, durable materials, and interlocking or overlapping joints to seal out air and moisture.[72]

71. https://www.nahb.org/-/media/NAHB/advocacy/docs/top-priorities/codes/technotes/tn05-window-and-door-flashing-201705.pdf
72. https://www.energy.gov/energysaver/storm-windows

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Doors[73]

Replacing outdated doors or adding storm doors can improve energy efficiency, but often simple maintenance does the trick. Start by inspecting and replacing worn weatherstripping. It's a quick fix that stops drafts and saves energy. If your door needs more than that, consider investing in a well-insulated, efficient model.

Steel and fiberglass doors with insulated cores (typically polyurethane) offer solid thermal performance, often rated around R-5 to R-6. They often come with magnetic weatherstripping, eliminating the need for extra sealing if installed properly.

Doors with glass, especially sliding patio doors, have lower insulation values due to glass's poor thermal properties. To improve performance, choose models with:

- *Thermal breaks* in metal frames
- Multiple glass panes
- *Low-e* coatings and/or inert gas fills

Sliding doors also tend to seal poorly over time, so opt for brands that allow easy weatherstripping replacement.

Installations

Pre-hung doors come with wood or steel frames and must be installed in a square rough opening for a tight seal and proper swing. Before adding trim, apply expanding foam caulk around the frame and threshold to block air leaks, use care with wood frames to avoid warping. Most pre-hung exterior doors include built-in weatherstripping, but it should be checked annually and replaced if worn.

> ***Weatherstripping*** *is a material or method used to seal gaps around doors and windows to block out air, moisture, dust, and noise. It helps improve energy efficiency by preventing drafts and keeping conditioned air inside your home.*
>
> *Common materials include rubber, foam, vinyl, felt and metal around door frames.*

73. https://www.energy.gov/energysaver/doors

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Storm Doors
A smart upgrade for older doors still in good shape but offer minimal energy savings when added to newer, insulated doors.

To boost efficiency, choose models with:

- *Low-e* glass or glazing
- Foam-insulated metal frames (less maintenance than wood)
- Convenience features like self-storing or sliding screens and panels

If installing a glass storm door, avoid trapping heat, especially on sunlit doors. *Low-e* glass helps reduce heat buildup. Always follow manufacturer guidelines. Storm doors for patio doors exist but rarely improve efficiency if the base door is already multi-glazed and *low-e*. For added insulation, consider cellular shades that can be closed at night or on sunny days.

REMEMBER: *When purchasing sustainable doors (some points also apply to other home interiors), pay attention to:*

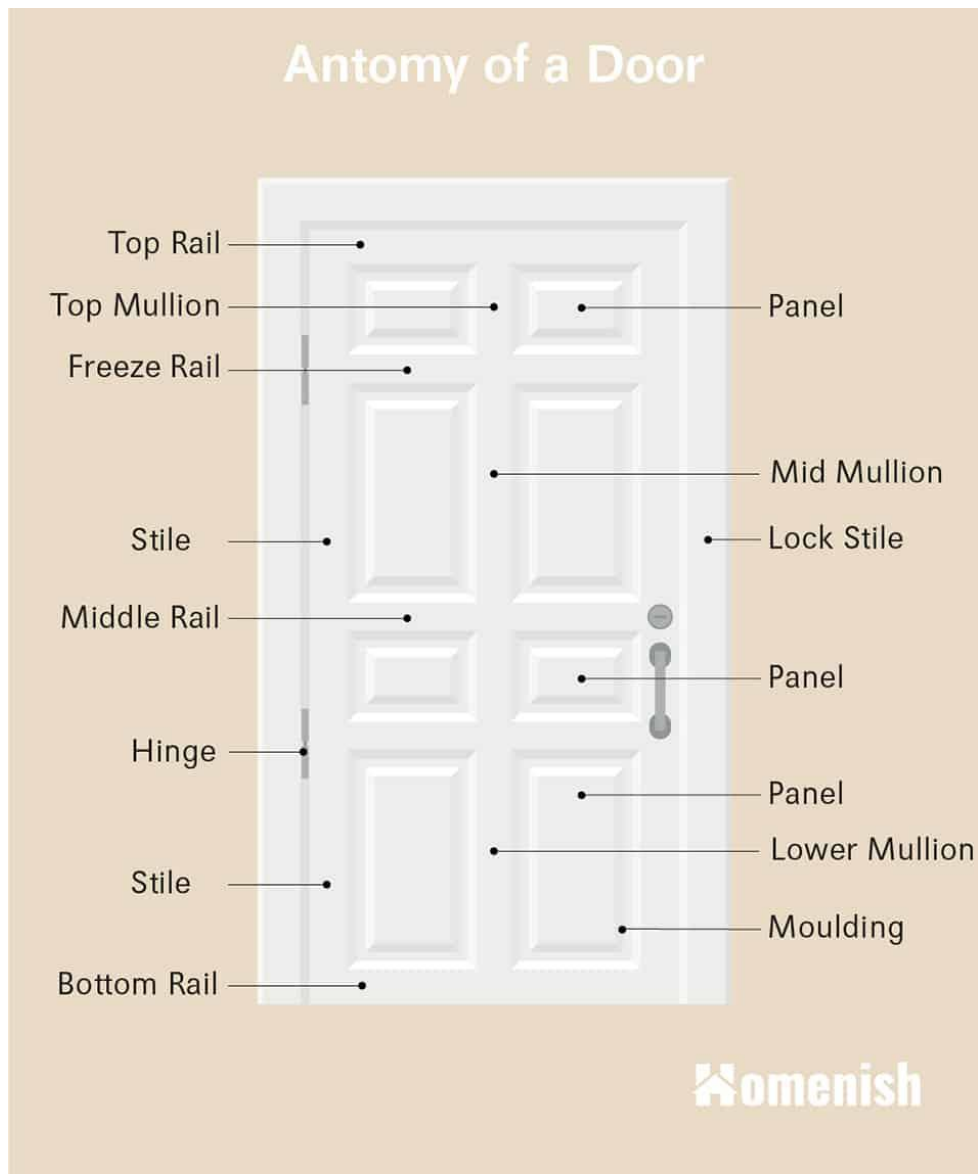
Materials:
Reclaimed wood, FSC-certified lumber
Recycled metal, aluminum or fiberglass
Low VOC finishes and sealants

Energy Efficiency:
R-value insulation performance
Airtight seals
Low-E glass doors

Sourcing:
Locally produced or regionally sourced
Environmentally conscious practices

Certifications:
ENERGY STAR-rated doors
Cradle to Cradle

Lifecycle:
Recyclable or biodegradabile
Long-lasting materials



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Performance Considerations

This focus on how exterior materials and systems stand up to weather, improve energy efficiency, and protect the home's structure. Key factors include moisture control, durability, and solar response. Smart choices here help extend building life, cut energy costs, and support a healthier indoor environment.

*A **blower door test** is an effective method for evaluating the airtightness of a building envelope. Leaks and openings, especially hidden attic bypasses, can significantly reduce thermal efficiency and introduce moisture issues.*

Because these areas are often covered with insulation and difficult to detect, a professional home energy audit is key to uncovering and addressing them.

Identifying and sealing these weak points improves overall performance by reducing energy loss and protecting indoor comfort.

Moisture Management

Air Sealing & Vapor Barriers

Air sealing involves closing gaps, cracks, and penetrations in a building's envelope to prevent unwanted airflow between conditioned indoor spaces and the outdoors. Common leak points include window frames, door thresholds, attic hatches, plumbing penetrations, and electrical outlets.

Professionals often use blower door tests to locate leaks and apply sealants like caulk, spray foam, or foam gaskets to seal them.[74]

Vapor barriers are materials designed to prevent moisture vapor from passing through walls, ceilings, and floors. They're critical in controlling condensation, which can lead to mold, rot, and insulation degradation. Vapor barriers are typically installed on the warm side of the insulation.[75]

Blower Door Test[76]
Use a powerful fan mounted in an exterior doorway to either pressurize or depressurize your home.

This creates a pressure difference between the inside and outside, which forces air through any leaks or gaps in the building envelope.

Technicians measure how much air escapes or enters.

74. https://sealed.com/resources/the-definitive-guide-to-air-sealing-your-house/
75. https://www.trenchguys.com/blog/vapor-barriers-and-insulation-how-they-work-together
76. https://www.energy.gov/energysaver/blower-door-tests

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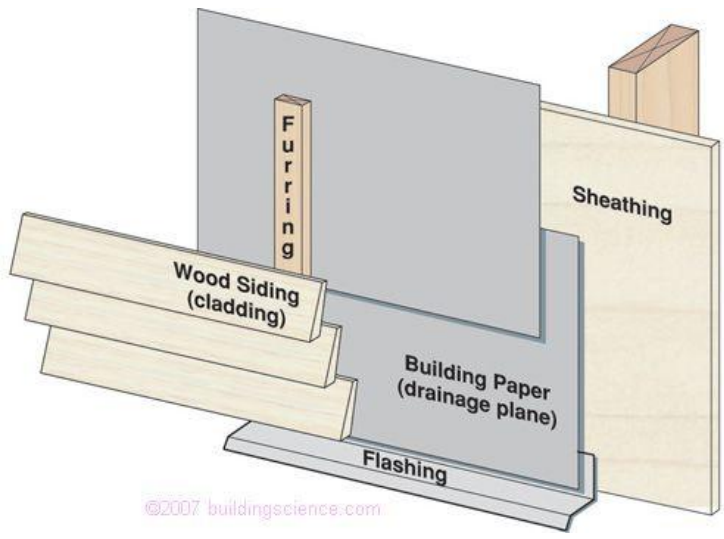
Ice dams commonly affect Midwestern homes. They form when heat escaping through the roof melts snow, which then refreezes at the roof's edge. This ice blocks drainage, causing water to back up and leak into the home. The permanent fix is to air seal and insulate the attic. As a temporary measure, snow should be removed using a roof rake shortly after each snowfall.

Courtesy to This Old House

For more guidance, see this resource.[77]

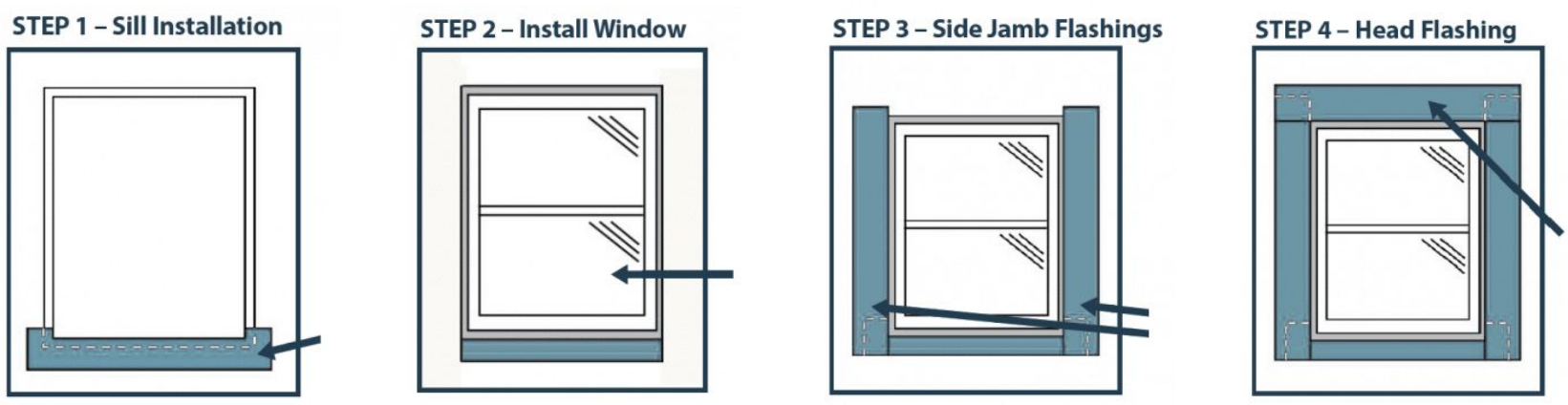
Drainage Plane

This is a critical component in managing rainwater and protecting building enclosures. Its purpose is to direct any water that penetrates the outer cladding downward and outward, away from the structure.



This system is typically made of house-wrap, felt, or paper, along with *flashing* around openings like windows and doors. Materials should overlap or be sealed to ensure water flows down and out without getting trapped. In a climate like MN, materials should be vapor permeable to allow moisture inside walls to dry outward.[78]

Openings like windows, doors, and vents are prime spots for moisture and air leaks. **Proper *flashing*** are overlapping materials that guide water away from wall interiors. *Flashing* should be installed at heads, jambs, and sills using self-adhering elastomeric membranes, metal, or plastic components. Avoid glues and tapes—they often degrade over time and compromise the seal.[79]



Courtesy to Premier Building Solutions

77. https://extension.umn.edu/protecting-home-rain-and-ice/dealing-and-preventing-ice-dams
78.https://buildingscience.com/documents/information-sheets/drainage-plane-water-resistive-barrier
79. https://buildingscience.com/documents/information-sheets/common-flashing-details

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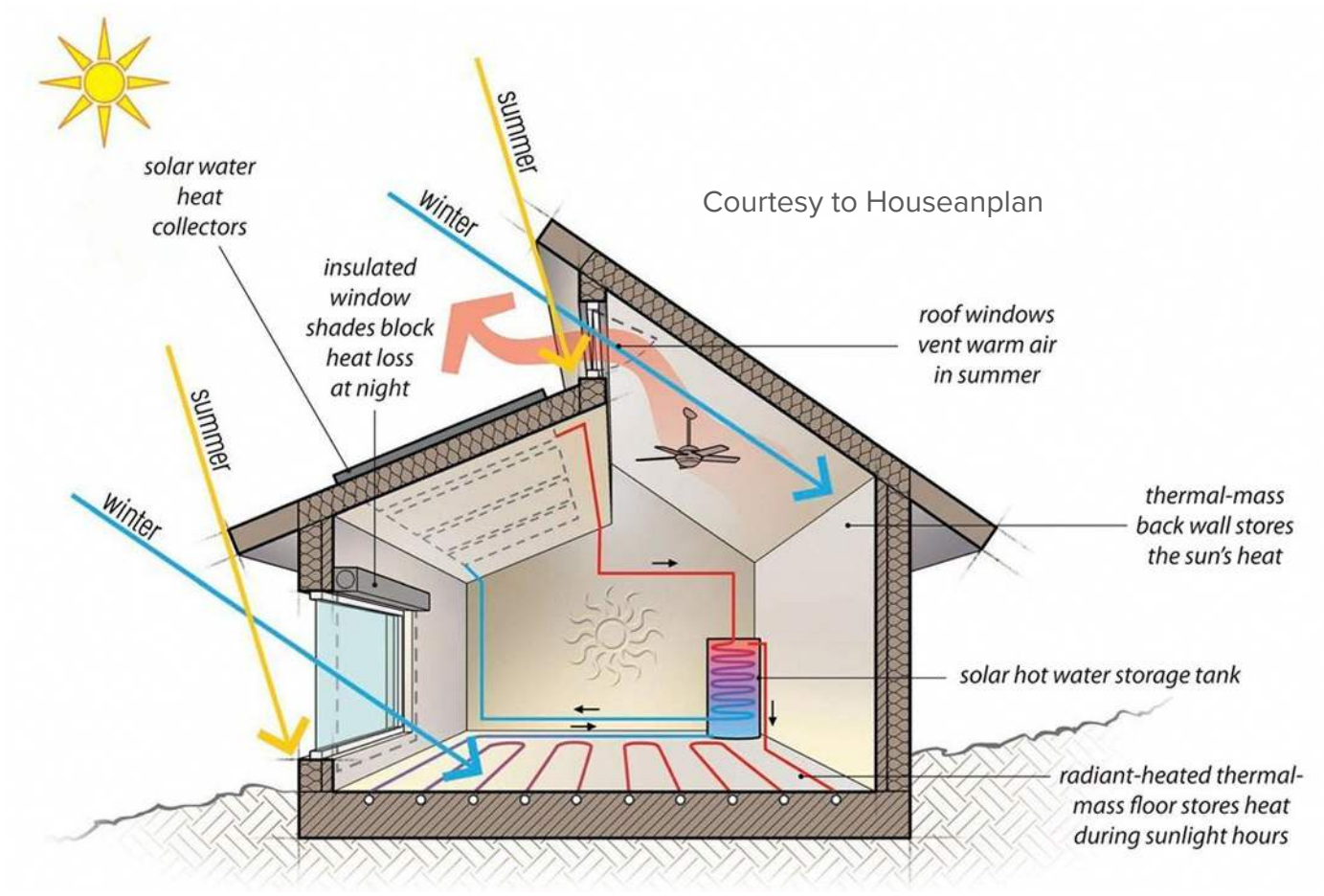
Passive Solar Design

Passive solar design is a smart, low-tech way to heat and cool buildings by harnessing the sun's energy without using mechanical systems like pumps or fans. It's all about using a building's orientation, layout, and materials to naturally regulate indoor temperatures year-round.



Elements of Passive Solar Design*

Orientation – South-facing windows (in the Northern Hemisphere) capture the most winter sun.
Windows – Cold climates call for fewer windows on north, east, and west walls. In warm areas, use shaded south and north-facing windows. Look for ENERGY STAR®-qualified windows to boost performance.
Absorber – Dark surfaces absorb heat.
Thermal Mass – Materials below the absorber stores the heat and slowly releases it, especially helpful during the winter to keep rooms cozy.
Heat Distribution – Heat moves via *conduction*, *convection*, and *radiation*. Some homes use fans or ducts to help move the warmth around.
Control – Overhangs and vegetation offer passive shading, while tools like thermostats, vents, and low-e blinds actively manage indoor temperature.

https://www.energy.gov/sites/default/files/2021-08/ES-Passive%20Solar%20design_081321.pdf

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Landscaping

Sustainable landscaping is all about designing outdoor spaces that work with nature not against it. It emphasizes low-impact, eco-friendly practices that conserve resources, support biodiversity, and reduce maintenance over time.

Key Features:

Native Plants: Thrive in local conditions with minimal water and fertilizer.
Water Conservation: Uses drip irrigation, rain barrels, and drought-tolerant species.
Soil: Enriched through composting and organic mulching.
Energy Efficiency: Strategic planting (like shade trees and windbreaks) reduces heating/cooling needs.
Wildlife support: Provides habitat for pollinators, birds, and beneficial insects.
Waste reduction: Recycles yard waste and uses reclaimed materials for hardscaping.

The Minnesota Department of Natural Resources recommends starting with the following steps:[80]

1. **Assess Your Property**
   - Map out your home, nearby buildings, pathways, utilities, trees, gardens, shrubs, and other features.
2. **Clarify Your Goals**
   - Define how you want to use the space and how long you plan to live there.
3. **Set a Budget**
   - Establish how much you're willing to invest in your landscape project.
4. **Create a Design Plan**
   - Gather inspiration by exploring gardens, reading reference materials, and sketching ideas.
5. **Prepare and Build**
   - Get your site ready and implement your landscape plan.

80. https://www.dnr.state.mn.us/gardens/nativeplants/landscaping_steps.html

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Native and Adaptive Plants

Incorporating native and adaptive plants into your landscape is a smart, eco-friendly choice that benefits both your yard and the surrounding environment.

Native plants are species that have naturally evolved in your region over centuries. Because they're perfectly adapted to local soils, climates, and seasonal patterns, they thrive with minimal watering, fertilization, and maintenance. They also provide vital habitat and food for native wildlife, including pollinators like bees, butterflies, and birds.

Adaptive plants are non-native but climate-resilient species that grow well in your region without threatening the balance of natural ecosystems. These plants are especially useful when you want diversity or specific aesthetics while still maintaining sustainability.

For La Crescent's native species, access this resource.[81]

For more information, the MN DNR[82] has other guides and resources for native planting.

Water Conservation

The way you design your yard can significantly influence water management. Choosing climate-appropriate plants helps reduce irrigation needs while also preventing soil erosion, runoff, and pollution. Integrated features like rain gardens, permeable surfaces, and drainage systems further improve stormwater absorption and minimize contamination of nearby waterways.

Efficient Sprinkler Types

Choosing the right sprinkler head can make a big difference in how effectively your landscape uses water.

- **Rotary spray heads** release water in a steady, thicker stream that penetrates the soil more easily. This minimizes water loss due to wind drift and evaporation, making them ideal for larger areas and windy conditions.[83]

81.https://docs.google.com/presentation/d/18FzBYh59UqTZcLDEr7urcv_lVtWbdctCZmgcG3MGrOo/edit?usp=sharing
82. https://www.dnr.state.mn.us/gardens/nativeplants/index.html
83.https://www.energy.gov/femp/water-efficient-technology-opportunity-multi-stream-rotational-sprinkler-heads

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Drip Irrigation is a water-efficient alternative to traditional sprinklers, delivering water directly to plant roots and minimizing loss from wind, runoff, and evaporation. These systems can use 20–50% less water and save up to 30,000 gallons annually.

For optimal results, consult an EPA WaterSense Certified Professional to design and install an efficient irrigation setup.

WaterSense[84] *is a voluntary program by EPA that helps consumers and businesses save water.*

What It Does:
Labels water-efficient products like faucets, toilets, showerheads, and irrigation systems that meet EPA criteria for performance and efficiency.

Promotes water-saving practices for homes, businesses, and landscapes.

Why It Matters:
WaterSense-labeled products use at least 20% less water than standard models. It helps water bills, conserve resources, and protect the environment.

To boost irrigation efficiency:[85]

- Install a **separate water meter** to track usage, detect leaks early, and potentially lower wastewater fees.
- Use **alternative water sources** like rainwater, air conditioner condensate, or boiler blowdown instead of drinking water.
- Choose **WaterSense-labeled** products, such as smart controllers and sprinkler bodies, which meet EPA standards for water savings, performance, and reliability.

Stormwater Management

Your yard can do more than look good—it can protect your home from runoff. Slope the ground away from your foundation and keep vegetation at safe distances to avoid flooding. Then discover eco-friendly strategies to absorb, slow, and reuse stormwater naturally.

Rain barrels and cisterns are great tools for harvesting roof runoff to slow stormwater or reuse it for irrigation. You can buy ready-made versions or build your own.

Rain Barrel: Elevate your barrel for better pressure and direct rainwater from your downspout. Use the base spigot and guide overflow to proper drainage.

DIY options available.
Refer to this resource.[86]

84. https://www.epa.gov/watersense
85.https://www.epa.gov/sites/default/files/2017-12/documents/ws-commercialbuildings-waterscore-irrigation-landscape-guide.pdf
86. https://www.epa.gov/soakuptherain/soak-rain-rain-barrels

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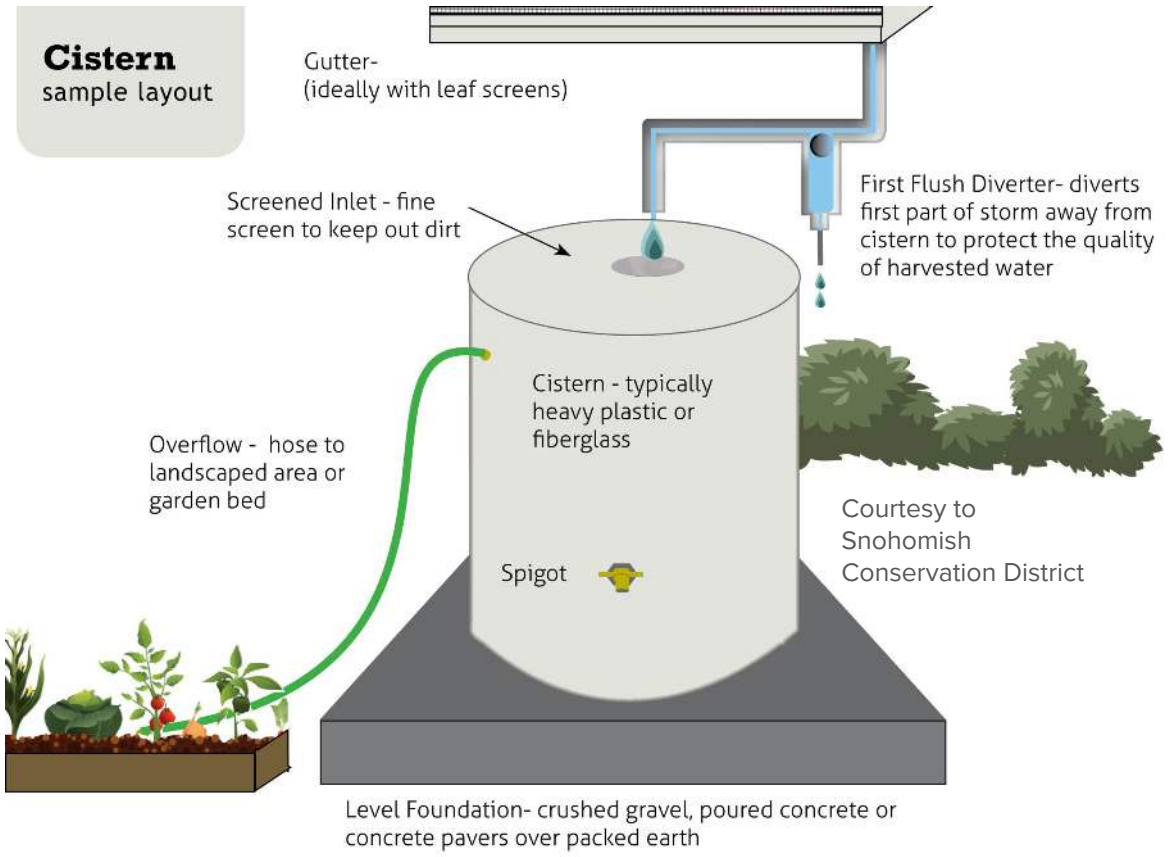
Cisterns: Large rainwater storage tanks, typically collecting runoff from rooftops for household use such as flushing toilets, gardening, or laundry.

Drinking use is possible but requires careful design to ensure water safety.

Cisterns can be above or below ground, with features like overflow pipes, plastic linings, and pumps for water delivery.



When using cisterns for drinking water, make sure the roof is galvanized steel or aluminum to avoid organic buildup. Keep trees away to prevent debris and animal waste, and always filter water before storage. Keep in mind that roofing materials can affect water quality.

Refer to the MPCA's resource[87] on cisterns.

Rain Gardens

Shallow plant beds that slow rainwater runoff, letting it soak into the soil to reduce erosion and pollution without causing puddles like traditional lawns. This helps prevent erosion and filters out pollutants before water reaches streams or lakes.

For best results:

- Choose a low spot or an area that naturally gathers water.
- Test the soil to ensure it drains well.
- Fill the garden with native plants that love damp soil, many will also attract birds and butterflies.

The EPA offers a comprehensive guide on rain gardens. Refer to this resource.[88]

Blue Thumb Planting for Clean Water[89] is a MN-based partnership that helps homeowners and communities use native plants, rain gardens, and shoreline stabilization.

87.https://stormwater.pca.state.mn.us/index.php?title=MS4_fact_sheet_-_Rainwater_Harvesting_/_Stormwater_Reuse_%26_Rain_Barrel_Programs
88. https://www.epa.gov/soakuptherain/soak-rain-rain-gardens
89. https://bluethumb.org/raingardens/#r68742f9b33e1a3a

Key
Glossary Terms: *Italicized*
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Drain Tiling
An underground system using perforated pipes and layered rocks to absorb and redirect excess groundwater, often away from foundations or retaining walls, to features like rain gardens, *bioswales*, or *culverts* that can be designed to resemble dry streambeds.

Courtesy to family handyman

How It Works:
Perforated pipes are laid beneath the surface, often surrounded by gravel or rock to aid water flow. These pipes collect groundwater and redirect it to safe outlets like rain gardens, *bioswales*, *culverts*, or dry streambeds.

While it boosts productivity, drain tiling can also accelerate nutrient runoff, especially nitrogen, into nearby water bodies.

Soil

Soil-focused landscaping centers on shaping the terrain to cultivate plant life, elevate the beauty of your outdoor space, and foster a thriving environment—all starting at the ground level. By layering compost and organic mulches, you can turn basic soil into a rich, living foundation that supports gardens, lawns, and sustainable green features.

Composting Essentials[90]

- Use leaves, grass clippings, vegetable scraps, coffee grounds, and small twigs.
- Compost piles should be 3–5 feet wide and contained in bins or barrels to retain heat and moisture.
- Alternate layers of organic material, nitrogen sources (like manure or fertilizer), and soil or finished compost.
- Keep the pile moist and turn it monthly to maintain oxygen flow.
- Well-managed piles decompose in 2–4 months during warm seasons.

Avoid composting pet waste, meat, dairy, and diseased plants.

90. https://conservancy.umn.edu/items/2ad81f22-83f1-42fa-bad5-c65d6d2b74f5

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Glossary Terms: *Italicized*
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Wildlife Support

Pollination occurs when wind, water, or animals transfer pollen between flower parts, helping plants reproduce. Nearly 90% of flowering species depend on animals for this process. These pollinators support food production, ecosystem stability, and even *carbon capture*.

Refer to this MN DNR page[91] for more information about MN's pollinators.

Butterfly Garden
A combination of plants and decorative stones to attract and shelter butterflies. Nectar-rich flowers like milkweed are used to feed adult butterflies and caterpillars.

The Morning Sky Greenery[92] is a nursery based in MN that specializes in native species. Refer to the site to find native plants that attract butterflies.

Bees
Honeybees are crucial for pollinating the foods we rely on, but they're in steep decline. You can help by planting native flowers in bold swaths of color. This makes it easier for bees to find food. Herbs like lavender, mint, and thyme are great additions.

To find native plants that attracts bees, refer to the University of MN Bee Lab.[93]

Birds
Fruit-bearing shrubs and seed-producing trees welcome songbirds and hummingbirds. These plants offer natural food sources like seeds, nectar, and berries. Unlike feeders, trees and shrubs support healthier migration by avoiding winter overfeeding.

Refer to the Morning Sky Greenery for more info.

91. https://www.dnr.state.mn.us/pollinators/index.html
92. https://www.morningskygreenery.com/?cPath=47_49
93. https://beelab.umn.edu/plants-mn-bees

Key
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Location

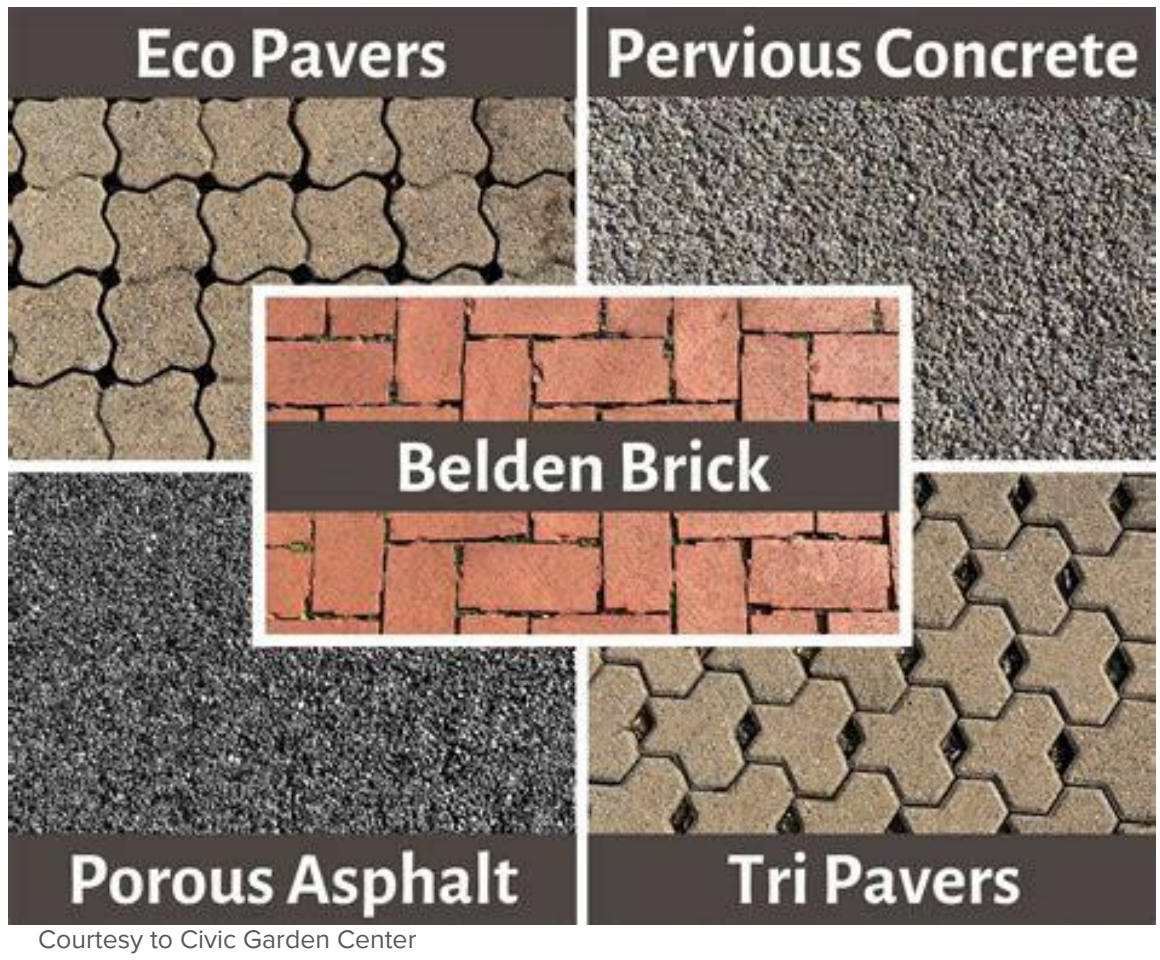
Place deciduous trees on the south and southwest sides of your home to block summer sun and keep things cool. Evergreens on the west and north sides shield against winter winds to help retain warmth. Keep large trees away from homes, sidewalks, and utility lines to avoid damage.

Always call Gopher State One Call[94] at 1-800-252-1166 at least 48 hours before digging to safely locate underground utilities.

Paving for a Cooler Landscape
Urban areas heat up fast due to dark hard surfaces like roofs, roads, and driveways. If you're updating a driveway or patio, opt for light-colored paving to reflect more sunlight and reduce heat absorption.

Consider pervious paving materials that let rainwater soak into the soil. When pervious options aren't feasible, recycled concrete or asphalt are smart alternatives.

For guidance on landscape materials and certified professionals in Minnesota, check out Minnesota Nursery and Landscape Association.[95]



Courtesy to Civic Garden Center

94. https://www.gopherstateonecall.org/
95. https://www.mnla.biz/

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Chapter 2: FAQ

Q: What are the common types of insulation?

Fiberglass, which are made from fine glass strands. Cellulose, created from recycled paper. Mineral wool, formed from rock or industrial byproducts. Foam boards and natural options like sheep's wool and cork.

Q: What steps should be taken if asbestos are identified in your home?

Asbestos was popular for its durability and fire resistance but is now banned in many countries. Homes built before 1980 may still contain it. If suspected, do not disturb it. Hire a certified asbestos professional for inspection and removal.

Q: What are R-value and U-value?

R-value: Measures how well insulation resists heat flow. The higher the R-value, the better it keeps heat in during winter and out during summer.
U-value: Indicates how easily heat passes through a building element, like a wall. A lower U-value means better insulation performance.

Q: What insulation materials are sustainable?

Products made with recycled or bio-based content. Natural fiber batts, cellulose, and EPS boards are great options. Don't forget to compare lifetime energy performance, emissions, and environmental impact before choosing.

Q: Are skylights and solar tubes energy-efficient?

Skylights add daylight but may cause heat loss if not double-paned or properly flashed. Solar tubes are a better alternative for light with minimal energy impact.

Q: What's the deal with roof ventilation?

Proper ventilation prevents moisture buildup and attic mold, helps maintain consistent indoor temperature, and prolongs the lifespan of roofing materials. Avoid mechanical ventilation systems in cold roofs, which can worsen condensation.

Q: What are some roofing mistakes to avoid?

Ignoring proper flashing or air sealing. Have poor drainage planning (causing water pooling). Improper ventilation (leading to heat/moisture issues). One misstep can compromise the system, leading to leaks, energy loss, rot, and material failure.

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Q: Should I replace or upgrade existing windows?

Consider repairs or add-ons first. Fix cracked or warped glass. Replace broken sashes or panes. Seal air leaks with weatherstripping or caulk. Add storm windows for insulation and to reduce drafts.

Q: What types of window glazing are best?

Double-glazed are most common, it balances costs and performance. Triple-glazed has better insulation and is most ideal for cold climates or passive solar homes. Low-E coatings are thin metal layers that reflect heat back inside while blocking UV light. These coatings in a climate like MN should be placed on the innermost glass surface.

Q: What do I need to know about window installation?

Flashing and sealing should follow manufacturer instructions to prevent leaks and maintain warranty coverage. Preserve the drainage plane so water flows away from your home. Hire certified contractors who have experience with your window type, offer a workmanship warranty, and provide verified references.

Q: Why consider storm windows?

Storm windows are secondary units mounted over existing windows. They are ideal for older homes with single-pane glass. Storm windows reduce drafts, weather damage, and heat loss.

Q: Why is weatherstripping important?

Weatherstripping seals gaps around doors to block air, moisture, dust, and noise. It also improve indoor comfort and efficiency. The common types of material are rubber, foam, vinyl, felt and metal.

Q: Should I get a storm door?

Storm doors are secondary doors that add insulation and protect against harsh weather. They are ideal when the existing door is older but structurally sound, and the desire for full performance without purchasing a new door.

Q: What makes a door sustainable?

FSC-certified wood, recycled metal or fiberglass, low-VOC finishes for materials. The door should have a high R-value, airtight seals, and low-E glass. The sourcing should ideally be locally made with eco-conscious production. Overall, the door should be long-lasting, durable and recyclable.

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Q: Why is moisture management important?

It protects your home from mold, structural damage, insulation degradation, and indoor air quality issues. Smart management includes proper air sealing, vapor barriers, drainage planes, and effective flashing.

Q: How to prevent ice dams?

Ice dams form when heat escapes through the roof, melting snow which refreezes at root edges. This traps water under shingles, leading to leaks. A permanent fix is to seal attic bypasses, have proper attic ventilation and insulation. A temporary fix is to remove snow after each snowfall.

Q: How does flashing protect your home?

Flashing channels water away from vulnerable areas like window sills, door thresholds, and vents. Avoid tapes or glue as these degrade over time and may fail. Metal or plastic flashings are better alternatives.

Q: What are the elements of a passive solar design?

Passive solar uses the building's shape and layout to heat/cool naturally without mechanical systems. The key elements are orientation, window placement, absorber, thermal mass, heat distribution, and control.

Q: What is sustainable landscaping?

It's creating outdoor space that benefits you and the environment. Sustainable landscaping works with local ecosystems, uses fewer resources like water and fertilizer, and promotes biodiversity.

Q: How to get started on landscaping?

Assess your space such as mapping out the area. Set your goals by deciding how the space should be used. Know your budget. Plan the design and prep the site for building.

Q: Why choose native and adaptive plants?

Native plants naturally thrive in your region and need less care. They attract pollinators like bees, butterflies, and birds. Adaptive plants are climate-tough non-natives that don't disrupt local ecology. They help expand design options.

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Q: What are some water-efficient options for landscaping?

Consider rotary spray heads and drip irrigation. Rotary spray heads are steady thick streams that resist wind and minimizes water loss. Drip irrigation delivers water directly to roots. Drip systems can cut water use by 20-50% annually.

Q: How to make my irrigation system more eco-friendly?

Install a separate water meter to monitor usage and detect leaks. Use rainwater for irrigation instead of potable water. Choose WaterSense-labeled products. Work with an EPA WaterSense Certified Professional for optimal setup.

Q: What are stormwater solutions for my yard?

Try out rain barrels or cisterns. Rain barrels can capture roof runoff for reuse and reduces flooding. Cistern are large tanks great for irrigation, toilets, or other non-potable uses. But if using water from the cistern for indoor use, ensure the water is filtered.

Q: What is WaterSense?

WaterSense is an EPA initiative that helps certify products that use at least 20% less water. It support water savings without sacrificing performance. Look for the WaterSense label when choosing faucets, showerheads, irrigations, toilets.

Q: Where should I place a rain garden?

Choose a low spot that naturally collects water. Avoid areas near septic systems or steep slopes. Keep it 10 feet from foundations and test soil for drainage.

Q: How do I compost effectively?

Use leaves, grass clippings, veggie scraps, twigs. Alternate organic layers with nitrogen-rich material and finished compost. Keep piles moist and turn it monthly. Avoid composting meat, dairy, pet waste, or diseased plants.

Q: How can I support wildlife?

To attract bees, plant bold swaths of native wildflowers. To attract butterflies, use nectar-rich flowers like milkweed and add stones for basking. To attract birds, plant seed or fruit bearing shrubs and trees.

Q: How does paving affect landscape?

Hard surfaces trap heat and block water absorption. Better options include light-colored paving, pervious materials, and recycled asphalt or concrete for low-impact construction.

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End of Chapter 2

La Crescent MINNESOTA

Growing from River to Ridge

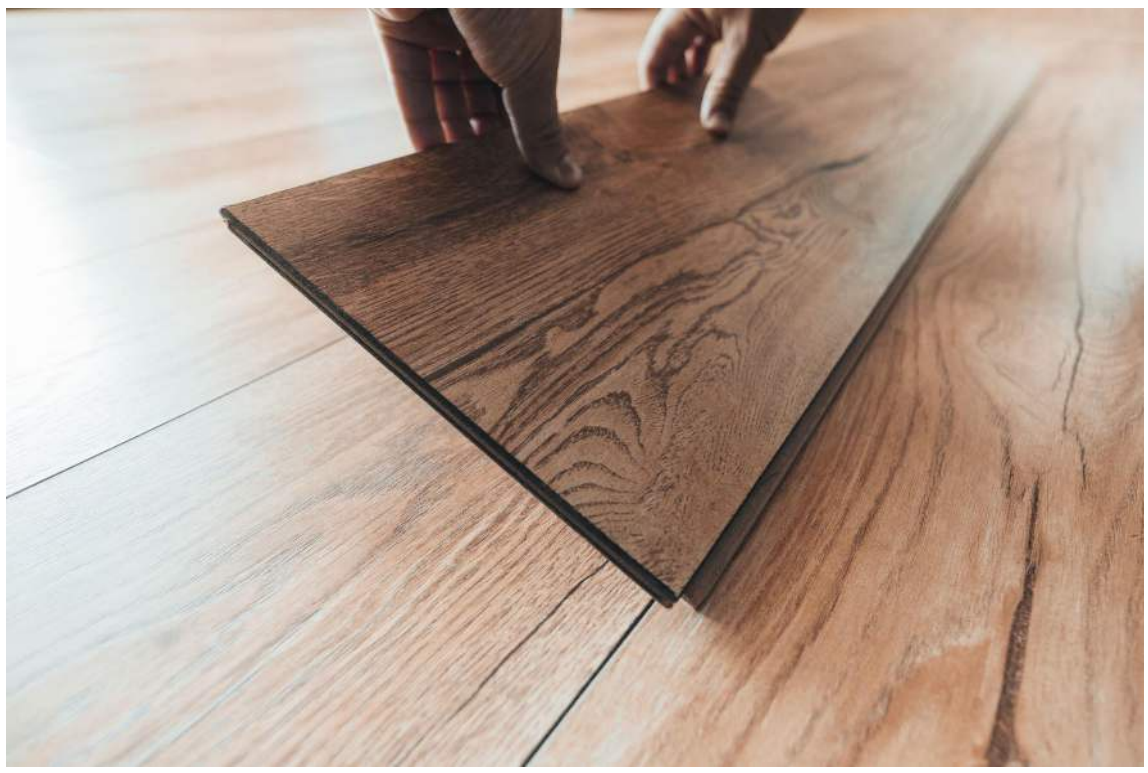
Chapter 3: Home Interiors

Where you live affects how you feel. Healthier materials, mindful energy use, and smart home upgrades can transform your space into a haven for you and the planet. This guide covers everything from simple tweaks to impactful changes, all designed to boost your home's health.

Material Selection

Choosing the right materials for your home affects everything from comfort and durability to energy efficiency and indoor air quality. Look for materials that are long-lasting, low in harmful chemicals (like *VOCs*), and suited to your local climate.

Thoughtful material selection not only enhances your home's performance but also supports a healthier living environment



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Clean Air, Safe Spaces

When designing or renovating home interiors, it's important to be mindful of materials that could impact health, sustainability, or long-term performance. Here are some to watch out for:

High-VOC paints and finishes – *Volatile organic compounds (VOCs)* can *off-gas* harmful chemicals into the air, potentially causing respiratory issues or headaches.

Formaldehyde-based products – Often found in pressed wood furniture, cabinetry, and some flooring, formaldehyde is a known irritant and possible *carcinogen*.[96]

PVC (polyvinyl chloride) – Common in vinyl flooring and wall coverings, PVC can release toxic chemicals during production and disposal, and may *off-gas* phthalates indoors.[97]

Flame retardants in upholstery and foam – While intended for safety, some older or poorly regulated flame retardants have been linked to hormone disruption and other health concerns.[98]

Synthetic carpets and adhesives – These can emit VOCs and trap allergens or moisture, especially if not properly ventilated or maintained.[99]

Not only is the above considerations to look out for, we spend most of our time indoors, where air can be more polluted than outside. To stay healthy, it's important to reduce exposure to hazards like mold, radon, lead, and carbon monoxide.

Mold – it becomes a problem when excess moisture is present. Left unchecked, it can damage surfaces and worsen conditions like asthma and allergies. It often shows up in basements or areas with poor insulation and ventilation. Preventing moisture buildup is the key to keeping mold at bay.

Radon – an invisible, odorless gas that forms naturally in soil as uranium breaks down. It can enter homes through cracks in foundations or walls, and its radioactive particles may raise the risk of lung cancer when inhaled. Sealing entry points and installing a radon mitigation system can help reduce indoor levels effectively.

96.https://www.pdrcorp.com/our-voice/articles/a-simple-interior-designers-guide-for-healthy-material-selections/
97. https://www.ecocenter.org/phthalates-toxic-chemicals-vinyl-plastic
98. https://www.niehs.nih.gov/sites/default/files/health/materials/flame_retardants_508.pdf
99. https://www.ewg.org/healthyhomeguide/carpet/

Key
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Lead – a harmful metal once widely used in household products, especially in paint before 1978. Exposure can seriously affect brain development and cognitive function, making it especially dangerous for children.

Carbon Monoxide (CO) – a colorless, odorless gas produced when fuels burn incompletely. It can replace oxygen in the body, leading to poisoning or death. Common sources include gas appliances, fireplaces, generators, and car exhaust. Because it's undetectable by our senses, CO can build up unnoticed indoors. Prevent risks by installing CO alarms and keeping fuel-burning equipment well maintained.[100]

Surfaces

When choosing surfaces for kitchens, bathrooms, shelves, etc, look for materials that balance durability with environmental responsibility.

Prioritize products with multiple eco-friendly traits:[101]

- **Waste-conscious** – made from *salvaged* or reused materials
- **Durable** – built to last, reducing replacement needs
- **Locally-sourced** – minimizes transportation emissions
- **Sustainably produced** – *FSC-certified* or low-impact manufacturing
- **Low-emissions** – emits little to no VOCs or harmful pollutants
- **End-of-life friendly** – recyclable or compostable

100. https://www.health.state.mn.us/communities/environment/air/index.html
101. https://www.usgbc.org/articles/green-building-101-sustainable-materials-and-resources

Key
Glossary Terms: *Italicized*
Links: Underlined

The table below highlights a selection of sustainable surface materials, along with eco-friendly attributes and optional locations.[102]

Materials	Attributes	Where to buy?
Bamboo	Renewable, lightweight, some *FSC-certified* options	Available at Green Building Supply
Reclaimed Wood	*Salvaged* from old structures, reduces demand for new lumber	Wood From the Hood Minneapolis-based, ships statewide
Recycled Glass	*Post-consumer content,* design variety, non-toxic binders	GlassArt Design Minneapolis
Paper Composite	Recycled paper, low VOC, heat resistant	Green Building Supply
Concrete with Recycled Content	Long-lasting, customizable	Living Stone Concrete Design MN-based, not recycled but sustainably manufactured
Local Stone	Durable, minimal processing, regionally sourced	Biesanz Stone Based in Winona, MN
Quartz	Engineered stone, recycled content	Cambria USA family-owned, MN retailers available
Linoleum	Linseed oil & natural materials, *biodegradable*	Galaxie Floor Stores Minneapolis
Laminate with Low-VOC Adhesives	Affordable, greener adhesives, durable	Menards - La Crosse Look for labels FloorScore®, CARB2 or GREENGUARD Gold

102. https://greencitizen.com/blog/sustainable-building-materials/

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Bamboo

Bamboo is a sustainable, durable, and attractive material for green home surfaces. It matures in just 3–5 years, making it a fast-growing alternative to hardwoods for use in flooring, walls, and countertops.[103]

Reclaimed Wood

This wood is usually *salvaged* from old structures like barns and factories, then cleaned and reused, keeping valuable materials out of landfills and lowering the carbon emissions tied to producing new lumber.[104]

Recycled Glass

This turns discarded bottles and jars into durable, colorful materials for countertops and tiles. It reduces landfill waste and requires less energy than making new glass, which helps cut emissions. The result is a strong, low-maintenance surface that's both eco-friendly and visually striking.[105]

Paper Composite

They are crafted from layers of responsibly sourced paper, natural colorants, and eco-friendly resins, all pressed into dense, resilient slabs. These materials stand out for their sustainable production, aesthetics, and durability.[106]

Recycled Concrete

Instead of sending demolished sidewalks, driveways, or buildings to landfills, the concrete is crushed and reused in new surfaces like patios and countertops. This process helps divert tons of waste and conserves natural resources like gravel and sand.

Local Stone

Natural stone is 100% recyclable, emits no VOCs, and can last for decades or even centuries with minimal maintenance. Because it's quarried nearby, it significantly reduces the carbon emissions associated with long-distance transportation.[107]

103. https://www.nar.realtor/magazine/real-estate-news/home-and-design/sustainable-material-spotlight-bamboo
104. https://buildingrenewable.com/reclaimed-wood-every-know-ultimate-guide/
105. https://www.nar.realtor/magazine/real-estate-news/home-and-design/sustainable-material-spotlight-recycled-glass
106. https://kitchinsider.com/paper-composite-countertops/
107. https://www.naturalstoneinstitute.org/consumers/sustainable-natural-stone/

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Quartz
Many engineered quartz products include recycled materials and use low-emission resins. Because quartz is extremely durable and long-lasting, it minimizes the need for replacement. However, sustainability depends on the brand's practices.[108]

Linoleum
Linoleum is a classic green surface material that's made almost entirely from natural, renewable ingredients. True linoleum is crafted from linseed oil, cork dust, wood flour, pine resin, and natural pigments. This makes it *biodegradable*, low-VOC, and free from synthetic plastics like PVC.[109]

Laminate with Low-VOC Adhesives
Traditional laminates often contain *volatile organic compounds (VOCs)* in their adhesives and finishes. Low-VOC laminates, on the other hand, use water-based or bio-based adhesives that emit fewer toxins.

***Wilsonart,** a top laminate producer, manufactures high-pressure laminates (HPL) using up to 32% post-consumer recycled materials and low-emitting adhesives.*

These products meet sustainability benchmarks, including GREENGUARD Gold and LEED v4.1 standards.

*They also own brands like **Laminart**, which focuses on high-end decorative laminates for commercial interiors.*[110]

Paintings, Coatings, Adhesives

When choosing paints, wood finishes, or adhesives, look for products certified by Green Seal or MPI, and select options with the lowest VOC levels available.

Water-based, latex, or plant-based formulas are ideal—plant-based paints may contain natural VOCs like terpenes but avoid toxic pigments and harmful chemicals. Use VOC limit charts, an example given below, to confirm the product meets low-emission standards and contributes to healthier indoor air.[111]

Product	VOC Limit
Flat Interior Paint	50 g/L
Non-Flat Interior Paint	100 g/L
Floor Coatings	100 g/L
General Indoor Adhesives	50 g/L

108. https://citizensustainable.com/quartz-sustainable/
109. https://www.thisoldhouse.com/flooring/21017948/all-about-linoleum-flooring
110. https://www.wilsonart.com/sustainability/laminate
111. https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-59

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Decoding Product Labels

Paints and coatings with **Green Seal, GREENGUARD** or **Cradle to Cradle** labels meet rigorous emission standards, helping you maintain low VOC levels suited to each type of finish.[112]

Eco-Label	What It Certifies
Green Seal	Low-VOC, performance-tested, environmentally preferably packaging
GREENGUARD	Low chemical emissions for indoor air
Cradle to Cradle Certified	Evaluates product safety & environmental impact
MPI Green Performance	Professional-grade paints, low-VOCs
EcoLogo	Certifies reduced environmental impact
SCS Indoor Advantage Gold	Low-VOCs

If certified paints aren't an option, look for the VOC content on the label. This usually reflects the base paint only. Since colorants can increase VOCs, ask the dealer for the total level after tinting.

For custom mixes, choose the lowest-VOC base and confirm the pigment's impact. Some brands now offer zero-VOC pigment systems to keep emissions low, even with color added.

IMPORTANT:
Be cautious when buying products labeled "natural" or "organic."

"Natural" is not a regulated term. It can be applied to anything, even synthetic products. "Organic" refers only to agricultural and food items, not to paints, finishes, or home materials.

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When in doubt, check for third-party certifications like Green Seal or GREENGUARD instead of vague marketing claims.

112. https://www.epa.gov/greenerproducts/identifying-greener-paints-and-coatings

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Smart Finishing Tips

Applying paints, coatings, and adhesives the right way enhances performance, cuts down on unnecessary waste, and lowers the risk of harmful chemical exposure. These smart practices also promote healthier indoor air, align with eco-conscious goals like choosing low-VOC materials, and help create safer living spaces for everyone, both during the project and long after it’s done.

Prep Thoroughly
Start by cleaning surfaces with a gentle detergent and rinsing to remove residue. For better adhesion, sand any glossy or uneven areas until smooth. Choose a primer that's specifically designed for the surface material you're working with.

Choose Low-VOC Products
Choose paints, coatings, and adhesives that are labeled as low- or zero-VOC. Be sure to confirm the final VOC level after tinting, since added colorants can raise the overall emissions.

Use the Right Tools
Use synthetic brushes for water-based paints and natural bristle brushes for oil-based finishes to get the best application results. For rolling, choose foam rollers for flat, smooth surfaces, and thicker nap rollers when working on textured walls or ceilings. Investing in high-quality tools helps reduce streaking and ensures even coverage across all surfaces.

Apply in Ideal Conditions
Keep the temperature and humidity at a comfortable level during application. Make sure the space is well-ventilated to clear fumes and accelerate drying. Always stick to the recommended drying intervals listed by the manufacturer before adding another coat.

Protect Yourself
Safeguard yourself during application by wearing gloves, goggles, and a mask to limit chemical exposure. Avoid direct skin contact and inhaling vapors. After you're finished, store any leftover materials securely or dispose of them responsibly, following local regulations for hazardous waste.

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Floor Finishes

When selecting flooring, it's important to consider options that balance style, durability, and indoor air quality. All flooring, regardless of type, affects your home's air during installation and over time.

For example:

- **Hard surfaces** like wood or tile can release harmful vapors *(off-gas)* from sealants and finishes.
- **Carpets** also *off-gas* and tend to trap particles like dust mites, pollen, pet dander, and moisture, which may trigger allergies or asthma.

To promote a healthier home environment, opt for materials with third-party certifications that meet low-emission standards.

Green Label Plus – ideal for carpets
Green Seal – great for grouts, sealants, and finishes

Look for products with multiple green features:

- Waste reduction
- Recycled content
- Durability
- Locally sourced
- Eco-friendly production
- Third-party certifications
- End-of-life options

Carpet

While carpet is a common flooring choice, it's also one of the least durable, contributing to over 4 billion pounds of carpet waste annually. Burning discarded carpet releases harmful chemicals like dioxins, which pollute the air.[113]

Before installing carpet, explore other flooring alternatives. If you choose carpeting, factor in its composition, fiber type, and potential for *off-gassing*. Carpets consist of:

- **Fiber** – forms texture and pattern
- **Backing material** – structural layer
- **Padding** – adds cushion
- **Stain guard** – may contain *carcinogens*

113. https://www.epa.gov/greenerproducts/identifying-greener-carpet

Key
Glossary Terms: *Italicized*
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Installation
Install carpets according to the manufacturer's instructions. Use low-emission adhesives and select carpets compatible with routine cleaning methods. Follow recommended cleaning practices, and consult CRI's Green Label list for approved vacuum cleaners that meet standards for soil removal, dust control, and appearance retention.

The Carpet and Rug Institute[114] offers more installation tips.

Materials Efficiency
Natural fiber carpets like wool and jute release fewer emissions, but their environmental benefit is debated due to the dyes and cleaning processes involved. A key advantage is their compostability.

Modular carpet tiles require more material upfront due to their thicker backing, but they offer long-term savings by allowing individual replacement of worn or stained tiles instead of the entire carpet. Their smaller size also makes them ideal for access flooring installations and minimizes waste from trimming, particularly in rooms with irregular layouts.

CONSIDER:
Asking manufacturers to support their environmental claims with certifications from recognized third-party auditors. These groups evaluate factors like recycled content and indoor emissions. If independent proof isn't provided, request a signed statement from a responsible company official.

The carpet industry has improved sustainability practices, but impacts still vary by company. Consider asking manufacturers for detailed information about their chemical emission levels, water and energy reduction strategies, and recent environmental goals they've met.

Wood Flooring

Wood flooring is valued for its durability, but environmental impact depends on sourcing and forest management. Locally harvested wood reduces transportation emissions and supports regional economies. Choose materials that are grown and harvested within 10 years, and ensure they come from responsibly managed forests to avoid biodiversity loss, erosion, and flooding.

Avoid products harvested prematurely, as this can disrupt ecosystems. Also consider the environmental footprint of manufacturing processes.

Look for *FSC-certified* products when shopping for wood related products.

114. https://carpet-rug.org/carpet-for-homes/installation-tips/

Key
Glossary Terms: *Italicized*
Links: Underlined

Solid Wood[115]

Most solid wood flooring is crafted from freshly milled lumber, some options use reclaimed wood, which are *salvaged* wood from old buildings, siding, or logs. Manufacturers often restore and rework this wood into flooring and other home finishes, making it a sustainable choice.

The surface finish may need refreshing every 15–20 years. Installation is straightforward, often requiring just nails. Adhesives with low VOCs are recommended if used.

Remember, they're not ideal for moisture-prone areas like bathrooms or basements.

Engineered Wood

Engineered wood flooring is made by bonding multiple thin layers of wood, sometimes up to 10, creating a strong, stable product that resists shrinking and swelling. This makes it suitable for moisture-prone areas like bathrooms and basements. Depending on the wear layer and manufacturer, some engineered wood floors can be refinished, while others may only allow recoating.[116]

Courtesy to Martin Allen Flooring

Be mindful of the VOCs in the adhesives used during its production and installation.

Other Wood

Other renewable wood-based flooring options include cork, bamboo, and poplar. Cork is durable, easy to clean, and releases minimal VOCs. Bamboo is strong and lightweight, but often imported, adding environmental and financial costs. Hybrid poplar offers a local alternative. It's fast-growing, widely available in the U.S., and resembles traditional hardwood.[117]

Bamboo Flooring
Courtesy to Clsa Flooring

115. https://elemental.green/the-pros-and-cons-of-using-reclaimed-wood/
116. https://www.thisoldhouse.com/flooring/21015018/all-about-engineered-wood-floors
117. https://flooringhunt.com/cork-vs-bamboo-flooring/

Key
Glossary Terms: *Italicized*
Links: Underlined

Vinyl Flooring[118]
Vinyl flooring, often made from polyvinyl chloride (PVC), is a popular choice due to its affordability and water resistance. However, it poses significant sustainability and health challenges. Manufacturing involves potent greenhouse gases and toxins during production and disposal. Health risks involves respiratory issues due to emitted VOCs.

End-of-life disposal is problematic as incineration releases harmful chemicals, and recycling is limited due to complex layered construction. The carbon footprint of vinyl flooring is also high.

Consider safer alternatives such as ceramic tiles or linoleum.

Other Floorings

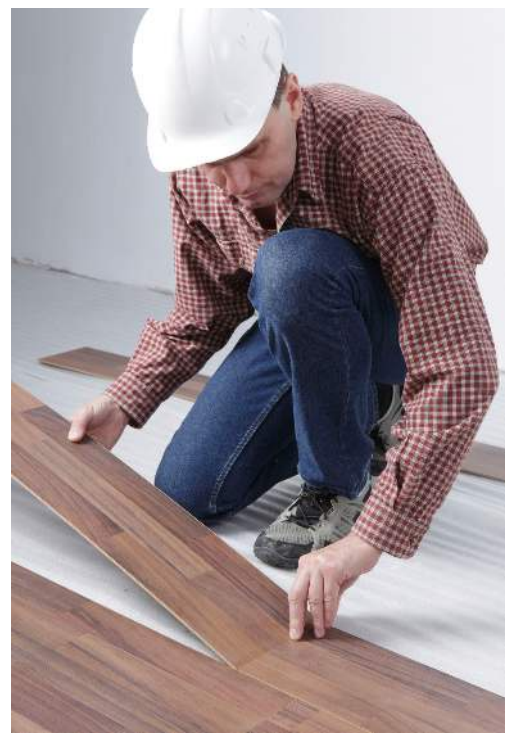
Porcelain and Ceramic Flooring[119]
Porcelain and ceramic tiles, crafted from fired clays, offer a cost-effective and long-lasting flooring solution. Despite their *energy-intensive* production, they stand out for their durability and potential environmental benefits.

Many tiles incorporate recycled glass or kaolin (a mining *byproduct*) to reduce waste and add visual interest. Some manufacturers, such as Daltile,[120] use over 99% recycled or reclaimed materials in their tile collections.

At end-of-life, tiles can be crushed and reused as fill material. Ceramic and porcelain tiles are inherently VOC-free due to their high-temperature firing process. But adhesives, grouts, and sealants may contain VOCs so look for certifications like GreenGuard, FloorScore®, or Green Seal to ensure low-emission products.

Tile surfaces typically require only mild cleaners, such as mild soap. Avoid bleach, ammonia, or acidic cleaners. Ceramic tile naturally resists dust mites, mold, bacteria, and germs. Some tiles and installation products now feature coatings that inhibit microbial growth. The Tile Council of North America (TCNA) is actively testing these technologies.

Laminate Flooring[121]
Laminate flooring mimics natural materials like wood or stone using a printed image layer beneath a protective wear coat. It's built from multiple layers, including resins and a moisture-resistant backing.



However, the resinous core and adhesives used during installation can release VOCs, so choose low-VOC or VOC-free products.

While laminate isn't ideal for high-traffic or moisture-prone areas since its surface can't always be refinished, it still offers friendly benefits.

118. https://ceh.org/flooringreport/
119. https://tcnatile.com/wp-content/uploads/2022/08/Ceramic-Tile-Green-Guide.pdf
120. https://www.daltile.com/why-daltile/sustainability
121. https://www.epa.gov/formaldehyde/questions-and-answers-regarding-laminate-flooring

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Glossary Terms: *Italicized*
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Linoleum Flooring[122]

Linoleum is a resilient flooring made from natural ingredients like linseed oil, cork dust, wood flour, and pine resin, layered over jute or canvas backing. The flooring is easy to cut and can last up to 40 years with proper care. It is *biodegradable* and recyclable, breaking down naturally at end-of-life.

Linoleum flooring requires regular sealing or topcoat to maintain wear resistance. Avoid harsh cleaners like ammonia or bleach. When spills occurs, such as water, clean it promptly and dry thoroughly to prevent moisture damage.

Courtesy to Green Building Advisor

Linoleum floors should be polished regularly to preserve their finish. When the surface loses its shine due to wear, start by vacuuming and washing the floor thoroughly. After the floor has dried completely, apply one or two coats of polish as directed by the manufacturer, allowing each coat to dry fully before adding the next. Avoid going over the same spot more than once or twice as this can lead to uneven coverage that may require stripping and reapplication.

IMPORTANT:
No matter which type of flooring you select, many finishing products can emit VOCs that may affect indoor air quality and health.

To minimize exposure, always choose products that are green certified for low emissions ***(Green Seal, Green Label Plus).***

122. https://www.bobvila.com/articles/how-to-clean-linoleum-floors/

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Glossary Terms: *Italicized*
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Energy Efficiency

Cutting back on consumption is cost-effective and reduces pollution from fossil fuels. Check your energy usage on your monthly bill, unplug devices when not in use, and be mindful of lighting habits. When replacing appliances, opt for Energy Star® certified models.

Check out the Consortium for Energy Efficiency (CEE),[123] which offers information of products that exceed Energy Star® standards.

Programmable Thermostats
Installing and properly using an Energy Star® certified programmable thermostat is one of the most cost-effective ways to reduce energy use.

Choose a model that's easy to program so you'll use it consistently. Program your thermostat to match sleep and wake times. Adjust settings during long periods when the home is empty to save energy. Place thermostats on interior walls, away from windows, vents, and heat sources to prevent inaccurate readings.[124]

Courtesy to the Spruce

Lighting

Opt for ENERGY STAR® rated fixtures and fans to cut energy use. In high-use areas, install CFL fixtures or replace older bulbs with CFLs or LEDs. LEDs cost more upfront, but they last longer and use far less energy, up to 90%, less than traditional bulbs. Combine ambient and task lighting to suit each space, and use pale wall colors to enhance natural light and minimize electricity use.[125]

123. https://cee1.org/program-resources/
124. https://www.energy.gov/energysaver/programmable-thermostats
125. https://justlightconcept.com/energy-star-lighting-guide-what-it-means-and-why-it-matters/

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Natural daylight lowers the need for artificial lighting. If privacy or room layout limits window access, consider solutions like obscure glazing, solar tubes, or light shelves to bring sunlight deeper into your space.

Obscure Glazing[126]
Frosted glass, tinting, or textured glass lets in light while maintaining privacy. Options like glass blocks, tinting, and frosting offer varying levels of privacy, though glass blocks tend to have poor thermal performance compared to double-glazed windows.

In daylight, obscure glass blocks views while allowing natural light inside. However, at night, interior lights can reduce its effectiveness. Solid frosted glass provides better nighttime privacy than patterned options.

Solar Tube[127]
Also known as tubular skylights, it uses a reflective tunnel to channel sunlight from a rooftop dome into interior spaces. The dome captures and redirects sunlight down the tube, which is often sealed to reduce heat loss and condensation. It requires minimal structural changes and is most ideal for hot climates.

Light Shelves[128]
Horizontal, reflective surfaces installed above windows to bounce sunlight into a room. They help distribute light evenly, reduce glare, and can even shade lower areas near windows at certain times of day. The shelf's depth and placement depend on the sun's angle and desired light control. Light shelves is effective at improving daylight quality while minimizing heat gain.

Obscure Glazing
Courtesy to Mardani Glazing

Solar Tube
Courtesy to Solatube

Light Shelves
Courtesy to Sutori

126. https://www.everest.co.uk/glass/obscure-glass/
127. https://www.energysage.com/solar/solar-accessories/solar-tubes-vs-skylights/
128. https://designhorizons.org/effective-light-shelves-design-types-and-integration-in-buildings/

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Beneficial Electrification

Beneficial Electrification involves shifting from direct fossil fuel use to approaches that lower greenhouse gas output, minimize climate impact, and sustain cost-effective energy solutions. Common appliances like stoves, dryers, and water heaters are available in both gas and electric versions. When shopping, look for Energy Star® certification to ensure efficiency. Keep in mind that Energy Star® does not certify clothes dryers or ovens/stoves.[129]

Electrification Benefits:

Lower Greenhouse Gas Emissions

- *Electric appliances produce little to no direct emissions*

Fire Risk Reduction

- *Without combustible fuel lines, electrified homes lower the chance of fire hazards and gas leaks.*

Indoor Air Quality

- *Gas appliances emit carbon monoxide, nitrogen dioxide, and other pollutants. Electrification eliminates these risks.*

Ventilation & Moisture Control

- *Electric systems can integrate more easily with modern HVAC and heat pump designs.*

Incentives & Rebates

- *Many governments offer rebates for electric upgrades.*

Efficiency

- *Heat pumps, induction stoves, and electric water heaters often outperform their gas counterparts in energy efficiency.*

Wiring and Panel[130]

An electrical panel regulates how much *current* enters and allocates electricity to specific areas through switches and breakers. The panel's capacity defines the maximum electrical load your lighting, appliances, and systems can draw simultaneously.

Components:

- **Circuit Breaker** – A modern switch that protects circuits by interrupting power during an overload or fault.
- **Expansion Slots** – These allow for future circuit additions, ideal when extending your home or installing new electrical systems.
- **Service Disconnect Switch** – A switch that can shut off power completely, used during emergencies or maintenance.

Before upgrading, first understand how much electrical *current* your home's service panel can handle. While many modern residences are equipped with 200-amp panels, older homes may have 100-amps or lower.

You can determine your panel's amp rating in several ways: Check the utility meter box outside your home for a label, inspect the electrical panel itself, or look at the main breaker located at the top or bottom of the panel.

129. https://xcelenergycommunities.com/document/beneficial-building-electrification-toolkit
130.https://bsesc.energy.gov/sites/default/files/2024-10/Home%20Electrification%20and%20Electric%20Panel%20Upgrades.pdf

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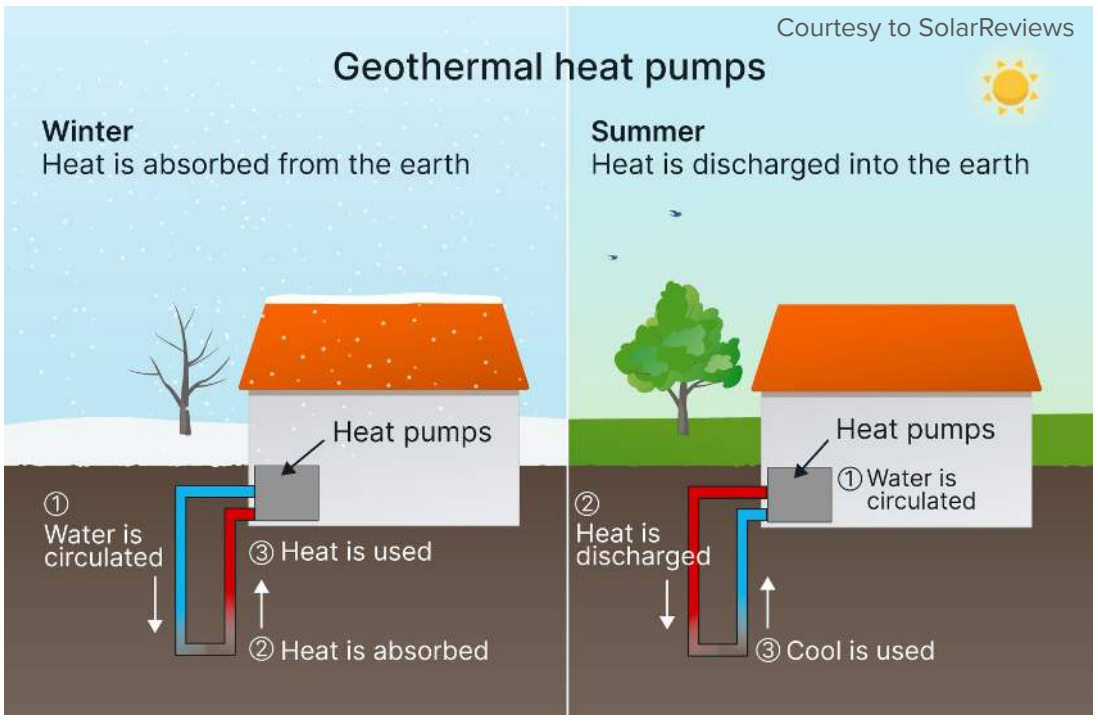
Links: Underlined

Air Source Heat Pumps[131]
In cold months, the air source heat pump draws heat from the outdoor air by circulating a *refrigerant* at lower temperatures. This *refrigerant* is then compressed to increase its heat level and deliver warmth indoors. In warmer months, the process reverses: the heat pump compresses the *refrigerant*, which then releases heat to the outside air, helping to cool the interior space.

For most homeowners, this heat pump strike an ideal balance of cost-effectiveness, performance, and versatility. Refer to this ASHP resource[132] for more information.

Geothermal Heat Pumps[133]
The pumps harness the steady underground temperatures to efficiently manage heating and cooling. During summer, they draw heat from the house and transfer it into the cooler ground. In winter, they tap into the naturally warmer earth to deliver indoor heat.

Because the ground maintains a fairly consistent temperature year-round, it acts as a natural insulator. However, installing underground loops can be complex and costly.



Hot Water Heating[134]
Water heating accounts for around 18% of a typical home's energy use. When selecting a new water heater, explore the different types, and make sure to choose the right size and fuel source.

Conventional Storage Water Heaters – a tank of hot water ready for everyday use, though they may fall short during peak demand such as when appliances run simultaneously or guests are visiting.
Tankless – heat water instantly without relying on a storage tank. When properly sized, they maintain a continuous flow of hot water.
Heat Pump Water Heaters – transfer heat rather than produce it directly, offering high energy efficiency and the potential to cut utility expenses significantly.
Solar Water Heaters – harness the sun's power to warm water, helping lower energy costs while going green.
Tankless Coil & Indirect Water Heaters – use your home's heating system to warm water, which can help limit energy consumption and ease monthly bills.

131. https://www.electrifyeverythingmn.org/heating-and-cooling
132. https://www.mnashp.org/
133. https://www.electrifyeverythingmn.org/buyers-guide-compare-electric-heating-options
134. https://www.energy.gov/energysaver/water-heating

Key
Glossary Terms: *Italicized*
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Hot water usage from faucets and appliances can lead to high costs. To keep your water heating expenses in check, adopt strategies that cut back on both use and waste. You can conserve hot water and lower energy bills by repairing leaks, installing low-flow fixtures, and insulating exposed hot water pipes.[135]

Showerheads

There are two main types of low-flow showerheads. The aerating showerhead mix air with water to create a misty spray, while the laminar-flow showerhead produce distinct streams of water, making it ideal for humid climates where you'd want less steam..

Refer to this Lavatory Lab article[136] for a more detailed explanation of aerating and laminating showerheads.

If your showerhead dates back to before 1992, it might have a flow rate up to 5.5 gallons per minute. To check if it's time for an upgrade, try this test first:

- Place a gallon-marked bucket under your showerhead.
- Turn it on using your normal water pressure.
- Time how long it takes to fill the bucket to 1 gallon (3.8 liters).

If it fills in under 20 seconds, you should replace it with a new low-flow model.

Faucets

Most modern kitchen faucets come with aerators, which is a screw-on tip of the faucet to controls its maximum flow rate. Aerators are affordable to swap out and rank among the most effective tools for cutting water use. Look for models rated at 1.0 gallons per minute (gpm) or less.

Bring your old aerator to the store to ensure a proper fit when replacing.

Courtesy to The Spruce

Leaks and Low-Flow FIxtures:

Quality low-flow fixtures can be purchased for just $10 to $20 each, helping you cut water use by 25% to 60%. One of the simplest ways to lower hot water consumption is by fixing leaks.

Just one drip per second adds up to 1,661 gallons of wasted water annually, potentially costing around $35 a year!

135. https://www.energy.gov/energysaver/reduce-hot-water-use-energy-savings
136. https://lavatorylab.com/shower-head/aerated-vs-laminar-flow-shower-heads/

Key

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Laundry
Laundry involves washing, drying, and caring for clothing, which consumes significant energy and water.

Clothes Washer
To cut down on energy use, opt for cold or warm water. Inefficient models can cost up to three times more to run than energy-efficient options. Look for machines with adjustable temperature and water level settings. Smaller-capacity washers often score higher on EnergyGuide labels, but a smaller capacity could mean more laundry loads, which may drive up energy usage.

For maximum savings, select clothes washer with the ENERGY STAR® label.

Clothes Dryer[137]
ENERGY STAR certified dryers use up to 20% less energy than conventional models. When buying a new dryer, look for one with a moisture sensor. It automatically shuts off when clothes are dry.

For greater efficiency, consider an ENERGY STAR certified heat pump dryer. These models can lower energy consumption by 20–60%.

Find out products, rebates, or other information on the ENERGY STAR clothes dryer[138] page.

Bathroom
Toilet efficiency is primarily measured by gallons per flush (GPF). Modern high-efficiency toilets and *dual-flush* models use 1.3 gallons or less per flush, while older toilets may use 3.5 to 7 gallons. Choose a WaterSense® labeled toilet for high-performance and water efficiency.

Swapping out old, inefficient toilets for WaterSense-certified models can help the average household cut toilet-related water use by 20–60%, translating to nearly 13,000 gallons saved annually. On a national scale, replacing outdated toilets across the U.S. would conserve over 260 billion gallons of water annually.[139]

137. https://www.energy.gov/energysaver/laundry
138. https://www.energystar.gov/products/clothes_dryers
139. https://www.epa.gov/watersense/residential-toilets

Key
Glossary Terms: *Italicized*
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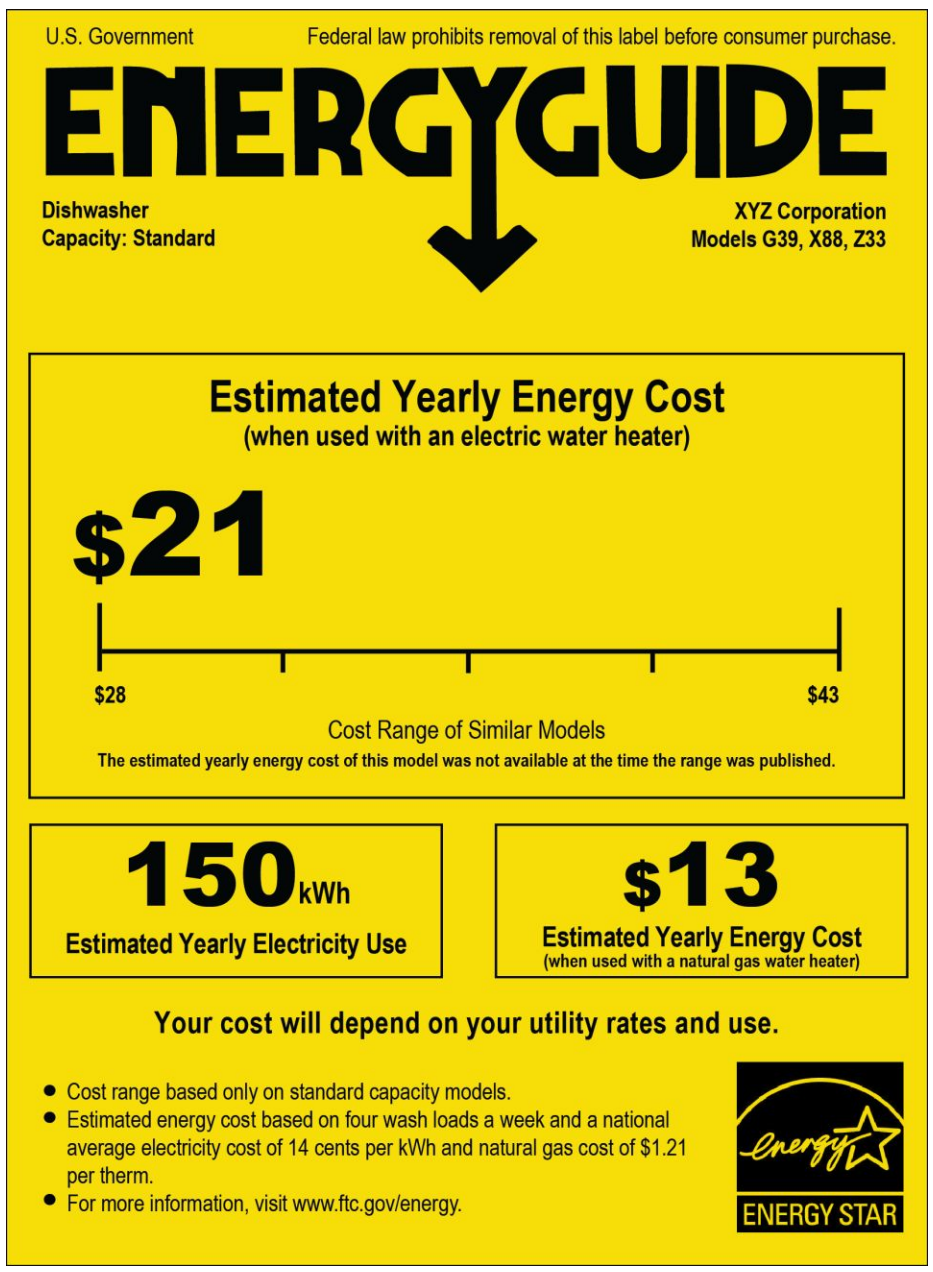
Bathroom Fan[140]
Install ENERGY STAR® certified fans. These models are designed for quiet operation and improved efficiency. The recommended ventilation rate according to ASHRAE 62.2 standards is 50 cubic feet per minute (cfm). To test this, hold two squares of toilet paper up to the fan while it's running. If it stays up, the fan is likely pulling 50 cfm.

Refer to this Energy Star resource[141] for ventilation fans.

Kitchens
Switching to Energy Star® appliances can save you $100–$200 annually. For refrigerators, smaller units use less energy, so start by considering size and then compare energy usage on the yellow Energy Guide Label.[142] Also, top mounted freezers are more efficient than side-by-side models. Certified Energy Star® refrigerators are required to use 20% less energy.



For dishwashers, newer models use less water and electricity. Many include built-in heaters to warm only the water being used, easing the load on your home's water heater.

Certified ENERGY STAR® dishwashers use about 12% less energy and 30% less water than standard models.

Modern models feature tech upgrades like:

- Soil sensors
- High-efficiency jets
- Smarter rack designs
- Built-in water heaters

To save more, skip the high-temp settings and opt for eco-mode.[143]

Check out the U.S. Department of Energy's Guide to Kitchen Appliances[144] for other energy-saving kitchen tips.

140. https://www.energystar.gov/products/ventilation_fans
141. https://basc.pnnl.gov/resource-guides/bathroom-fan-ratings#edit-group-description
142. https://consumer.ftc.gov/articles/how-use-energyguide-label-shop-home-appliances
143. https://www.energy.gov/energysaver/dishwashers
144. https://www.energy.gov/energysaver/kitchen-appliances?nrg_redirect=308326

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Range Hoods

Range hoods are essential for maintaining healthy indoor air. Without one, moisture and airborne particles from cooking, especially from gas stoves, can degrade finishes, and trigger respiratory issues.

Key Benefits:

- Removes moisture, *particulates*, smoke, and harmful gases like CO_2 and CO.
- Improves indoor air quality and reduces asthma risks.
- Protects walls, ceilings, and finishes from damage.

Ducted (vented) hoods exhaust air outside and are best for air quality. **Recirculating hoods** reduce odors but don't handle moisture or gases.

For installation, choose a hood with multiple fan speeds for flexible ventilation. Ensure proper sizing for cfm (cubic feet per minute), especially for wide or commercial ranges. Always check manufacturer specs and consider make-up air systems to avoid negative pressure issues.

Choose products with the **Home Ventilation Institute (HVI)**[145] Certified label. These products have been independently tested for airflow, sound, and energy use, and undergo ongoing checks through the HVI Verification Program. Refer to the HVI chart below for proper range hood sizing.

Width of hood against a wall	2.5 feet (30 in.)	3 feet (36 in.)	4 feet (48 in.)
HVI recommended rate	250 CFM	300 CFM	400 CFM
Minimum	100 CFM	120 CFM	160 CFM

Location of range	HVI recommended ventilation rate per linear foot of range	Minimum ventilation rate per linear foot of range
Against a wall	100 CFM	40 CFM
In an island	150 CFM	50 CFM

145. https://www.hvi.org/

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Stoves/Ovens[146]

We spend 90% of our time indoors, so choosing electric stoves and ovens over gas operated ones is a smarter move. Gas stoves contribute significantly to indoor air pollution with elevated levels of nitrogen dioxide (NO_2) emissions, reporting 50–400% more emissions than homes with electric stoves. Indoor NO_2 emissions from gas appliances often exceed outdoor standards.

Children are especially vulnerable with studies showing a 42% increased risk of asthma symptoms in homes with gas stoves.

__Energy Star__® certified certain residential energy electric cooking products, including electric ranges and cooktops.

Ovens and stoves are NOT certified by Energy Star®.

For individuals with gas stoves, recommendations include replacing with an electric stove, running your exhaust hood or opening a window while cooking, installing and maintaining a CO detector.

Refer to SmarterHouse[147] for additional information about cooking appliances.

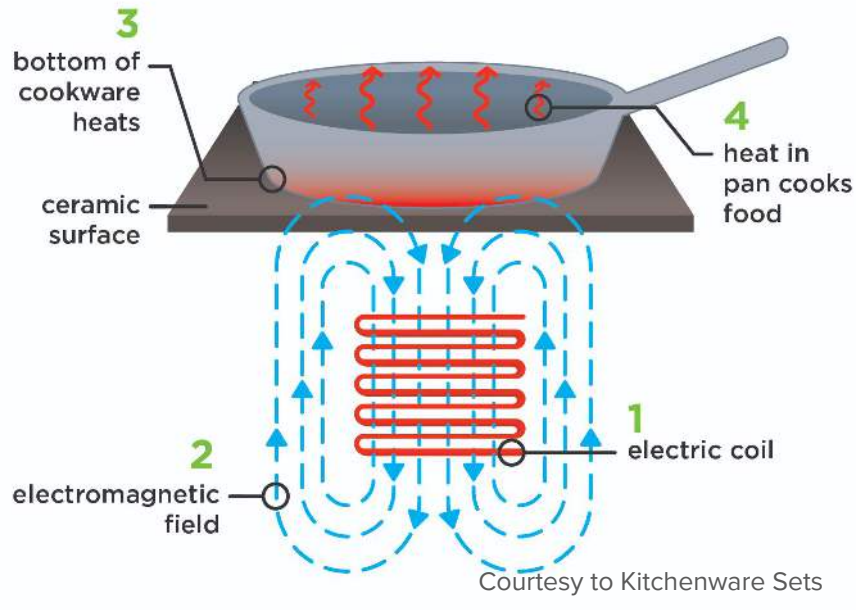
Induction Stoves[148]

Traditional cooktops rely on an open flame or heat from burners to transfer warmth to pots and pans. Induction cooking uses electromagnetic fields to generate *currents* directly within compatible cookware. Because the heat originates from within the cookware itself and ceases instantly when removed, the cooking area stays considerably cooler than gas or conventional electric cooktops.

Induction surfaces remain cooler, cannot be turned on unintentionally, and most models automatically shut off if no cookware is detected. They also emit no indoor air pollutants.

It is recommended to use cookware made from magnetic materials, such as steel and iron, if using an induction stove. If a full-size induction stove isn't feasible, you can still enjoy the benefits by opting for a portable induction cooktop.[149]

Refer to the Wirecutter[150] for portable options.



Courtesy to Kitchenware Sets

146.https://www.energy.gov/eere/better-buildings-residential-network/articles/smart-range-hoods-vs-indoor-air-quality-coming
147. https://smarterhouse.org/appliances-energy/cooking
148. https://www.energy.gov/articles/making-switch-induction-stoves-or-cooktops
149. https://www.electrifyeverythingmn.org/buyers-guide-cooking
150. https://www.nytimes.com/wirecutter/reviews/best-portable-induction-cooktop/

Key
Glossary Terms: *Italicized*
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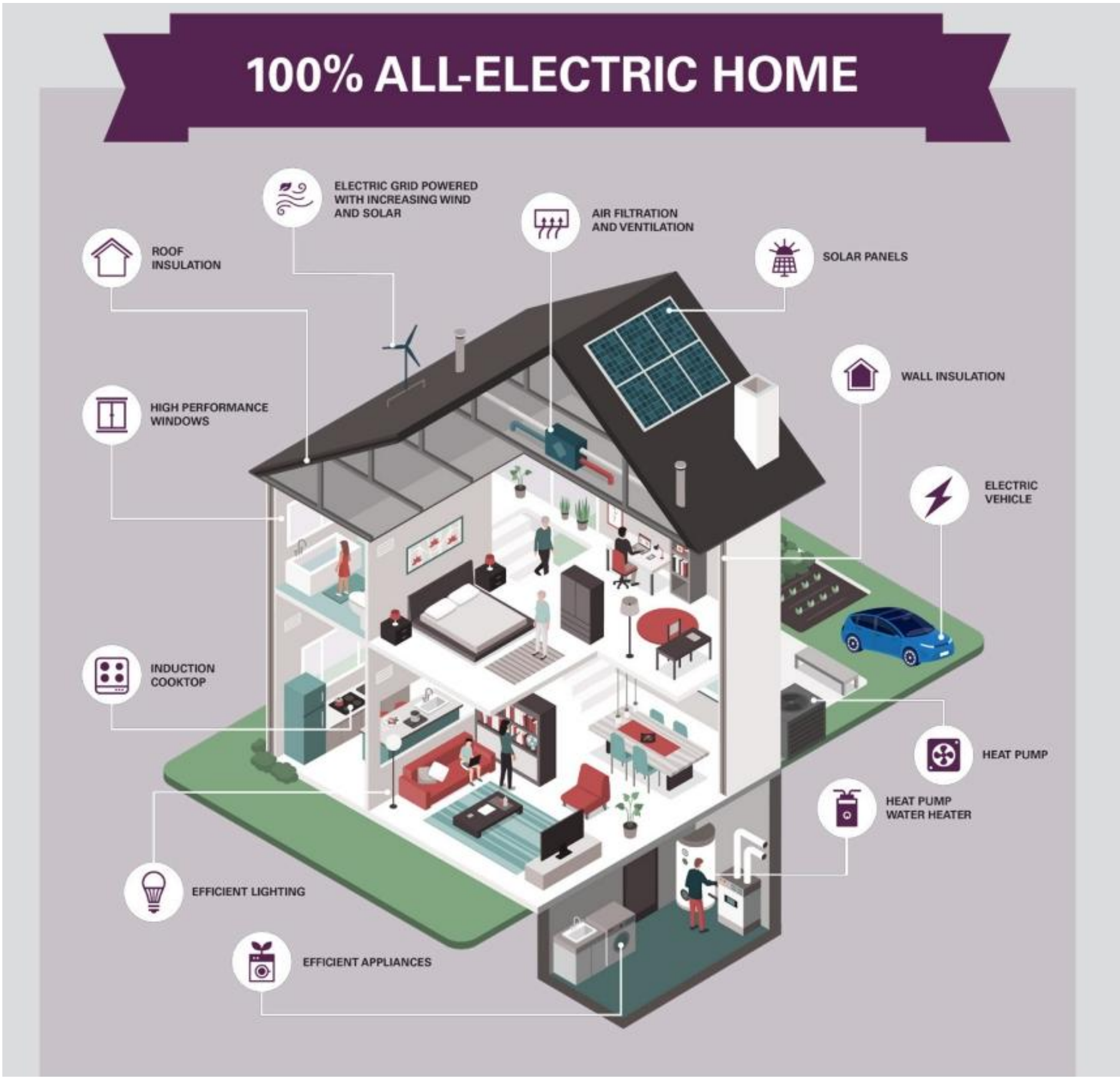
Taken directly from Xcel Energy's Beneficial Electrification Toolkit, this is a diagram of a fully electrified home.

Refer to this link[151] for the full toolkit.



151. https://xcelenergycommunities.com/document/beneficial-building-electrification-toolkit

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Greywater Systems

Greywater is lightly used wastewater from sinks, showers, and laundry—excluding toilet waste, which is classified as blackwater. With soaps and cleaners, greywater can be reused for flushing toilets, irrigating landscapes, and reducing reliance on treated water.

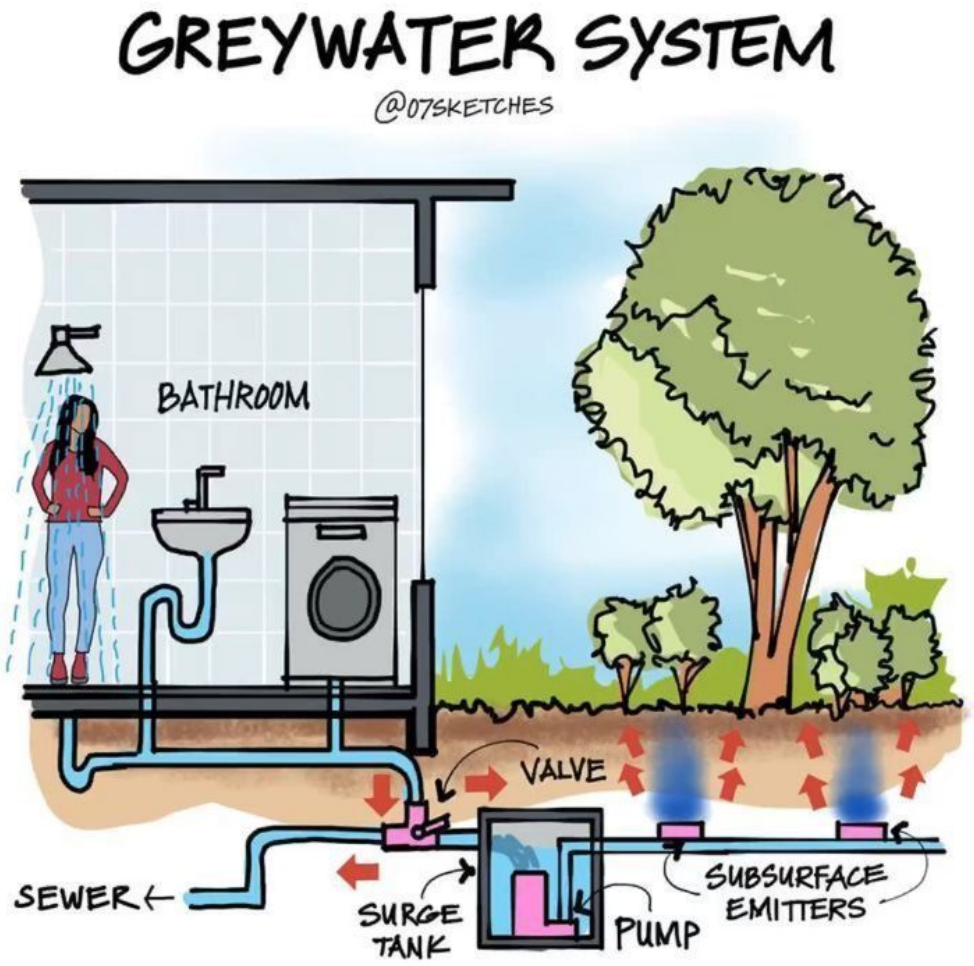
Before starting a greywater project, under Minnesota's plumbing code, greywater systems often fall under rigorous classification and can be restricted depending on how the water is collected, treated, and reused.

Small Scale Greywater Systems

- Ideal for remodels or single bathrooms.
- Easy to install and typically unregulated by local building codes.
- Example:
  - Sink water collected in a small tank, filtered, and reused in the toilet.

Large Scale Greywater Systems

- Collect greywater from multiple household sources.
- Require state and city approval due to health codes.
- Must meet plumbing regulations for filtration, storage, and distribution.
- Must be labeled
  "Greywater – Do Not Drink."
- Greywater should be reused within 24 hours to prevent contamination.



STATE RULES:
Minnesota's Administrative Rule 7080.2240 outlines technical requirements for greywater systems, including tank sizing and flow values.
MN Rule 7080.2240[152]

LA CRESCENT's RULES:
Reach out to La Crescent's Building & Zoning Department to confirm local ordinances and inspection requirements.
La Crescent Building & Zoning[153]

Remember: *Toilet waste is strictly prohibited in greywater systems.*

152. https://www.revisor.mn.gov/rules/7080.2240/
153. https://www.cityoflacrescent-mn.gov/building-zoning/

Key
Glossary Terms: *Italicized*
Links: Underlined

Chapter 3: FAQ

Q: Why are VOCs a concern?

Volatile Organic Compounds (VOCs) evaporate into the air and contribute to indoor air pollution. This can cause headaches, respiratory irritation, long-term health risks with frequent exposure.

Q: What materials should I avoid?

High-VOC paints/finishes, formaldehyde-based products, PVC (vinyl), flame retardants, synthetic carpets/adhesives. All of these releases high-VOCS, toxins, and cause irritation or health concerns.

Q: What hidden indoor dangers should I watch for?

Mold in damp basements or poorly ventilated areas. Radon, cancerous invisible gas that can enter through cracks. Lead, found in paint pre-1978. It is neurotoxic, especially for children. Carbon monoxide (CO) is fatal at high levels so install alarms.

Q: What makes a material sustainable?

Look for materials that are made from recycled or salvaged content, emits low-VOCs, locally sourced, durable, and biodegradable.

Q: What is important to know about labels like “natural” or “organic”?

“Natural” is not regulated by an entity, therefore it can apply to synthetic products despite not being natural. “Organic” only applies to food/agriculture, not paints or adhesives. Trust certifications such as Green Seal or GREENGUARD, not marketing claims.

Q: What should I look for in safer paints and adhesives?

Low or zero-VOC formulations, especially after tinting. Water-based, latex, or plant-based products. Always look for third-party certifications such as Green Seal, GREENGUARD, MPI, Cradle to Cradle.

Q: How do I apply finishing safely?

Prep thoroughly for better adhesion. Use low-VOC products and choose the right tools. Ventilate well by keeping air fresh throughout. Protect yourself by using gloves, masks, googles, avoid direct contact with skin. Follow dry times and dispose responsibly.

Key
Glossary Terms: *Italicized*
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Q: Why do floors affect indoor air quality?

Every flooring type, hard surface or carpet, can release chemicals (VOC off-gassing) or trap allergens like dust mites, pollen, moisture which can promote mold.

Q: What flooring labels should I look for?

Green Label Plus for carpets and adhesives. Green Seal for sealants and finishes. FSC for wood-based products.

Q: Is adding a carpet a good idea?

Carpet is cozy, but less durable and contributes to millions of pounds of waste yearly. Choose your carpet wisely. Consider natural fibers such as wool, or modular carpet tiles as these are easy to replace.

Q: How can I cut back energy use at home?:

Review your monthly energy bill to understand your usage. Unplug devices when not in use. Be mindful of turning off lights when leaving a room. Replace old appliances with ENERGY STAR® certified models.

Q: If installing a programmable thermostat, where should I place it?

On interior walls, away from windows, vents, and heat sources to ensure accurate readings. When buying a programmable thermostat, choose ENERGY STAR® models.

Q: How can I brighten rooms with limited window access?

Using obscure glazing, which are frosted or textured glass to allow daylight while preserving privacy. Another option are solar tubes, also called tubular skylights, they channel rooftop sunlight through reflective tunnels. Lastly, light shelves, horizontal reflective surfaces that bounce light deep into rooms.

Q: What are the benefits of electrification?

Electric appliances are cleaner, safer, and more efficient. They minimize emissions and eliminate risks from gas leaks and indoor pollutants. Easy to pair with HVAC and heat pumps, they improve ventilation and outperform gas systems in energy use with tech like induction cooktops and electric water heaters.

Q: How do air source heat pumps work?

During winter, it pulls heat from the cold outdoor air using refrigerant technology, compressing it to warm your home. In the summer, the process reverses–drawing heat from indoors and releasing it outside to keep your space cool.

Key
Glossary Terms: *Italicized*
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Q: What are geothermal heat pumps?

They rely on the stable underground temperature to heat and cool your home year-round. But installation involves complex underground loops, which can be pricey upfront but pay off in long-term savings.

Q: What other alternatives to consider for hot water heating?

Some alternatives are heat pump water heaters, solar heaters, tankless units, or indirect/tankless coil.

Q: How to reduce water wastage?

Fix leaks, use low-flow fixtures, insulate pipes, reduce flow with aerators such as swapping in models rated 1.0 GPM or less. These applies to showerheads, faucets, and other water-related appliances.

Q: To upgrade my appliances efficiently, what should I look for?

ALWAYS look for ENERGY STAR® certified products! Not all appliances, such as stoves and ovens, are certified. However, for other appliances, look for an ENERGY STAR® label,

Q: What label should I look for in bathroom upgrades?

ENERGY STAR® certified products for ventilation fans and WaterSense® certified toilets.

Q: Why is a range hood important?

It helps remove smoke, moisture, and air pollutants. Consider ducted (vented) hoods as these exhausts air outside—great for indoor air quality. Look for a hood with multiple fan speeds, and is a Home Ventilation Institute (HVI) certified model.

Q: What's special about induction cooktops?

It uses electromagnetic fields for safe, quick cooking. Surfaces stay cooler quicker, it shut off automatically when no cookware is present, and emit no indoor air pollutants. Use magnetic cookware (steel or iron) for induction cooking. Portable induction units are available if space is limited.

Q: What is greywater and how should I use it?

It's used water from sinks, showers, and laundry. It can be reused for flushing toilets, irrigating gardens, and reducing potable water use. Know that Minnesota's plumbing code (Rule 7080.2240) requires greywater systems to meet specific technical standards. And contact your local city for permits and guidance.

Key
Glossary Terms: *Italicized*
Links: Underlined




End of Chapter 3

La Crescent MINNESOTA

Growing from River to Ridge

GLOSSARY

Attic Card
A documentation tool used during insulation installation to verify and record key details about the work done. It serves as a quick reference for inspectors, homeowners, and future contractors to confirm that the insulation meets building codes and energy efficiency standards.

Biodegradable
Biodegradable refers to materials that can be broken down naturally by microorganisms like bacteria or fungi without leaving harmful residues.

Biowales
Shallow, vegetated channels designed to capture, filter, and slow down stormwater runoff.

Byproduct
Something that's unintentionally produced during the creation of something else.

BTU
BTU stands for British Thermal Unit, and it's a way to measure heat energy. One BTU is the amount of energy needed to raise the temperature of 1 pound of water by 1°F at sea level.

Carbon Capture
Technology designed to trap carbon dioxide (CO_2) before it enters the atmosphere.

Carbon-Negative
Removing more carbon dioxide (CO_2) from the atmosphere than what you emit. It is different from carbon neutral—emitting and removing carbon dioxide equally.

Carcinogen
Any substance or exposure that can lead to the development of cancer. It doesn't guarantee cancer will occur, but it increases the risk of incurring one.

Center for Energy and Environment (CEE)
A Minnesota-based nonprofit that works with homeowners, businesses, and communities to deliver solutions that reduce energy use. Their services range from home energy audits and insulation programs to financing options.

Clean Energy Resource Team (CERT)
A Minnesota-based initiative that helps communities take steps toward energy efficiency and renewable energy. They empower local projects, offer expert guidance, and strengthen clean energy networks across the state.

Conduction
Process of heat or energy transfer through direct contact between particles, without any movement of the material as a whole.

Convection
Transfer of heat through the movement of fluids, like gases or liquids, caused by differences in temperature and density.

Culverts
Structures that allow water to flow under roads, railways, or embankments, essentially acting as underground channels or tunnels.

Current
Current, as in electric current, refers to the rate at which electric charge flows through a conductor.

Dual-Flush Toilet
A toilet that provides two flushing options, one for liquid waste and one for solid waste. It's designed to reduce water usage.

Energy-Intensive
Processes, industries, or products that require large amounts of energy, electricity, gas, or fuel, to operate or be produced.

Embodied Energy
The total energy used to produce a material or product, from raw material extraction, manufacturing, and transportation, all the way to installation.

Flashing
It refers to thin material used to prevent water from penetrating openings in buildings. It's a defense against leaks, especially around roofs, chimneys, windows, and walls.

FSC-Certified
A product that came from responsibly managed forests according to the standards of the Forest Stewardship Council (FSC).

FTC Insulation
Federal Trade Commission's regulations on how insulation products are labeled and advertised.

Low-Emissivity (Low-E)
Low-E refers to a special coating applied to glass that helps control heat transfer

Off-Gas
The release of gases from materials or chemical processes.

Particulates
Particulates, or particulate matter (PM), are tiny solid or liquid particles suspended in the air. They're a major component of air pollution and can come from natural sources like dust storms and wildfires, or human activities such as vehicle emissions and the burning of fossil fuels.

Post-Consumer
Usually refer to materials that have been used by consumers, then recycled and repurposed into new products. It's a key component of sustainable manufacturing and packaging.

Radiation
Transfer of energy through space or a material, either as waves or particles.

Refrigerant
A chemical substance used in cooling systems like air conditioners, refrigerators, and heat pumps to absorb and release heat as it cycles between liquid and gas states.

Renewable Energy Credits (RECs)
RECs are tradable certificates representing the generation of electricity from renewable sources. Each REC equals 1 megawatt-hour (MWh) of renewable electricity delivered to the grid.

R-Value
R-value is a measure of thermal resistance—how well a material resists heat flow.

Salvaged
A material that's been rescued, recovered, or repurposed—often from damage, destruction, or discard.

Thermal Break
Insulating materials placed between highly conductive building components like steel or aluminum to interrupt the flow of heat. They're essential for improving energy efficiency and preventing issues like condensation, mold, and heat loss.

Thermal Conductivity
A material's ability to conduct heat, how efficiently it transfers thermal energy from one part to another.

Thermal Mass
The ability of a material to absorb, store, and release heat over time.

U-Value
Also known as thermal transmittance, U-value measures how well a building material conducts heat.

Volatile Organic Compounds (VOCs)
A large group of carbon-based chemicals that evaporate at room temperature and can cause short to long term health effects. These are found in thousands of products: paints, cleaning agents, adhesives, pesticides, cosmetics, and more.

Window-to-Floor Ratio
This is a design metric used to evaluate how much window area a room has compared to its floor area. To calculate, use the following formulas:
Window Area (WA) = Sum of all window areas
Floor Area (FA) = Floor area
(WA / FA) x 100 = Window-to-floor ratio as a percent

RESOURCES

Below are helpful resources and organizations to support your green remodeling efforts.

Codes & Regulations
La Crescent Electrified Homes – www.cityoflacrescent-mn.gov/fully-electrified-homes/
La Crescent Building & Zoning – https://www.cityoflacrescent-mn.gov/building-zoning/
Environmental Protection Agency (EPA) – https://www.epa.gov/
Home Ventilating Institute (HVI) – https://www.hvi.org/
International Code Council – https://www.iccsafe.org/
U.S. Department of Energy Building Codes – https://www.energycodes.gov/
MN Residential Code – https://www.dli.mn.gov/business

Incentives & Rebates
La Crescent Energy Rebates – www.cityoflacrescent-mn.gov/energy-rebate-programs/
Database of State Incentives for Renewable – https://www.dsireusa.org/
MN State Programs – https://mn.gov/commerce/energy/consumer/energy-programs/

Energy Services
Clean Energy Resource Teams – https://www.cleanenergyresourceteams.org/
ENERGY STAR – https://www.energystar.gov/
WeGoWise – https://www.wegowise.com/
Alliance for Water Efficiency – https://allianceforwaterefficiency.org/

Landscape
River City Lawnscape – https://www.rivercitylawnscape.com/la-crescent
Classic Rock, La Crescent – https://www.classicrockproducts.net/
MN DNR Native Plants – https://www.dnr.state.mn.us/gardens/nativeplants/suppliers.html
UMN Landscape Design – extension.umn.edu/lawns-and-landscapes/landscape-design
MNL Corp – https://mnlcorp.com/

Sustainable Building
U.S. Green Building Council – https://www.usgbc.org/
Whole Building Design Guide – https://www.wbdg.org/
UMN Housing Tech – https://extension.umn.edu/home-and-financial-management#caring
Efficient Windows Collaborative – https://efficientwindows.org/
MN B3 Guidelines –
https://mn.gov/admin/government/construction-projects/sustainable-buildings/

Third-Party Certifications
Carpet & Rug Institute – https://carpet-rug.org/testing/green-label-plus/testing-protocol-and-requirements/
Federal Trade Comission EnergyGuide – https://consumer.ftc.gov/articles/how-use-energyguide-label-shop-home-appliances
Forest Stewardship Council – https://fsc.org/en
Green Seal – https://greenseal.org/
Cradle to Cradle Certified – https://mbdc.com/
Declare Label – https://living-future.org/declare/
Resilient Floor Covering Institute – https://rfci.com/
EPA Watersense – https://www.epa.gov/watersense

Home Programs
USAGov Home Repair – https://www.usa.gov/repairing-home
MN Home Improvement Programs – https://www.mnhousing.gov/homeownership/improve-your-home.html
Rebuilding Together MN – https://rtmn.org/apply-for-help/home-repair-program/

Indoor Air Quality
EPA Indoor Air Quality – https://www.epa.gov/indoor-air-quality-iaq
American Lung Association – https://www.lung.org/clean-air/indoor-air
American Industrial Hygiene Association – https://www.aiha.org/public-resources/healthierworkplaces/healthier-community-resources/indoor-air-quality-resources

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