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Green Building (Part 3): Building Systems

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Green building is about more than low-flow toilets, energy-efficient appliances and fluorescent light bulbs. Ultimately, it's about building a home that's environmentally friendly—from the inside out.

That's because homes are like humans. They have brains, hearts and skeletons, not to mention vital, blood-pumping organs. In order to be truly green, therefore, a home must have more than a green face; it's got to have green guts, too.

Nobody knows that better than Jonathan Philips, senior director of Cherokee Investment Partners, a Raleigh, N.C.-based private equity firm that promotes the sustainable redevelopment of brownfield properties worldwide. He oversaw and recently moved with his family into his company's capstone green building project, a showcase home known as the National Homebuilder Mainstream GreenHome.

"Our objective was to create a home that looks and feels like a typical home," Philips says. "Builders think green homes require too many sacrifices on the part of the end user, in terms of conveniences and comforts. So, we put a lot of green solutions into this one home in order to inspire builders of all types and at all price points."

Philips wanted to prove that green homes can be comfortable homes. To do that, his team embraced not only green building materials but also green building systems, including HVAC systems, plumbing systems and even electrical systems.

"This is very doable," Philips says. "It's doable in a mainstream way that can enhance your sales, enhance comfort and convenience for homebuyers, and also differentiate your company during a down market."

If you want to follow Philips' example and green a home's central nervous system, consider these options:

HVAC Systems

Within the typical home, heating and cooling systems consume the largest portion of energy. Philips recommends the following energy-efficient HVAC solutions:

- **Geothermal energy:** A ground source heat pump, or geothermal system, can save homeowners up to 70 percent on heating costs and up to 50 percent on cooling costs, according to the Environmental Protection Agency, because they harness the earth's consistent year-round temperature of 59 degrees to heat the home in the winter and cool it in the summer. Water circulates through underground wells, absorbs the earth's temperature and then turns into heating or cooling via standard ventilation.
- **Radiant flooring:** Warmboard radiant flooring includes conductive aluminum tubing through which hot water flows, providing radiant heat from the ground up. Because it heats up so quickly, radiant flooring tends to be more energy-efficient than traditional furnaces. And because the heat is distributed through flooring, not ventilation, it contributes to improved air quality.
- **Smart fireplaces:** A direct vent fireplace minimizes natural gas consumption and includes a climate control system that transfers excess heat from the fireplace to other areas of the house. The result is a fireplace that becomes a heating source for the entire home.

Plumbing Systems

As national and global supplies of water diminish, green buildings will have to be as efficient as possible in terms of water use. Fortunately there are several plumbing solutions that could help increase water efficiency.

Use best plumbing solutions for maximum water efficiency:

- **Rainwater harvesting:** Installed on a roof, a rainwater catchment system collects, filters, stores and delivers recycled rainwater for landscape irrigation and non-potable uses within the home.
- **Water recycle systems:** Similar to rainwater harvesting, water recycling systems collect water condensation from your air conditioning and use it to water your lawn, flush your toilets, etc. Other systems recycle "greywater," water that has already been used once, to wash clothes or dishes, for instance.
- **Structured plumbing:** A structured plumbing system captures cold water that is wasted while waiting for hot water and re-delivers it to the water heater. The system produces hotter water more quickly, and saves water, energy and sewage costs.
- **Drain-water heat recovery:** A waste drain heat-exchange system uses hot water that drains via the shower or sink to preheat incoming cold water from city water lines, thereby recapturing hot water energy in order to heat cold water.
- **Solar thermal hot water:** A solar thermal hot-water system warms your water by capturing the sun's heat via pipes beneath your roof. You can use the solar energy to pre-heat cold water before it enters your hot water tank, saving time and energy by taking the pressure off your tank.
- **Tankless hot water:** Using traditional water heaters means spending money to heat water all day long that you're not using, but installing a tankless hot water heater enables you to have on-demand hot water that you pay to heat only as needed.

Electrical Systems

By installing solar panels, homeowners can significantly reduce their electrical needs. If

you don't like the look of solar panels, Philips suggests these energy-producing and saving systems:

- **Building integrated photovoltaics:** A photovoltaics (PV) system allows you to capture sunlight and convert it into solar energy; building integrated systems allow you to do the same thing, but without the use of awkward-looking solar panels. Instead, you might use special roof shingles or glass panes to collect solar power, which you can then sell back to your electric utility.
- **Whole house energy control:** A whole-house system that allows one to control lights, appliances and HVAC with the flip of a switch, an energy control system enables you to save energy when you're leaving the house or going to bed by cutting off power to electrical appliances, which use energy even when they're off.

To learn more about green building tools and techniques, check out parts [one](#) and [two](#) of our three-part green building series.