

Angi

Building a Greener Future:

How Our Homes Impact Climate Change



Do Our Homes Impact the Environment?

The simple answer is yes. From the materials used to build and maintain our homes to the energy it takes to keep them running, our homes impact our environment. At Angi, we want to take a deeper dive and explore the ways in which we can help build toward a more sustainable future.

Understanding the environmental impact of homes in America

In 2020, housing produced 15.6% of the nation’s total global warming greenhouse gas emissions.¹

How? It’s primarily because of the energy we use. Our homes are heavily reliant on electricity for things like lighting, heating, air conditioning, and operating appliances. The remaining greenhouse gas emissions are largely due to consumption of natural gas and petroleum products for heating and cooking.

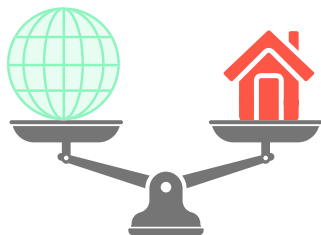
Taking a deeper dive into the energy usage of our homes, 45% comes from space heating, another 18% from water heating, and 9% from space cooling.²

Is there anything homeowners can do?

The answer is yes.

On the one hand, we want comfortable homes that provide us with a healthy indoor living environment and pleasant year-round temperatures and humidity; enough living space for family, friends, and entertaining; and modern luxury amenities like high-end spas in our bathrooms and gourmet chef tools in our kitchens.

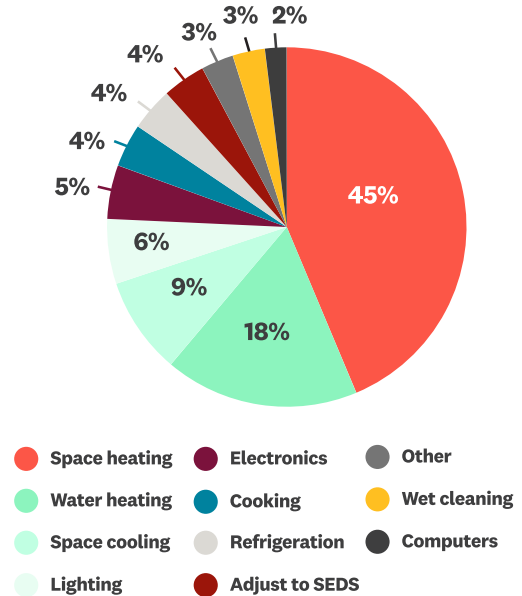
On the other hand, the planet—our outdoor living environment—is also important. Breathable air, a pollution-free ocean, and a reduction in global carbon emissions are all not only necessary to enjoying our lives but requirements to ensure we pass a livable Earth on to future generations.



Thankfully, an amazing home where you love where you live and a sustainable climate future can be complementary pursuits.

In fact, thanks to innovations in product manufacturing, building techniques, and action by homeowners, we can make our homes “greener.”

RESIDENTIAL SITE ENERGY CONSUMPTION BY END USE⁴



Solution 1: Building More Energy-Efficient Homes

The [boom in home spending](#) during the pandemic has brought new home construction back to highs not seen in nearly 20 years.³

Homebuyers concerned about living more sustainably should know that homebuilders have been making steady progress toward more energy-efficient homes. In fact, on a per-square-footage basis, homes built during the previous building boom (in the early 2000s) used 14% less energy than the homes built during the preceding decades and nearly half the energy (40%) of those built in the post-war building boom.⁴

This has been accomplished by multiple improvements up and down the supply chain, including using recycled materials as well as more efficient transportation and shipping. But most noticeably, it has been accomplished by changing how houses are built.

Specifically, builders have adopted two main methods of increasing efficiency over time:



1. Construction that reduces or eliminates thermal bridging in the walls, foundation, and ceiling, by adopting both different design standards and different materials to frame.

Different materials include —

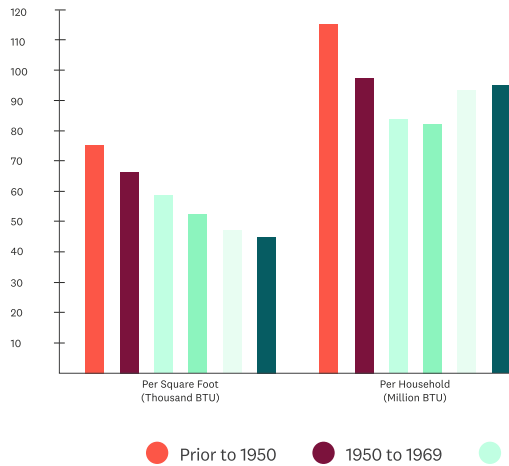
- Structural Insulated Panels (SIPS)
- Insulating Concrete Forms (ICFs)
- Insulated Studs or Double-Stud Walls
- Insulated Studs With Continuous Exterior Barrier Insulation

2. Airtight and thicker insulation and sealing of the wall system and vapor barrier.

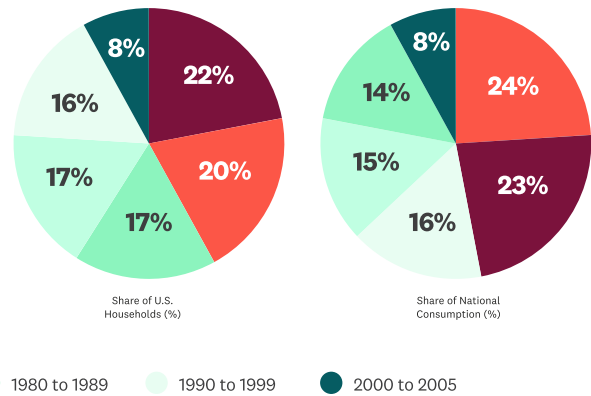
In addition to these two methods, new homes are also more likely to have modern appliances, heating and cooling systems, windowpanes, and other more efficient pieces of technology. These standards and improvements mean that high-performance homebuilders have more options to pull from to meet modern building codes and a more stringent design of their housing model to upgrade potential buyers to. A code is the minimum allowed by law, and most high-performance homebuilders are working to build to ENERGY STAR, Indoor airPLUS, and Zero Energy Ready Home standards from the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). Over 3 million homes today are also Home Energy Rating System (HERS)-rated by a third-party energy rater, ensuring buildings and homeowners meet the highest performance levels.

However, keep in mind that we are also building homes larger, especially single-family homes. Homes built between 2000 and 2005 are 29% larger than homes built in the 1980s and 38% larger than homes built before 1950⁵. According to the DOE, “the oldest homes—which generally have less efficient systems and little or no insulation—have the highest per-household energy consumption of all home vintages. Despite better building practices and newer systems, the greater average floor space of new homes has offset their improved efficiency.”

ENERGY INTENSITY BY HOUSING VINTAGE ⁶



SHARE OF HOUSEHOLDS AND ENERGY CONSUMPTION BY HOUSING VINTAGE ⁶



As impressive as most of these energy reductions are, new home construction is only a small part of the overall housing landscape.

Solution 2: Improve Our Existing Homes

Existing older homes were built when energy was cheaper, the climate was not an immediately pressing concern, and consumer expectations around draftiness and internal comfort within the home were not as demanding. New home construction gets a significant amount of attention because of the level of economic activity it creates, but it still only adds a tiny share of the total housing stock available to the country every year.

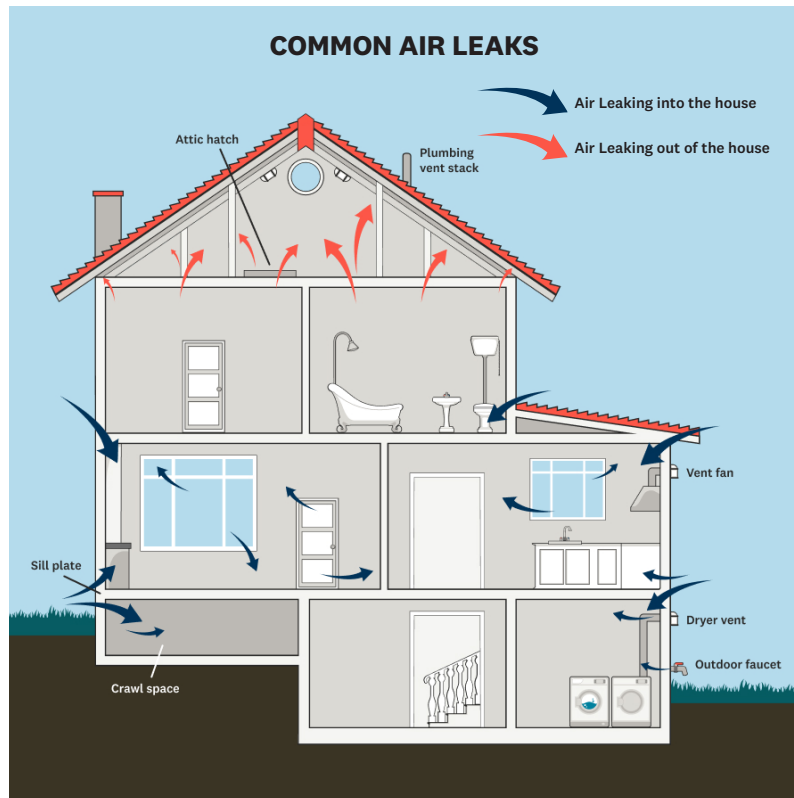
At our current booming home construction rate, it would still take 109 years to completely rebuild and replace the entire national housing stock of 141 million housing units. That means both current and future homeowners will be the ones responsible for helping make existing homes greener.

Homeowners should focus on these key projects for retrofits and renovations to reduce their home’s energy needs and carbon footprints.

1. Consider Insulation, Air Sealing, and Proper Ventilation

Arguably one of the most important things homeowners can do to become more energy efficient is to make their home's building envelope stronger. What is that? A home's envelope is defined as the continuous thermal and pressure barrier that surrounds the structure. Tightening your home's building envelope can improve energy efficiency. To do this, homeowners can add more and better-quality insulation, improve air sealing, install Energy Star-rated windows, and add products to monitor and control indoor air quality.

According to the [DOE](#), 45% of residential energy use is spent on heating and 9% on cooling. With over 50% of residential energy spent on either heating or cooling, better insulation is key to becoming more efficient.



Where to start? Homeowners can start with an energy audit. Many utilities offer energy audit programs, which include tests like a blower door test that uses equipment like thermal cameras to help make recommendations.

Insulation

Insulation can be added to walls, attic spaces, and the rim board of your home (that area of the floor trusses at the basement ceiling). Insulation can keep your home cozy and warm on long winter nights or cool on hot sunny days. According to Angi's Insulation Cost Guide data, you can expect to pay between \$1,500 and \$10,000 for all that energy-saving efficiency. Blown-in insulation costs \$5,213 on average, which is a little less than batting, fiberglass, and radiant barrier insulation. Spray foam insulation has the highest return on investment (ROI) but is also the most expensive option.

Any home pro hired to add or update insulation will also seal any gaps in the wall and envelope at the same time. This helps prevent thermal bridging and air leakage, where the walls and ceiling of your home act as an easy way for your treated indoor air to get outside, wasting energy and running up your utility bills.

Windows

New [windows](#) that meet Energy Star requirements for your climate zone are a great next step in helping make your home more energy efficient. Energy-efficient windows generally cost between \$120 and \$1,200 per window, according to Angi's Window Cost Guide data. Quality, efficiency, and low e-coatings (also known as electrodeposition coating), which are used as a protective primer, determine the cost. Installing energy-efficient windows can save you between 7% and 15% annually in energy costs.

Consider replacing older single-pane windows with more energy-efficient double-pane or even triple-pane windows. Not only can homeowners save money on their HVAC costs, many may be able to claim a tax credit for windows and appliances that conserve energy. Homeowners should keep receipts and paperwork for proof when claiming this credit come tax season.

When old windows are removed, your contractor can properly seal the area surrounding the window with an airtight foam, thereby sealing one of the leakiest areas of your home's envelope. Once you have eliminated uncontrolled airflow into your home, it's time to think about controlling and filtering the air for your family.

Healthy Indoor Air

Once you have a properly sealed home, it is time to look at your indoor air quality. Look at adding an Energy Recovery Ventilator (ERV) to your home. This filters the outside air and captures energy from the exhausted inside air to deliver healthy fresh air to the house.

Another option is to add air filtration units to your home. These are often whole-house units that are integrated with the HVAC system or room units that are standalone. According to SOURCE, these filters should be high-efficiency particulate absorbing (HEPA)-level (MERV 16 in HVAC talk) to help remove the smallest pollutants from the air.

And if you live in a damp, humid climate or a dry climate, consider adding humidification and dehumidification units to the HVAC system to help keep your home healthy and comfortable. [According to the EPA](#), indoor relative humidity (RH) should be kept below 60%, ideally between 30% and 50% to help limit the growth of harmful molds.

Finally, look at adding smart sensors to your home that track and monitor indoor air quality and alert you of any issues.

Maintaining a healthy and comfortable year-round environment in your home means keeping your house cool in the summer and warm in the winter, and heating and cooling are two of the most energy-intensive functions of our homes. However, homeowners looking to make an impact can follow our advice and work to reduce the loss of heat and air conditioning as a great first step toward a greener home.

2. Opt for Better Heating and Cooling

At the turn of the last century, we heated our homes by burning coal or wood. We have come a long way in terms of [efficiency](#) for our homes. Modern baseboard heating and natural gas systems have reduced the need to burn wood to heat most homes, with the best gas appliances often having an efficiency rating of 90% and heat pumps delivering a 300% to 400% efficiency improvement.

Heat pump technology impressively heats and cools your home without burning oil or gas. Heat pumps shouldn't be a foreign concept to homeowners. Our refrigerators and air conditioning units currently use this efficient technology today. Think of it this way: In the right conditions, a heat pump can replace both your furnace and your AC. The [average cost of a heat pump](#), according to Angi Cost Guide data, is \$5,700, depending on prices in your area, your current HVAC system, and brand.



Heat pumps and [ductless multi-split air conditioning systems](#) provide zoned heating and air conditioning without needing ductwork like central air and are not intrusive like window units. This can be beneficial for older homes where installing new ductwork isn't feasible. According to Angi Cost Guide data, you can expect to pay **\$1,500 to \$4,000** for a mini-split air conditioning unit itself, but expect the cost of labor and installation to increase the price overall.

Another way to utilize this technology is with heat pump water heaters and heat pump dryers. Heat pump water heaters provide efficient heating of water systems without the need to punch a hole in the home envelope for intake and exhaust. As an added bonus, using this style of heater means there is no danger of emissions in the home. Heat pump dryers also are highly efficient and have no need for exhaust or make up air in the home.

Heat pumps also have the potential for additional benefits, such as running a heat pump off of local electrical energy-generation systems to avoid the inefficiency in electricity transmission while potentially creating healthier indoor air quality in our homes.

3. Install Solar Panels and Battery Storage

Solar panel installations are on the rise, with there currently being over 2.7 million residential photovoltaic systems currently installed in the country.⁷ Along with the rise in solar panel installations, homeowners across the U.S. are adding battery storage to their homes.



Most solar panels cost between \$17,000 and \$32,000. However, homeowners could save around \$600 a year on energy costs, allowing you to return your investment over time. The cost to install home solar panels can vary by thousands of dollars depending on where you live. The biggest price differences fall between the Southeast and New England. However, consider your local area and county, as some places may have a better ROI than others.

For homeowners who might be considering solar panels, many localities are not only allowing their use but actively encouraging them with **incentives like tax breaks**. A great way to think about solar panels as an investment is to replace your current electricity bill with a solar payment. If your electricity bill today is \$200 per month, you may be able to offset all or most of your bill by installing panels and paying for a solar system you own.

Battery storage may be one of the biggest changes coming to your home. There are options today that provide enough energy to operate as whole-house generator systems and ones that integrate with electric vehicles. The combination of solar with backup batteries and a smart inverter could allow homes to operate “off the grid” for three to 10 days in case of an outage, or allow homeowners to avoid peak rate charges from electrical utilities, even helping the utility balance demand on the grid.

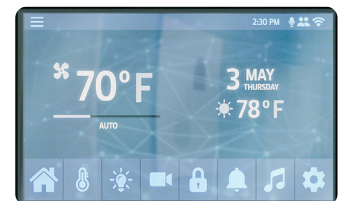
The average home in 2020 used an estimated **10,000 kilowatt-hours per year** of electricity. Looking toward the future, if more homes install solar panels and battery systems, they will be able to contribute clean energy, improve air quality, and help lower carbon emissions while becoming more resilient to grid outage events.

4. Take on Many Small Projects for a Bigger Impact

In addition to the aforementioned projects, homeowners can take on a range of smaller improvements to collectively make a difference.

These include:

- Switching to low-power LED lights
- Adding smart home devices like a smart thermostat and smart lighting to reduce usage over time
- Using materials that can be recycled and upcycled to prevent them from ending up in a landfill at their end of life
- Updating old appliances with Energy Star-rated appliances
- Updating plumbing fixtures like toilets and showerheads for low-flow models
- Xeriscaping exterior landscaping to native and drought-tolerant plants
- Adding weather monitoring to existing sprinkler systems



There are also a number of behavioral changes that homeowners can make to help reduce energy consumption and improve the overall sustainability of their homes.

- Do an energy audit to better understand your energy usage.
- Run your dishwasher, washer, and dryer during the night or non-peak energy hours.
- Keep your air conditioning on at a warmer temperature (higher than 72 degrees Fahrenheit) during summer months and below 68 degrees Fahrenheit during winter months.
- Turn down your water heater or opt for lukewarm showers.

Small changes adopted by many homeowners across the country can make a big impact. From major things like installing solar panels to generating your own energy to more minor changes like installing low-flow toilets and smart thermostats, a green home is within every homeowner's reach.

The Green Home Future

Homeowners do not have to choose between a comfortable home and a sustainable future for our planet. These two goals are complementary.

Across the nation, building standards are constantly evolving and becoming more sustainably minded, including innovations like reducing thermal bridging, continuous insulation, and using more efficient heating and cooling systems. Because of the work of builders, home pros, and smart choices made by homeowners, we have been driving down the energy usage on a per-square-foot basis continuously since the 1950s.

But because new home construction is only a small portion of the total existing housing stock, renovations of existing property will allow us to bring our buildings up to speed, faster than the 109 years it would take to completely replace all existing homes. In order to reverse the harmful changes to our environment, we must update the 141 million existing homes in America.

Sustainable retrofits, upgrades, and renovations that can lead the way include adding residential solar panels and batteries, switching or adding heat pumps to the heating and cooling mix, updating insulation and air sealing, changing doors and windows, and making a suite of other small projects.

At Angi, we believe that the home is the most important place on earth. Alongside our new partner, [EEBA Team Zero](#), we share a vision that better homes today can deliver a better future tomorrow. We will continue to educate homeowners and home service professionals to build toward that future.

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Sources

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⁴ <http://192.31.135.76/ChapterIntro2.aspx> DOE EERE Buildings Data Energy Book, pg. 63.

⁵ <http://192.31.135.76/ChapterIntro2.aspx>

⁶ <http://192.31.135.76/TableView.aspx?table=2.2.3>, <http://192.31.135.76/TableView.aspx?table=2.1.12>

⁷ <https://www.nrel.gov/docs/fy21osti/80427.pdf>

Images: Getty Images, Angi, and [Energy & Environmental Building Alliance by BPC Green Builders](#)