

ENERGY CODES ARE LIFE-SAFETY CODES

SOUTHWEST ENERGY EFFICIENCY PROJECT

Building codes ensure and protect the safety of the houses and buildings where we live and work. The International Energy Conservation Code, or IECC, is one of a suite of model national building codes adopted by state and local jurisdictions to ensure a bare minimum of durability, quality, health, and safety.

Once in a while, we hear building officials mistakenly say they don't adopt or inspect for the energy code, "because it is not a life-safety code." This comment, however, stems from a basic misunderstanding of the energy code, and what it is designed to achieve. We're here to correct the record—the energy code fundamentally improves the durability of buildings as well as the health and safety of us humans inside. It's not just a "nice-to-have."



(It's worth remembering, though, that the energy code is the only code that literally pays for itself, saving homeowners and building owners money year after year. The energy code as a whole, and the provisions in it, are tested for their cost-effectiveness. Extra money in your pocket: that is indeed "nice to have.")

But back to the life safety discussion: The energy code affects the moisture management (rot, mold, and mildew), indoor air quality, fire safety, extreme weather protection, and resiliency of homes and buildings. It works in tandem with the other model building codes to ensure safe buildings.

Once a building official good-naturedly joked with us, "You all think it's the energy code that keeps the buildings from falling down." There is more than a grain of truth to this. Meeting the requirements of the energy code increases durability of the building envelope¹—and yes, that helps ensure that the walls stay standing, and that the house remains livable for decades upon decades. Inside the house, the energy code guards against pollutants, mold, mildew, and vulnerability to temperature extremes. Let's take a closer look.

¹ The building envelope refers to the walls, floors, roofs, windows, and doors that separate the interior from the exterior of a building.

MOISTURE MANAGEMENT

In a nutshell, the energy code aims to want to prevent rot, mold, and mildew. Rot destroys the structure of the house or building, making it potentially unsafe to inhabit, and mold and mildew wreak havoc on human health. To prevent rot, mold, and mildew, the energy code dives deep into the field of building science—controlling heat, air, and moisture transfer in building enclosures. The energy code is based on the latest advances in building science, treating each building as an integrated, complex system and taking into account climate zone, building materials, and more.

Warm air that comes in contact with a cooler surface can condense water onto that surface. Throughout different seasons and climate zones, houses are full of areas where warmer air and surfaces come in contact with cooler air and surfaces. Preventing that condensation through proper sealing, insulation materials, and construction techniques is what keeps the rot, mold, and mildew from running rampant. Here's a sampling of energy code provisions controlling moisture:

- **Air barriers.** Air barriers prevent air—which carries moisture—from carrying and depositing that moisture right into the wall cavities.
- **Slab-on-grade insulation.** Take a cold slab in the winter, and add warm conditioned air above it: you get condensation. Slab-edge insulation, if done properly according to code, reduces the risk of condensation.
- **Rim joists.** Rim joists are often easy to insulate but difficult to properly air seal. So, in colder climates, air (and moisture) passes through the insulation and condenses on the rim joists, keeping those rim joists moist for months on end. First the mold sets in, and then the rim joists get rotted out, making the building unsafe. Air sealing the rim joists according to code protects against this.
- **Condensation on windows.** Here we have the same story: warm conditioned air that comes in contact with the cold surface of the glass in winter months can condense, damaging nearby wall, ceiling, and floor materials over time. Better-quality windows specified by climate zone in the code significantly reduce this condensation.
- **Ice damming.** Ice dams are thick ridges of ice that build up along the eaves. These can tear off shingles and cause water to build up and leak into the house. Ice dams form when warm air seeps through cracks and crevices into an unconditioned attic, causing snow to melt on the roof but refreeze at the cold eaves. Properly insulating and sealing the ceiling assembly, as specified in the energy code, is the solution.

These building science specs are in the energy code for a reason: to protect building stability and durability and protect human health. Many of these moisture issues are hidden from view until the structure is unsafe or health is adversely affected. (For more details, see [here](#).) This leads us to our next “invisible” issue: dangerous levels of air toxins. What you don't know *can* hurt you.

INDOOR AIR QUALITY

An unofficial motto of the energy code is “build tight, ventilate right.” Basically, it’s about ensuring safety of the air the occupants breathe. Air that leaks into a home or building can carry pollutants and contaminants—car exhaust from a garage, or radon from under a foundation, for instance. That’s one reason the energy code has very precise details about separating conditioned space from unconditioned space. We also need to ventilate out pollutants that arise from inside the house, such as the gases emitted by certain building materials, furniture, finishes, cleaners, paints and more. Rather than letting air leak in or out from any random crook or crevice leftover from poor workmanship, and rather than gambling on the levels and whereabouts of dangerous contaminants or pollutants in the air, the energy code seals the hidden leaks and specifies how and when we need controlled, whole-house ventilation.

FIRE SAFETY

It’s the fire code that keep fires from crumbling our houses, spreading to nearby structures, and killing lives in the process. But the energy code helps. The energy code’s focus on tight construction, sealing up all the cracks and holes, and separating conditioned from unconditioned space also helps prevent fire and smoke from spreading through draft openings. If the apartment, condo, or single family house next door catches fire, yours doesn’t get smoke damage or catch on fire as easily.

EXTREME TEMPERATURES AND STORMS

During extreme heat waves or extreme cold freezes, the energy code elevates from a life-safety code to a *life-survival* code. Every extreme heat wave that triggers a blackout is accompanied by news stories of lives lost from heat stress, especially among the elderly or people with health conditions (for instance, 700 lives were lost in the Chicago’s 1995 heat wave, and more than 100 in the New York City’s 2006 heat wave). Extended winter outages spur similar news stories. When a cold freeze or blizzard knocks out power, occupants may resort to fires or portable gas heaters just to keep warm, leading to a risk of home fires or carbon monoxide poisoning. Leaky houses with little insulation and terrible windows—well, these make the fatality numbers rise. Tightly-built and well-insulated houses with good windows help maintain livable temperatures for longer, allowing residents to “shelter in place.” A **study** after Superstorm Sandy (which left 8 million people without power) modeled residential building types versus energy codes and showed that newer codes allow people to stay in their homes for more days during blackouts triggered by heat waves or cold freezes. And buildings constructed to higher performance standards became “so improved that they were merely uncomfortable, rather than dangerous”—a ringing endorsement in this case.

It all comes down to better building envelopes. Although the energy code addresses the efficiency and comfort of all major building systems—including mechanical, hot water, and lighting—in a power outage, none of these will work. One component of the energy code that does continue to work in a power outage: the building envelope. Newer codes (and better enforcement of codes) mean better building envelopes—and that means more lives saved.

DESIGNED BY EXPERTS IN BUILDING DURABILITY

Each new version of the model energy code is developed through an extensive consensus process by experts in building durability and building science. The everyday users of building codes—builders, architects, engineers, code officials, raters, and more—develop, adopt, enforce, and improve upon the energy code because they care about the safety of our built environment and the health of its inhabitants. The energy code is not a “green code” or an aspirational standard—it is the bare minimum that building officials deem acceptable and that consumers expect they are getting.

INTERACTIONS WITH OTHER CODES

Local officials, through the International Code Council, develop the model energy code in tandem with the model plumbing codes, electrical codes, fire codes, mechanical codes, and more. They all fit together like a puzzle. Leaving the energy code behind—because of misunderstanding its intent or importance—can cause codes to be out of sync and can cause inconsistencies between other code elements. You can't take a chunk of one jigsaw puzzle, put it in another, and expect it to fit well. It's better to upgrade the whole suite of model codes at a time, including the energy code.

NEW CODES ARE IMPROVED CODES

Just like other codes, each new version of the model energy code improves on the last. As newer, safer, and more durable building materials, technologies, and techniques become more commonplace, they are voted on and incorporated into the model energy code. The latest version of the energy code also clarifies sections that had caused confusion, simplifies the language, adds flexibility, and removes contradictions between different parts of the code—making it more likely that builders can comply with the code's intent and that building departments can verify safety and durability. Here's our tip—**always update to the latest code.**

Energy codes create safe, resilient, and habitable structures based on building science and physics principals for heat, air, and moisture transfer—all of which have real and significant impacts on human lives and health. Our message to builders, architects, engineers, local building departments, and health and safety advocates: the energy code is a life safety code.

ABOUT THE AUTHOR: Christine Hurley Brinker is a Senior Associate in SWEEP's Buildings Efficiency Program, where she advances building energy codes, energy efficiency programs, and local policies. She specializes in commercial building efficiency, including high performance buildings, benchmarking and transparency, multifamily, and commercial building energy code adoption and compliance. She can be reached at cbrinker@swenergy.org.



REPRINTED FROM: Builder Magazine at www.builderonline.com/building/building-science/energy-codes-are-life-safety-codes_o