BY DOUG GARRETT

Code Conflict

There appears to be a major conflict—one that poses a real danger to the life and safety of building occupants—in the 2012 International Energy Conservation Code (IECC) and 2012 International Residential Code (IRC). The 2012 IECC sets a mandatory blower-door-tested maximum air-infiltration rate at a tight 3 ACH50 (50 air changes per hour) in most of the country (climate zones 3 to 8) and 5 ACH50 in hot, humid regions (climate zones 1 and 2).

The problem lies in the fact that the new IECC/IRC also allows builders to install natural-draft gas appliances in these homes with no safety testing. There is a significant danger that negative pressure near combustion appliances will cause backdrafting, drawing carbon monoxide into the building. The IRC says that if your home meets the ACH50 standards of the IECC, you must comply with the ASHRAE 62.2 mechanical ventilation standard, which could be met with an exhaust-only system, but it says nothing about combustion appliance zone (CAZ) safety.

The IRC also says that if you have gas appliances in this home, you must comply with the fuel gas requirements of the International Mechanical Code (IMC), and the IMC says something weird: If the house is less than 4 ACH (50 or natural; it's not clear) you must have combustion makeup air so the fire can breathe. But there is nothing to address CAZ depressurization due to fans.

Now we have climbed through several codes, none of which makes this trail easy to follow, and we still don't have the assurance we need. Unless there is language in the IMC, or someplace else, that I'm not aware of, we have a threat to life and public safety.

CAZ safety limits established by the Building Performance Institute show that natural-draft gas appliances can suffer backdrafting when placed under a pressure of as little as -2 to -5 Pascals (Pa). When a home is very tight, even very small exhaust fan flows will exceed these safety limits. Take a 2,000-square-foot home with an average ceiling height of 9 feet (volume = 18,000 cubic feet). To meet the 2012 code, this house would have to test-out at 900 cfm50. This is the leakiest a home this size can be built under the 2012 code. What happens when you turn on an exhaust fan in this home?

The chart at left depicts the relationship between tightness, airflow, and depressurization. The vertical dotted line represents 900 cfm50. The red dot represents what happens when you turn on a 300-cfm kitchen exhaust fan. A natural-draft gas water heater depressurizes the house to -2 Pascals, which is the BPI CAZ safety limit. But the 300 cfm fan will depressurize the home to -10 Pa. This is twice the safe maximum depressurization allowed for a gas furnace and two to three times what a natural-draft gas water heater can safely operate against. Turning on a clothes dryer or two bathroom exhaust fans to generate an exhaust flow of 200 cfm (blue dot) will result in a depressurization of -5 Pa. This says nothing about any "worst-case depressurization" scenarios when all exhaust appliances may be operating and bedroom doors are closed. Homes built tighter than this will experience even greater depressurization as the dotted line shifts to the left.

What's the solution? It's easy: If you seal to the 2012 IECC requirements, install only draft-induced or sealed combustion appliances. Any natural-draft combustion appliance is a disaster waiting to happen.

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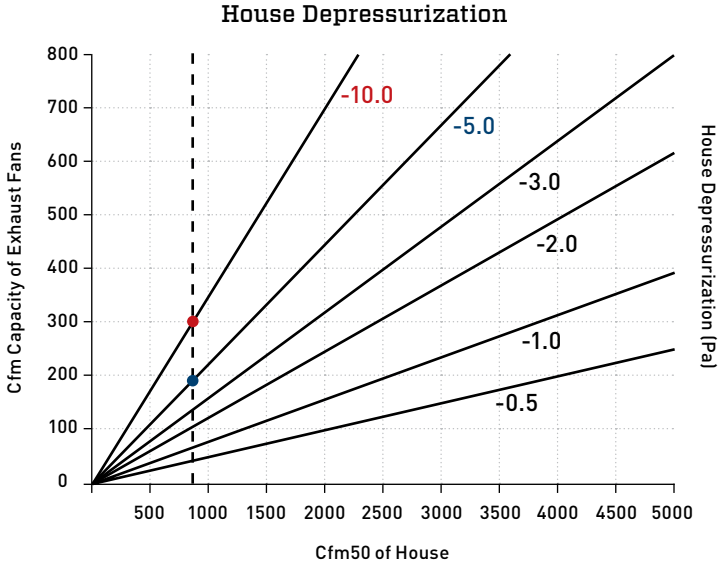

A 300 cfm exhaust fan can depressurize the leakiest 2,000-square-foot home allowed by code (blower door at 900 cfm50, as indicated by dotted line) to -10 Pa (red dot). No natural-draft gas appliance in the home could safely draft under these conditions.

Graph: Adapted from The Energy Conservatory