Questions and Answers on Radon

Basics of Radon

What affects the persistence of radon in any particular area?
Radon comes from the breakdown of uranium in the earth's crust. That source will not run out. As long as a building is in contact with the ground, there is potential for elevated radon. There are places where there are statistically more buildings testing high; this can be for a number of reasons which we cannot predict.

Is radon a greater risk in colder climates, and how will climate change affect radon exposure risk?
Not really. The risk comes from long-term exposure to high levels of radon. High levels of radon can occur anywhere (even Hawaii has homes with high radon levels). If your building sits in contact with the earth, there is radon in it. The only way to determine the level is to test.

Does topography affect radon levels?
Generally speaking, no. Radon is an inert gas that moves up through air currents until it can expand to fill the volume of the earth's atmosphere. Where a house sits on the incline can have interesting impacts on radon levels—especially in areas of karst geology—but most of the time it is not a factor.

Can we assume that mobile homes don't need to be tested? Likewise, is manufactured housing with skirting considered open air and therefore at low risk?
No. There have been mobile homes tested with very tight skirting that tested high. Without skirting there is less chance, but if the source is strong enough and there's a connection to the ground for air to flow, any skirted mobile home could test high.

Is radon a greater concern for a slab-on-grade house or one that is elevated off the ground/has a basement?
Radon can enter all homes that have a connection to the ground. Foundation type, leakiness, and age do not matter.

How much of an issue is radon in ranch-style (single-story) homes with no basements, which are prevalent in the desert southwest?
The risk is the same regardless of building style. Radon is present everywhere. The approach to installing a mitigation system can vary with the construction and soil type in a region.

Can you provide a good way to explain how radon can still be a risk even in houses without basements?
Heating and cooling the home causes a certain amount of suction by the home on the ground. This suction of air into the home pulls soil gas into the home and with it comes any available radon.

What are the gaps with the existing state, EPA, and CDC data, and what we can learn from the data sets?
The data sets are just recordings of actual tests done. CDC's data is on average more recent and perhaps for some states more comprehensive than the original data sets from the EPA maps in the early 1990s. As the test data sets grow, the estimates of average radon levels should become more accurate. For example, if you only have 10 tests for a county, you maybe be over- or under-representing the likelihood of a high test. Ideally, all homes should be tested (per the surgeon general); instead, we have partial testing data coverage (sometimes multiple tests in one home), which necessarily restricts the use of any of the data sets. However, no matter how extensive the data set, it will never be predictive for individual radon test results in a building.

Does increasing energy efficiency in buildings through a more insulated building envelope ironically increase the radon concentration? For example: better insulated windows with less indoor/outdoor air exchange.
If substantial air tightening of an existing structure occurs, it can lead to a change in radon levels. However, it is possible to move the radon value both ways; always retest a structure after significant changes to the air dynamics are made.

How much radon is released when showering? Is that a concern?
The primary concern with radon in water occurs in homes with private wells where the well water being tapped has substantial amounts of radon. There is little additional short-term lung cancer risk associated with the radon released during a shower. The greater concern is whether enough radon is released on average over time from water usage to increase the average indoor radon value throughout occupied areas of the house.

What are the exposure and risk implications for a mixed-use building with ground-floor commercial use and residential on the upper floors?
The standard for testing in a multi-use building requires testing all ground contact units regardless of use and 10% or a minimum of one unit of each upper floor. This is based on the experience that radon in multi-use buildings often is reduced by HVAC zoning and use setbacks along with occupied time. Every building has radon. Testing is the only way to characterize a specific property's risk regardless of building use.

Should we look at radon exposure risk differently for non-residential buildings of different uses, such as daycare facilities, community centers, fire departments, EMS facilities, nursing homes, etc.?
We focus on homes because we spend the most time in them. Most of the time we spend at home is sleeping. The time we spend at home has increased for many people during/after the pandemic which has necessarily increased the exposure to home levels of radon whatever they are. There are OSHA regulations on radon levels in workplaces. Clearly, nursing homes (while tested with different protocols), housing, and daycares/schools are a good place to reduce exposure for children under 18 early in their lives.

Is radon more of a concern in old houses versus new homes? And are mitigation options different for older homes versus newer homes?
No. Age of the structure does not factor into whether a home tests high. The techniques for mitigating existing homes (whether newer or older) are the same. We can use radon-resistant new construction techniques when building new homes to end up with an active system that easily reduces radon levels (when installed correctly).

Are there any notable highlights about similarities and differences in state/federal requirements? EPA? HUD currently only has the FHA Multifamily policy. Do any states have action levels that are different from the EPA action level?
No states use an action level for air other than EPA's. For radon in water there are variations. Generally, states that require certification require the same training and exam and then hold state-certified folks to a set of rules that differs slightly by state. Florida, Ohio, and Pennsylvania, for example, have extensive rules that are not quite the same as the training/exam. However, many states are updating these rules with their differences to the current consensus standards. You must check each state you're working in to make sure you are meeting their laws.

Consultants and other sources have indicated that Hawaii may be at lower risk due to its unique geography. Does that mean radon is not a concern in Hawaii?

Testing in the island climates with associated variations in building HVAC systems creates unique challenges compared with the continental U.S. While fewer expected elevated test results is a correct assumption, 1 in ~50 homes may still test elevated versus the original 1 in 15 estimate for the U.S. as a whole. The same applies to the islands below.

Are there similar considerations for Puerto Rico, Guam, American Samoa, Northern Mariana Islands, and Virgin Islands?

The National Radon Services Program has worked with folks in Puerto Rico, and their trainers have installed systems in Guam. While volcanic islands are less likely to contain the uranium/radium that is the source of radon gas, there are structures in all of those locations with high radon. You must test to find out. Nonetheless, there are modifications that make sense for testing in temperate humid environments. Ultimately, we want an accurate estimation of the exposure of the occupants. Once we've set up those conditions, testing is still recommended. This is also true for climates like Alaska's. Deviating from the standards is likely necessary to properly estimate exposure and/or mitigate a structure.