# The Business Case: Radon As an Important and Overlooked Public Health Problem

***Radon exposure in buildings is the second leading cause of lung cancer and results in more than 21,000 deaths each year.*** Radon is one of the most comprehensively investigated human carcinogens: laboratory studies have documented that an alpha particle (e.g., from radon decay products polonium-218 and polonium-214) can cause both single- and double-strand DNA breaks and can produce indirect genotoxic and nongenotoxic effects on both traversed and neighboring non-traversed cells.[i]

***Radon knows no boundaries:*** high radon levels have been found in all states and nearly every county. Exposure affects the health of people in farmhouses and townhouses, new homes and old homes, one-story buildings and multi-story buildings, regardless of foundation or structure type. By reducing air leakage in buildings, radon mitigation conserves energy, lowering costs for property management and occupants.

## The Business Case for Action on Radon Is Substantial

***The return on investment from the benefit of avoided lung cancer death over the cost of radon mitigation is significant.***

- EPA's recent cost-benefit analysis estimates that testing and mitigating 100,000 homes for radon over 20 years will prevent 3900-9900 cancer fatalities with a return on investment (ROI) of $2.72-$4.54 assuming a seven percent discount rate.[ii] This means that for every dollar invested in mitigation yields benefits in terms of avoided medical expense and deaths valued at $2.72-$4.54. This range compares favorably with the ROI of $.83 to $2.52 for smoke cessation.

| Risk Scenario | Total Number of Reduced Cancer Fatalities With Intervention | Net Present Value (Billions of Dollars, B-A) | | Return on Investment (B/A) | |
|---|---|---|---|---|---|
| **Test and Mitigate Existing Homes** | | | | | |
| **Discount Rate** | | 3% | 7% | 3% | 7% |
| **BEIR VI** | 6,391 | $8.1 | $1.1 | $9.06 | $3.22 |
| **PUMA** | 9,986 | $12.5 | $1.8 | $13.51 | $4.54 |
| **Residential** | 3,902 | $6.0 | $0.9 | $7.00 | $2.72 |

*(Source: EPA Return on Investment Presentation, 2024)*

***Radon-induced lung cancer costs the health sector and the economy $8.6 billion annually.***

- The National Cancer Institute estimated the medical cost of a lung cancer case to be $201,000 per patient per year in **2020** based on Medicare data, [iii] encompassing initial (first year after diagnosis), end-of-life (year before cancer death) and continuing (the time in between) medical care plus oral prescription drugs. Medicare is funded by taxpayer contributions, premiums and federal appropriations.
- The estimated economic loss caused by each lung cancer case each year per patient was $210,000 in **2008**,[iv] including forgone earnings for employed individuals and imputed forgone earnings for informal caregiving. This loss of income affects the wellbeing of families, harms the larger economy, and causes increased dependence on benefit programs.
- EPA estimated in **2003** that there are 21,000 annual lung cancer deaths from radon (with an uncertainty range of 8,000 to 45,000).[v]
- A death toll of only 21,000 is a fairly conservative estimate two decades later, after considering growth in the population[vi] and housing stock[vii] plus the high proportion of energy-efficient homes:

**CHANGES SINCE 2003**

| | Population | Housing Units | Radon-Induced Lung Cancer |
|---|---|---|---|
| **2003** | 290,207,933 | 121,525,460 | 21,000 |
| **2024** | 340,110,988 | 146,770,711 | ? |
| **Growth (#)** | +49,903,055 | +25,245,251 | ? |
| **Growth (%)** | +17% | +21% | ? |

## The Business Case for Radon Testing in Multifamily Lending Is Multi-Faceted

***The incremental per-unit cost of 100% ground contact unit radon testing is at most 31 cents per unit per month over a 20-year loan at 4% interest.***

- Based on IEA's analysis of the testing requirements for a typical property with an average of 155 units of which, per the standard, 100 ground contact and upper floor units would be tested at the high-end cost of $80 each, the monthly cost per unit ranges from 20 cents per unit per month to 31 cents per unit per month over the life of a 20-year loan at 4% interest (and less for shorter-term loans).[ix]
- Mitigation costs $2.35 - $3.91 per unit per month over the life of a 20-year loan period at 4% interest.[x]

***In December 2020, after a three-year review and extensive public comments, HUD multifamily lending eliminated the 25% threshold to require testing 100% of ground contact units consistent with the industry consensus standard.***

- HUD's decision was based on data from the Antonio Neri paper, "Evaluation of percentage- based radon testing requirements for federally funded multi-family housing projects"[xi] and the HUD-funded New York State Department of Health study, "Evaluating and Assessing Radon Testing in Housing with multifamily federal financing (EARTH Study)."[xii]
- The EARTH study team analyzed 100% ground contact test results for 687 multifamily buildings encompassing 7,892 dwelling units and determined that testing only 25% of ground contact units (HUD's protocol since 2013) had a 38% chance of missing at least one unit with a high radon level.

**AVERAGE PROBABILITY (%) OF PARTIAL SAMPLING MISSING A UNIT IN A BUILDING WITH RADON LEVEL >4 PCI/L AT VARIOUS SAMPLING PERCENTAGES**

| Number of ground contact units | Number of buildings | 10% sampled | 25% sampled | 50% sampled | 75% sampled |
|---|---|---|---|---|---|
| **05-06** | 45 | 58% | 34% | 19% | 5% |
| **07-08** | 71 | 55% | 36% | 15% | 5% |
| **09-10** | 40 | 65% | 39% | 24% | 9% |
| **11-12** | 37 | 52% | 41% | 21% | 8% |
| **13-14** | 14 | 51% | 35% | 20% | 7% |
| **15-16** | 20 | 47% | 32% | 15% | 5% |
| **17-18** | 15 | 59% | 39% | 21% | 8% |
| **19-20** | 12 | 69% | 46% | 23% | 9% |
| **All** | 276 | 58% | 38% | 19% | 6.5% |

*(Source: EARTH Study)*

***Inspecting 10% of ground contact units fails to identify homes with high radon levels.***

- The usual multifamily environmental assessment process, based on common QC procedures in manufacturing and other industries, has involved inspecting (or sampling) 10% of units under the theory that 10% is sufficiently representative.
- Variations in conditions below slabs and crawl spaces, building tightness, HVAC system operation, the stack effect, intrusion pathways present, and other building science realities cause significant differences in radon levels from one dwelling unit to the next within the same building, and from one building to the next on the same property.
- Since radon is naturally occurring in the ground, moves around opportunistically, and therefore is not present throughout, or consistently across the footprint of, a multi-unit structure, the EARTH Study found that it's necessary to test all ground contact dwelling units. Testing only 10% of ground contact units, the Fannie Mae and Freddie Mac protocol, has a 58% chance of missing a high-radon unit.[xii]

***Inadequate sampling creates liability risk for properties and cancer risk for occupants.***

Liability against the property and its owners can arise from a claim under:

- the warrant of habitability in landlord-tenant law
- unreasonable risk of serious harm to occupants' current or future health[xiv]
- deliberate indifference
- neglecting to follow known standards.[xv]

***Radon-induced lung cancer is relevant to the financial services sector since radon levels in every building ever occupied by an individual affect their lifetime risk.***

- The occasion of a loan (upon rehab, refinancing, sale) facilitates removing the property from the risk pool through investment in radon testing (and mitigation if needed). While mobility makes individual risk imprecise in the sense that some occupants move each year (though not all occupants move every year) and not all buildings have the same radon level, resident mobility between properties does not diminish the serial risk presented to the multiple occupants of each unit over the life of a building. In reality, a higher number of residents in a unit with high radon levels increases the number of individuals for whom the property owner may be held liable.
- Although lung cancer's minimum five-year latency period has been used as an argument against property owner liability for radon-induced lung cancer, 40% of tenants in multifamily buildings with five or more units have occupied the same unit for five or more (which includes one in six who have not moved for ten or more years).[xvi]

***Full compliance with 100% ground contact testing per the industry consensus standard does not add significant time or complexity as long as testing is properly specified and executed.***

- A radon measurement professional can complete placement of test devices in 100-200 units in one day and retrieve them in a single day at the end of the testing period.
- One common cause for delay is when the due diligence firm or other party has not provided the radon measurement professional the required property information in advance.
- Invalid results, delays and extra costs (for retesting) arise when an untrained person conducting testing deviates from the standard's device placement, closed building, or quality control requirements, or otherwise improperly handles test devices.
- HUD reported in 2021 during a listening session on radon policy that the agency "has seen no discernable patterns of impact on application numbers or processing timelines at any of these points."[xvii]

## Radon in HUD, Fannie Mae, and Freddie Mac Multifamily Lending

***Lending policies to test multifamily properties for radon have evolved over time.*** In January 2013, HUD's Office of Multifamily Development directed multifamily mortgagees to include radon testing in environmental reviews, and ensure needed radon mitigation, requiring the use of certified radon professionals but limiting testing to only 25% of ground contact (GC) units.[xviii] If elevated radon was determined present, additional testing was required to include the remainder of GC apartments to meet compliance with 100% of GC apartments tested. In December 2020, based on HUD-funded research indicating that testing only 25% of GC units had a 38% chance of missing a unit with high radon levels, HUD amended its radon policy to require 100% GC testing consistent with the EPA-recommended industry consensus standard.[xix]

***Fannie Mae and Freddie Mac multifamily policy mistakenly and prematurely eliminated in 2025.***

- Historically, Fannie Mae and Freddie Mac (GSEs) required testing one in ten ground contact (GC) units for radon for multifamily loans but did not require the use of certified radon professionals or adherence to industry consensus standards.

***For radon, all projects that are subject to NEPA's related environmental laws must test for radon and install radon mitigation systems for any spaces that test above 4.0 picocuries per liter for radon.*** *In addition, new construction projects must use radon-resistant construction techniques as described in the ANSI/AARST CC-1000 standard. Because installation of mitigation systems cannot occur before the environmental review is completed, this must be entered into the environmental review record as a mitigation measure. For new construction and substantial rehabilitation properties, all mitigation, including follow-up testing, must be completed and all reports submitted to HUD staff prior to final endorsement. Radon mitigation included as part of a Section 223(f) project's repairs must be completed as quickly as possible and no later than 12 months after closing. The scope of work and related costs identified in the firm application must include all repairs related to radon. An operation and maintenance plan, called an operation, maintenance, and monitoring (OM+M) plan under the ANSI/AARST standards, must be administered per the applicable mitigation standard for any mitigation project. HUD attaches a condition to the firm commitment requiring that the borrower operate and maintain the property consistent with the referenced OM+M plan for the duration of the insured mortgage. The project must submit the final OM+M plan to HUD after the radon mitigation system is installed.*

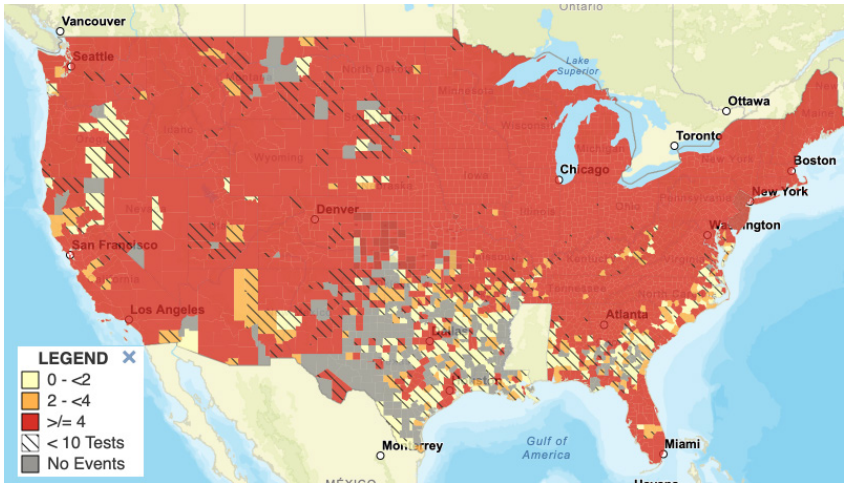
- February 12, 2021: The Federal Housing Finance Agency (FHFA) directed the GSEs to revise their radon testing and mitigation policies.
- November 3, 2022: FHFA directed the GSEs to adopt additional changes to their radon testing and mitigation policies, including testing 25% GC units, and testing additional units where elevated concentrations were determined present.

- January 19, 2023: With FHFA, the GSEs announced their joint policy. FHFA stated that the agency "will continue to monitor the multifamily mortgage market and will coordinate with the U.S. Environmental Protection Agency (EPA) in its continuing efforts to address radon. Further adjustments may be warranted based on results from an evaluation of the Enterprises' radon testing standards to ensure they are comprehensive, data informed, fully understood by property owners, and properly implemented and enforced."[xx]
- March 29, 2023: In a response to a letter about the limitations of the GSEs' policy, FHFA stated it "recognizes more work is needed on radon," "believes there are information gaps regarding radon in multifamily buildings," and "was partnering with the Centers for Disease Control (CDC) to identify opportunities and challenges in collecting radon data at multifamily properties with Enterprise-backed mortgages." FHFA also stated, "In 2024, after they collect additional property data, the Enterprises will reassess costs, delays, and their ability to meet their mission, including any impacts to affordability and liquidity across market cycles. Your feedback will help to inform the final radon policy." [xxi]
- March 26, 2025: Claiming that the policy added "time, expense, and operational complexity" and was 'no longer consistent with the Federal Housing Finance Agency's priorities and objectives as conservator," offering no indication of re-evaluation based on facts, FHFA rescinded its prior directive for GSE radon testing and mitigation.[xxii]
- April – June 2025: Fannie Mae and Freddie Mac retreated from the joint 2022 policy to only require radon testing and mitigation if there is a state or local requirement, or when "the Environmental Professional recommends that testing be conducted," which has been interpreted by the environmental due diligence industry as radon testing in EPA Radon Zone 1 only. Fannie Mae and Freddie Mac testing protocol requirements have reverted to 10% of ground contact units or one ground contact unit per building with no requirements for additional units tested within buildings determined to have elevated radon concentrations.

***Fannie Mae and Freddie Mac reliance on the 1993 EPA Radon Zones for determining if radon testing should be conducted is a flawed screening method: high concentrations of radon have been determined present in all EPA radon zones and most counties.***

- Data reported to CDC's National Environmental Public Health Tracking Network by labs and states indicate that only 13% of US counties had no radon test result above the EPA action level of four picocuries per liter of air between 2008 and 2017; fewer than ten test results were reported in 85% of these counties during the entire ten-year period.[xxiii]

**US COUNTIES' HIGHEST RADON LEVELS**




[i] National Research Council. Health Effects of Exposure to Radon: BEIR VI. 1999.
[ii] Bowles, T, Return on Investment for Radon Reduction (Presentation). 2024.
[iii] National Institutes of Health. Cancer Trends Progress Report. 2022.
[iv] National Institutes of Health. Productivity Costs of Cancer Mortality in the US. 2008.
[v] US EPA, Assessment of Risks from Radon in Homes, 2003.
[vi] US Census, Population and Housing Estimate Tables, 2025.
[vii] Ibid.
[ix] Indoor Environments Association, Cost Analysis. 2021.
[x] Ibid.
[xi] Neri, A, Evaluation of percentage-based radon testing requirements for federally funded multi-family housing projects; *J Occup Environ Hyg.* 2019 Apr;16(4):302-307.
[xii] Kitto, M. et al., Evaluating and Assessing Radon Testing in Multifamily Housing, *Journal of Public Health Management and Practice,* 28(2):p E525-E532, March/April 2022.
[xiii] Ibid.
[xiv] ***Vega v. Semple***, US Ct of Appeals, 2nd Circuit. 2020
[xv] Ledg Cap., LLC v. Cove, L.P., 2024 Ala. Cir. LEXIS 36**.** 2024
[xvi] US Census, American Community Survey. 2025
[xvii] Jensen, S, HUD FHA Radon Policy, Presentation. 2021
[xviii] HUD, Mortgagee Letter 13-07. 2013
[xix] HUD, MAP Guide Briefing Webinar. 2021
[xx] FHFA, Radon Standards Release. 2023
[xxi] FHFA, FHFA Letter to CRCPD and AARST, 2023
[xxii] Pulte, W, Posting on X. 2025
[xxiii] CDC, National Environmental Public Health Tracking Network, Data Explorer