

Radon Action Guide for Municipalities

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Summary

Radon is a naturally occurring radioactive gas that emanates from the ground and can enter and accumulate in buildings. Radon gas is found in every building in Canada at some level. Radon exposure is the leading cause of lung cancer after smoking, and accounts for an estimated 16 percent of lung cancer deaths in Canada. Radon risk reduction is easy to address through testing and mitigation. Simple tests involve placing a long-term radon detector in the lowest lived-in level of a building for three months during the fall-winter months. Health Canada estimates that ~7% of homes will have a high radon level; this percentage varies significantly across Canada, as indicated by [Health Canada's radon map](#). There are relatively inexpensive and very effective ways to reduce radon exposure in homes and buildings with high radon levels, i.e., over the Canadian Radon Guideline of 200 Bq/m³.

Municipalities can become leaders in advancing radon action through education and awareness, supporting community testing, creating databases and maps, enforcing radon provisions in Building Codes, policy development, and other actions. This Radon Action Guide for Municipalities describes why municipalities should take action, how to create radon action strategies, and important steps that can be taken to reduce radon-induced lung cancer in communities.

Table of Contents

Summary	2
Table of Contents	3
1. What is Radon and Why is it a Problem?	4
2. Why Municipalities Should Take Action on Radon	6
3. Planning for Radon	8
4. Education and Awareness	9
5. Testing, Mapping and Databases	10
6. Government Operations and Social Housing	12
7. Building Codes	13
8. Standards of Maintenance/Housing Standards	14
9. Radon Requirements in Public Spaces	15
10. Subsidies and Incentives for Testing and Mitigation	16
11. Energy Efficiency Retrofits	16
12. New Development Areas	17
13. Conclusion	18

1. What is Radon and Why is it a Problem?

Radon is a naturally occurring radioactive gas found in every building in Canada. Radon gas comes from the breakdown of uranium in the ground. Long-term exposure to high radon levels is the leading cause of lung cancer after smoking, and accounts for more than 3,000 lung cancer deaths in Canada.¹

All homes and buildings have some level of radon. In Canada, radon concentrations in homes varies significantly, with an average of 7% of homes having high radon levels. In some communities, almost half of the homes have concentrations above the [Canadian Radon Guideline](#) of 200 Bq/m³. Radon concentrations will vary from building to building, and depend on a mix of underlying bedrock and soil, construction methods, and behaviours of inhabitants. Elevated radon is typically not a problem in homes above the 2nd floor in multi-story buildings.

The standard way to test homes in Canada involves placing a small detector in the lowest lived-in level of the home (basement or main floor) for at least 3 months during the heating season.² Do-it-yourself (DIY) long-term test kits are available, typically costing 30 to 60 dollars, from a variety of online suppliers and hardware stores. “Real time” digital monitors can give a short snapshot of radon levels, but should be supplemented with 3-month tests. Radon measurement services from radon measurement professionals certified by the Canadian National Radon Proficiency Program (C-NRPP) are also available, at a much higher cost than the DIY test kits. If test results are high (above 200 Bq/m³), a radon mitigation professional certified by the C-NRPP can determine and implement the most appropriate method to reduce the radon level. Techniques to lower radon levels are effective and can save lives. A radon mitigation system, which can be installed in less than a day, will reduce the radon level by more than 80% in most homes. The cost is about the same as other common home repairs, such as replacing the furnace or air conditioner.³

¹ Chen, J., Moir, D. and Whyte, J., 2012. “Canadian population risk of radon induced lung cancer: a re-assessment based on the recent cross-Canada radon survey,” *Radiation Protection Dosimetry* 152(1-3), pp. 9-13.

² See Health Canada, 2017. Guide for Radon Measurements in Residential Dwellings (Homes). Available at <https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/guide-radon-measurements-residential-dwellings.html> (accessed June 9, 2020).

³ Health Canada, 2018. Residential Radon Mitigation Actions Follow-Up Study: Public Summary. Available at <https://www.canada.ca/en/health-canada/services/publications/health-risks-safety/residential-radon-mitigation-actions-follow-up-study.html> (accessed October 20, 2020).

Over the last decade, some radon awareness, action and policy progress have been achieved in Canada.

Health Canada's National Radon Program (NRP) reduced the Canadian Radon Guideline from 800 to 200 Bq/m³ in 2007. Health Canada leads an extensive public education program, and has conducted surveys⁴ and health research⁵ and developed and validated technical guidance for radon risk reduction.⁶ The NRP ensures Canadians have access to accredited radon services and resources to help test and reduce indoor radon exposure.

Across Canada, some actions taken by diverse provincial and territorial governments and other institutions include:

- Radon reduction requirements in Building Codes
- Promoting radon awareness and testing on websites
- Testing of public buildings—schools, daycares, and social housing
- Inclusion of radon in real estate Property Disclosure Statements and guidance on professional obligations for agents to treat radon as a latent defect
- Coverage for elevated radon in New Home Warranty claims
- Requirement of radon mitigation in rental properties by some tribunals for landlord-tenant disputes; and
- Clarifying guidelines for radon in the workplace

Despite this progress there still remain many regulatory gaps in Canada, with many people living and working in high radon environments without knowing it.

⁴ Health Canada, 2012. Cross Canada Survey of Radon Concentrations in Homes, Final Report. Available at <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/cross-canada-survey-radon-concentrations-homes-final-report-health-canada-2012.html>.

⁵ Chen, J., Moir, D. and Whyte, J., 2012. "Canadian population risk of radon induced lung cancer: a re-assessment based on the recent cross-Canada radon survey," *Radiation Protection Dosimetry* 152(1-3), pp.-13. Chen, J., 2013. "Canadian lung cancer relative risk from radon exposure for short periods in childhood compared to a lifetime," *International Journal of Environmental Research and Public Health* 10(5), pp. 1916-1926. Chen, J., Bergman, L., Falcomer, R. and Whyte, J., 2015. "Results of simultaneous radon and thoron measurements in 33 metropolitan areas of Canada," *Radiation Protection Dosimetry* 163(2), pp. 210-216. Chen, J. 2019. "Risk Assessment for Radon Exposure in Various Indoor Environments," *Radiation Protection Dosimetry* 185 (2), pp. 143–150.

⁶ Health Canada, 2008. Guide for Radon Measurements in Residential Dwellings (Homes). Available at <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/guide-radon-measurements-residential-dwellings-homes.html> (accessed January 8, 2021). Health Canada, 2014. Radon—reduction guide for Canadians. Available at <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/radon-reduction-guide-canadians-health-canada-2013.html> (accessed January 8, 2021). Health Canada, 2014. Reducing Radon Levels in Existing Homes: A Canadian Guide for Professional Contractors. Health Canada, 2016. Guide for Radon Measurements in Public Buildings, Workplaces, Schools, Day Cares, Hospitals, Care Facilities, Correctional Centres. Available online at <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/guide-radon-measurements-public-buildings-schools-hospitals-care-facilities-detention-centres.html> (accessed January 8, 2021).

While public awareness has increased, there is much work still to be done. A vast majority of Canadian households (<90%) have never tested for radon.⁷ Local, community-based implementation is needed to ensure progress in reducing radon exposure.

This guide will help municipal governments develop programs and policies to address radon. It considers individual interventions across the built environment such as: Public education programs; community testing; radon risk maps; testing and mitigation in schools, daycares and public buildings; and including radon in standards of maintenance and business bylaws. It draws on existing experience of radon action from across Canada, the United States, and Europe.⁸

Companion documents to this one should be reviewed, including the following:

Justifications and Policy Rationales for Radon Action: Provides detail on why governments should take action, discussing societal values around public health, saving lives, and environmental concern. It also discusses initiatives already in place for which radon action is a natural extension, from Disease Prevention Strategies to Healthy Community Planning.

Radon Action Guide for Provinces and Territories: Provides a series of steps that provinces can take to establish a Radon Action Plan. It also discusses in detail the division of powers in Canada, why provincial action is required, and draws from international experience.

Radon Action in Municipal Law: Understanding the Legal Powers of Cities and Towns in Canada. Provides a review of the powers that municipalities have to address radon, recognizing that municipalities are “creatures of the provinces” and constrained by enabling law.

2. Why Municipalities Should Take Action on Radon

⁷ See Statistics Canada, 2019. Knowledge of radon and testing. Table: 38-10-0086-01. Available at <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810008601> (accessed January 8, 2021).

⁸ Quastel, N., Siersbaek, M., Cooper, K. and Nicol A-M. 2018. Environmental Scan of Radon Law and Policy: Best Practices in Canada and the European Union. Toronto and Burnaby: Canadian Environmental Law Association and CAREX Canada. Available at https://cela.ca/wp-content/uploads/2019/07/Radon-Policy-Scan-Full-Rept-with-Appendices_0.pdf (accessed January 8, 2021). For US laws, see Environmental Law Institute, 2019. Database of State Indoor Air Quality Laws. Database Excerpt: Radon Laws. Available at https://www.eli.org/sites/default/files/docs/2019_radon_with_cover_boldd.pdf (accessed January 8, 2021).

Governments play a role in helping individuals avoid risks. Health Canada research estimates that with lifetime exposure at 800 Bq/m³, the lifetime lung cancer risk would be 5% (1 in 20) for non-smokers, significantly higher than the baseline lung cancer rate of 1% (1 in 100).⁹ People who smoke and also live in high radon environments can have a 1 in 3 chance of contracting lung cancer.¹⁰ Canadians expect health and safety standards for their homes, workplaces, and recreational spaces. **Radon action is a proven and cost-effective way to save lives and is a natural extension of existing policy and planning frameworks that support action on health and environment.** In the companion document, **Justifications and Policy Rationales for Radon Action**, a variety of reasons why governments should take action on radon are outlined in more detail.

This guide details many action items that municipalities and local government can take, independently or in concert with higher levels of government. Radon fits within a variety of policy platforms municipalities already use, such as sustainability planning, housing policies, healthy built environments, standards of maintenance, and clean air bylaws.

Municipalities have legal powers to act on radon. Most provinces' municipal legislation mentions protecting health and safety as part of the general purposes of a municipality or allows for bylaws concerning health.¹¹ Many provinces also provide that municipalities have the purpose of fostering environmental well-being or can make bylaws to protect the environment.¹² Radon can fit into these powers, and the document **Radon Action in Municipal Law** sets out specific actions on radon that municipal law frameworks support.

Municipalities can take a leadership role and show that bold action on radon is possible. As the level of government often closest to people, and the one with which they identify, municipalities will often be trusted to respond to citizens' concerns. Even when provinces engage in comprehensive radon planning there will be important roles

⁹ Chen, J., 2017. "Lifetime lung cancer risks associated with indoor radon exposure based on various radon risk models for Canadian population," *Radiation Protection Dosimetry* 173(1-3), pp. 252-258.

¹⁰ US EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003). Available at <https://www.epa.gov/sites/production/files/2015-05/documents/402-r-03-003.pdf> (accessed January 8, 2021).

¹¹ Community Charter, SBC 2003, c 26, s. 8(3)(i); *Municipal Government Act*, RSA 2000, c M-26, s. 3(c) and 7(a); *Municipalities Act*, SS 2005, c M-36.1, 4(2), and s. 8(1)(b); *The Cities Act*, SS 2002, c C-11.1, 4(2) and 8(1)(b); *The Northern Municipalities Act*, 2010, SS 2010, c N-5.2 The *Northern Municipalities Act*, 2010, SS 2010, c N-5.2 s. 4(2) and 8(1)(b); *Municipal Act*, CCSM c M225 232(1)(a); *Municipal Act*, 2001, SO 2001, c 25, (s. 10 (1), s. 10 (2)(6), s. 11(1) and 11(2)(6)); *Municipal Powers Act*, CQLR c C-47.1, s. 4 (5), s. 4(7), s. 55; *Local Governance Act*, SNB 2017, c 18, s. 10 (1)(a); *Municipal Government Act*, RSPEI 1988, c M-12.1, s. 180, *Municipal Government Act*, SNS 1998, c 18 s. 172 (1)(a).

¹² Community Charter, SBC 2003, c 26, s. 7(d); *Municipal Government Act*, RSA 2000, c M-26, s. 3(a.1); *Municipalities Act*, SS 2005, c M-36.1, 4(2)(d); *The Cities Act*, SS 2002, c C-11.1, 4(2)(d); *The Northern Municipalities Act*, 2010, SS 2010, c N-5.2 s. 4(2)(d) and 8(1)(b); *Municipal Act*, 2001, SO 2001, c 25, (s. 10 (2)(5), s. 10 (2)(6), s. 11(2)(5); *Municipal Powers Act*, CQLR c C-47.1, s. 4 (4), s. 19 *Local Governance Act*, SNB 2017, c 18, s.5 (d); *Municipal Government Act*, RSPEI 1988, c M-12.1, s. 180 m), *Municipal Government Act*, SNS 1998, c 18 s. 172 (1)(a).

for municipalities. Municipalities enforce areas which make up core components of radon policy, including but not limited to building codes, construction permits, air quality in indoor public spaces (as is currently done for smoking), and standards of maintenance for rental accommodation.

Risk management. Municipalities are employers, building owners and operators and at times landlords. As such they are subject to many laws that impose general duties to ensure spaces are safe—and increasingly these laws are recognized as including protection from elevated radon. Municipalities are also subject to a duty of care when inspecting buildings. As Building Codes are updated to include radon-resistant construction techniques, this creates new responsibilities for municipal building inspectors. Becoming aware of radon and taking steps to address it can be a good way to avoid exposure to litigation.

Radon action can increase the value of the building stock. Certified mitigators can reduce radon levels to safe levels, which can become a selling feature—not only ensuring users/owners that radon has been dealt with, but also increasing the value of the home or business.

3. Planning for Radon

Municipal governments regularly engage in long-term proactive planning, as found in long-term land use plans, sustainability plans, healthy community strategies or housing initiatives. Not only do municipalities have the power to include radon in these plans, but doing so follows from existing municipal roles of planning for housing and healthy built environments. More detail on the way radon can be included in established municipal planning frameworks is outlined in **Radon Action in Municipal Law**.

Radon planning is well established in many countries. Municipalities can begin to put in place many of the core features of a Radon Action Plan, including:

- Delivering annual public education and awareness campaigns during November, Radon Action Month in Canada.
- Conducting community testing to gain better understanding of local radon levels.
- Adopting goals of reducing indoor radon exposure in the community.
- Establishing specific bylaws and operating policies covering Building Code enforcement, rental accommodation, municipal owned buildings, and publicly accessible places.

In later sections, this guide describes in more detail specific actions municipalities can take, either as part of a comprehensive plan or individually.

Developing radon plans should include collaboration, consultation, and partnerships. Municipalities should particularly reach out to independent organizations that have a strong presence at the local level and can play an important role concerning radon. Health authorities are likely to have significant knowledge about radon and be prepared to engage in education campaigns and site investigations. School boards can ensure testing and mitigation in educational spaces. Local libraries can lend out radon detection devices (akin to book loans). Non-profit health associations may also have special insight into the problem and lend grassroots support.

4. Education and Awareness

Developing a radon outreach program is a good first step for governments to take, because awareness is a precondition for action. Websites, pamphlets, ad campaigns, and public presentations can be good ways to start building momentum. Ideally, materials will guide the general public through the science and health risk of radon, show how to test and mitigate, explain relevant legal requirements (such as in the Building Code), and provide links and resources for people to learn more and take action. Health Canada has developed many radon outreach materials that can be used and adapted as required. Many local governments have put up radon websites.

Section 1 of the Appendix provides a list of Health Canada's resources, messaging and outreach materials that municipalities can use and examples of radon websites for Canadian towns and cities.

An effective way to draw attention to radon is through civic declarations. For instance, many provinces have taken the lead from Health Canada and the Canadian Lung Association and declared November "Radon Action Month." This aligns with the start of winter as the ideal time to begin long-term radon testing. This type of awareness campaign has been used by some provinces and municipalities (Appendix, Section 1).

Ideally, educational campaigns are combined with other initiatives to maximize reach, impact and ensure knowledge is translated into action. Some successful Canadian campaigns have included well-known players from the Canadian Football League¹³ and

¹³ Giesbrecht, L. 2019. "CFL players tackling radon with new awareness campaign," *Regina Leader-Post*, August 31, 2019. Available at <https://leaderpost.com/news/local-news/cfl-players-tackling-radon-with-new-awareness-campaign> (accessed January 8, 2021).

home improvement personalities with their own television shows.¹⁴ Rather than simply giving people knowledge, some programs provide ways for the public to gain hands-on experience, such as through sample community testing initiatives and “citizen science” engagement programs.¹⁵ (See this Guide, section 5, and Appendix, section 2). Other initiatives discussed in this Guide will also have a strong educational component and subsidies (see this Guide, section 10, and Appendix, section 7), and new bylaws (see this Guide, section 8 and 9 and Appendix, section 5 and 6).

5. Testing, Mapping and Databases

An important step in radon action is testing for radon concentrations in residences, businesses, and other indoor public spaces. For individual residents, businesses, and occupiers of buildings, this indicates whether mitigation is needed.

Local governments can consider selling test kits as a way to increase testing and collect radon data in their communities. Promoting radon testing and making it available through municipal channels validates and adds credibility to this important issue, resulting in increased action by community members. A further advantage of this approach is that the agency selling the test kit can ask buyers to agree up front for test data to be shared with the municipality. Municipalities may also be able to find ways to reduce the price relative to commercial vendors, such as through buying in bulk, not charging markup, having city staff sell from their desks, working with existing lung associations and charitable societies, or through a direct subsidy (see the Appendix, Section 2).

At a municipal scale it is important to know radon prevalence, because in some regions much greater percentages of buildings have a high radon problem compared to other regions. Individuals will respond better to health prevention messaging if they can translate the risks into their own personal experience, such as by knowing if radon is very common where they live. **Community testing can help municipalities characterize local radon prevalence, and for relatively high radon areas, send a**

¹⁴ Holmes, M. 2018. What is Radon? [Mike's Advice / Home Safety & Maintenance](https://makeitright.ca/holmes-advice/home-safety-maintenance/what-is-radon/). Available at <https://makeitright.ca/holmes-advice/home-safety-maintenance/what-is-radon/> (accessed January 8, 2021).

¹⁵ McKinley, Duncan C., et al. 2017. “Citizen science can improve conservation science, natural resource management, and environmental protection,” *Biological Conservation* 208: pp. 15-28. Examples of citizen science programs include Simon Fraser University and Dr. Anne-Marie Nicols’ projects in Metro Vancouver, and the University of Calgary and Dr. Aaron Goodarzi’s Evict Radon program. See Simon Fraser University, 2018. SFU researcher urges North Shore citizens to test for cancer-causing radon gas. Available at <https://www.sfu.ca/university-communications/issues-experts/2018/01/sfu-researcher-urges-vancouverites-to-test-for-radon.html> (accessed January 8, 2021). Evict Radon, 2020. Website, available at Evictradon.org (accessed January 8, 2021).

strong signal of the need to take action. This can help professionals such as realtors, building inspectors, and employers be alert to local radon risks. Community testing provides data that can support important policy and regulatory change, such as public health standards, school and daycare testing requirements, occupational health and safety and tenancy considerations. In some provinces, such as Ontario, the Building Code requires radon mitigation systems “where methane or radon gases are known to be a problem.”¹⁶ Community testing becomes a way to establish whether radon levels are higher, and the community can then take steps to enforce radon requirements.¹⁷ In British Columbia, the Building Code provides that municipalities can take additional steps to be added to the list of places where radon levels are higher and mitigation is needed.¹⁸ For further resources on community testing, see Section 2 of the Appendix.

Radon testing also contributes to improving databases and risk mapping, which helps research on radon and provides easy visual cues that radon is an issue.

Find a list of existing Canadian and international radon database and mapping initiatives in Section 2 of the Appendix.

There are a variety of programs to stock digital radon monitors in public libraries, which allows participants to check them out (akin to book loans) and conduct a radon test at home. Currently there are radon library lending programs in Nova Scotia, PEI, British Columbia and Ontario (see Appendix 2 for more detail). These programs can help people with limited funds, or who want an initial introduction to radon. These programs should be considered a screening test only with a primary goal of raising awareness about radon. Health Canada recommends a long-term test of at least three months during the heating season. This is not always possible with the library lending programs, but these programs can help people understand radon and can motivate them to conduct long-term tests. Municipalities can work with libraries, supporting lending programs or the distribution of long-term test kits to patrons/community members. Health Canada, in collaboration with provincial lung associations and radon experts, has developed a Radon Library Lending Program Guide to provide libraries across the country with support, education, and useful resources to run an effective and successful radon monitor lending program.

¹⁶ Ontario Building Code Section 9.13.4.2. and Supplementary Standard SB-9.

¹⁷ Guelph, 2020. Radon Gas Mitigation Program. Available at <https://guelph.ca/city-hall/building-permits-inspections/residential-building-permits/radon/> (accessed January 8, 2021). Kingston Soil Gas Mitigation Strategy. Available at <https://www.cityofkingston.ca/documents/10180/26367/Soil+Gas+Mitigation+Strategy/a0862e3c-a23a-4033-9844-cc032055fc19> (accessed January 8, 2021).

¹⁸ BC Building Code, Division B, sec. 1.1.3.3 (2)

6. Government Operations and Social Housing

Governments have broad duties to ensure spaces they control are safe. When acting as employers they are bound by “general duty clauses” that require attention to hazards.¹⁹ They are also open to compensation claims if workers contract lung cancer from radon.²⁰ Many municipalities control social housing—as landlords they have a duty to address radon to ensure the spaces they rent are in good repair.²¹ Municipalities may be open to litigation under occupiers’ liability law if their spaces lead tenants to develop lung cancer. Addressing radon in social housing is an ethical and socially responsible action for municipalities to take. In some cases, municipalities may also control schools, daycares, and other facilities for which radon action is also important.

A government could choose to test and mitigate its existing buildings and improve standards in new buildings as a way of acting ethically, or to help support local environmental industries. Testing of government buildings and social housing demonstrates leadership by example. Section 3 of the Appendix summarizes initiatives in Canada for testing of government-occupied buildings, and summarizes federal, provincial, and municipal social housing testing initiatives.

An important principle in government testing and mitigation is to use certified radon professionals. **Health Canada recognizes professionals certified under the Canadian National Radon Proficiency Program (C-NRPP)**. In the absence of clear rules from the provinces on who should perform radon services, local governments should consider setting policies limiting any contracts for radon work to C-NRPP certified professionals. This not only ensures high standards, but helps build an important industry.

¹⁹ British Columbia, Occupational Health and Safety Regulation, BC Reg 296/97, Part 4 - General Conditions - 296/97 at s. 4.1; Alberta, *Occupational Health and Safety Act*, RSA 2000, c O-2 at s. 2(1); The *Saskatchewan Employment Act*, SS 2013, c S-15.1, at s. 3-8; *Occupational Health and Safety Regulation*, 1996 O-1.1. at section 12; Manitoba, *Workplace Health and Safety Act*, s. 4(1) C.C.S.M. c. W210; Ontario, *Occupational Health and Safety Act*, RSO 1990, c O.1 s. 25(2)(h); Quebec, *Act respecting the occupational health and safety*, CQLR c S-2.1 at s. 51 Nova Scotia, *Occupational Health and Safety Act*, SNS 1996, c 7 at s. 13 (1); New Brunswick, *Occupational Health and Safety Act*, SNB 1983, c O-0.2 at s.9; Prince Edward Island, *Occupational Health and Safety Act*, RSPEI 1988, c O-1.01 s. 12; Newfoundland, *Occupational Health and Safety Regulations*, 2012 under the *Occupational Health and Safety Act* (O.C. 2012-005) at s. 42, Yukon, *Occupational Health and Safety Act*, RSY 2002, c 159 at s. 3(1); Northwest Territories, *Safety Act*, RSNWT 1988, c S-1 at s. 4. (1); Nunavut, *Safety Act*, RSNWT (Nu) 1988, c S-1 at s. 4(1).

²⁰ All provinces and territories have workers compensation legislation with broad provisions for injury on the job. Many specifically list ionizing radiation or radon leading to lung cancer as an occupational disease, see Nova Scotia, The *Workers' Compensation Act*, SNS 1994-95, c 10 s. 15(1); Quebec, The *Workers' Compensation Act*, CQLR c A-3, s. 111(8) and Schedule D (8); Alberta, *Workers' Compensation Act*, RSA 2000, c W-15 s. 24(6); *Workers' Compensation Regulation*, Alta Reg 325/2002 s. 20(1), Schedule B; British Columbia, The *Workers Compensation Act* RSBC 1996, c 492 s. 5 (1), s. 6(11), Schedule B.

²¹ All provinces and territories have landlord-tenant law that includes broad language about fitness of habitation or good state of repair. On how this applies to radon see Ontario, CET-67599-17 (Re) 2017 CanLII 60362 (ONLTB) Quebec-- *Vanderwerf v. Dolan*, 2019 QCRDL 37417.

7. Building Codes

Some municipalities may be in a position to add radon provisions to building codes.

Whether a municipality can impose stricter building code requirements depends on the provincial and municipal law system. Where possible, municipalities should consider requiring full radon reduction systems in new homes and low-rise residential buildings.

The most recent statement on best practices is now the Canadian General Standard Board’s 2019 “Radon control options for new construction in low-rise residential buildings.”²² Section 4 of the Appendix describes varying standards for radon in new construction across Canada and best practices.

In some provinces, municipalities have some control over whether radon provisions apply in their area. For instance, the Ontario Building Code has a section on “Soil Gas Control” which imposes requirements “where methane or radon gases are known to be a problem.”²³ As a result, a number of municipalities and local health units have completed community testing to determine if radon is a problem and if so, they are then enforcing the radon building code provisions. Beyond enforcing or improving building codes, there is scope for municipalities to communicate and conduct education about radon with builders and homeowners as part of the permitting and enforcement processes. Some cities, such as the Ontario municipalities of Guelph and Kingston, now deny occupancy permits to new construction that does not meet the Code requirements on radon.²⁴

In provinces with uniform Building Codes, local governments can also consider negotiating voluntary compliance with builders as a way of reaching higher standards, such as full passive sub-slab depressurization systems rather than “rough-in stubs.” This would be especially appropriate in areas where elevated radon is known to be prevalent. Generally, requirements for uniformity concerning Building Codes attach to mandatory requirements and “enactments” in bylaws. There is thus still the option of tying compliance to other benefits a city might provide. For instance, a municipality

²² Canadian General Standards Board CAN/CGSB-149.11-2019. Available at http://publications.gc.ca/collections/collection_2019/ongc-cgsb/P29-149-011-2019-eng.pdf (accessed January 8, 2021) section 6, page 10.

²³ Ontario Building Code Section 9.13.4.1. and Supplementary Standard SB-9.

²⁴ City of Guelph, Radon Gas Mitigation Program. Available at <https://guelph.ca/city-hall/building-permits-inspections/residential-building-permits/radon/> (accessed January 8, 2021). City of Kingston. Radon Gas Mitigation. Available at <https://www.cityofkingston.ca/resident/building-renovating/radon-gas-mitigation> (accessed January 8, 2021).

might be able to use density bonus bylaws or land covenants to impose higher standards, or offer subsidies and incentives.²⁵

Building Code enforcement is a key focus of municipal governments. Most provinces now have some form of radon protection in place for new construction but rely on municipalities for enforcement. This is an important role, and municipalities need to ensure inspectors understand radon and radon mitigation systems. Ensuring building inspectors receive training on radon, including C-NRPP mitigation credentials, can be a good way to ensure radon is not overlooked. This can ensure inspectors meet the required standard of care, and can help protect municipalities from the risk of liability.²⁶ Section 4 of the Appendix provides more detail on steps municipalities can take to enforce radon provisions, such as outlining the inspection process and ensuring building inspectors have relevant C-NRPP training.

8. Standards of Maintenance/Housing Standards

Many Canadian municipalities have standards of maintenance bylaws that cover the conditions of property. In practice, these often focus on “community standards” that aim to create calm, ordered, and quiet outdoor environments through attention to issues such as graffiti, garbage, or noise.²⁷ However, some municipalities include details on indoor environments in these bylaws, and so supplement provincial residential tenancies protections.²⁸ In some cases, such as British Columbia, the provincial government provides explicit guidance to municipalities that include indoor conditions, such as having plumbing in good working order.²⁹ Municipalities should consider updating these standards to explicitly require radon testing and mitigation to ensure Canadian Radon Guidelines are met.

Municipalities can also take steps to ensure enforcement of maintenance standards. In Waterloo, Ontario, the city uses the business license process to enforce standards of maintenance, denying permits to landlords who do not maintain rental properties in

²⁵ Bullhozer, B. 2017. The Building Act: What You Need to Know. Young Anderson Seminar Paper. Available at https://www.younganderson.ca/assets/seminar_papers/2017/The-Building-Act-What-You-Need-to-Know.pdf (accessed January 8, 2021) p. 6.

²⁶ Rothfield v. Manolagos [1989] 2 S.C.R. 1259; Just v. British Columbia, 1989 CanLII 16 (SCC), [1989] 2 SCR 1228; Ingles v. Tutkaluk Construction Ltd., 2000 SCC 12 (CanLII), [2000] 1 S.C.R. 298

²⁷ c.f. Regina Community Standards Bylaw No: 2016-2.

²⁸ c.f. Winnipeg Neighbourhood Liveability By-law 1/2008, at Part 2; Montreal By-law concerning the sanitation, maintenance and safety of dwelling units (03-096).

²⁹ See BC Government, 2020. Standards of Maintenance Bylaw. Available at http://www.housing.gov.bc.ca/pub/htmldocs/pub_guide.htm (accessed January 8, 2021). BC Government, 2020. Standards of Maintenance Bylaw: Sample Bylaw. Available at http://www.housing.gov.bc.ca/pub/htmldocs/pub_sample.htm (accessed January 8, 2021).

good condition, and allowing enforcement by medical officers of health, as well as building inspectors, enforcement officers, and police officers.³⁰ Municipalities can add protection from high radon to such bylaws, creating a powerful tool for protecting renters. Section 5 of the Appendix provides examples of model language to help draft such bylaws and ensure their enforcement.

9. Radon Requirements in Public Spaces

Through the 1990s and 2000s many municipalities and other local governments in Canada came to adopt bylaws prohibiting smoking in public spaces such as restaurants, shopping malls, workplaces or parks. In some cases these were described as “Clean Air Bylaws”.³¹ In other cases they were part of a more omnibus “Health Bylaw” that covered areas such as bans on pesticides, spitting in public, or boats discharging sewage.³² “Clean Air” or “Health” bylaws could be expanded to include rules requiring testing and necessary mitigation of radon in public indoor spaces. Cities generally can also use business permitting powers to enforce health bylaws.

Typically, anti-smoking bylaws drew on explicit wording in provincial legislation allowing municipalities to pass smoking regulations. However, municipalities could expand clean air/health bylaws or create new radon bylaws on the basis of the very general powers to pass health-related regulations (or, in some cases, general environmental powers).

Municipalities generally cannot prohibit normal business activity or trade, or, in most provinces (outside of Quebec, Newfoundland and Prince Edward Island) impose more stringent building codes. **It is important to emphasize that requirements to ensure low radon levels will not be unduly costly and so will not severely impact businesses.** As well, regulating the health impacts of air can be differentiated from imposing structural requirements. While Building Codes can provide detailed prescriptions for how buildings should be built, which can have the result of lowering radon levels or making it easier to do so, this is different from a requirement concerning the quality of indoor air. There will not be conflict between complying with a low radon requirement and complying with the Building Code (indeed, they will likely work together).

Appendix 6 suggests content for radon bylaws for public spaces.

³⁰ City of Waterloo Rental Licensing Bylaw 2011-047.

³¹ Capital Regional District, Bylaw No. 3962, Capital Regional District Clean Air Bylaw No 1, 2014; Kelowna Bylaw #: 5980-86; Clean Indoor Air and Smoking Regulation Bylaw; City of Revelstoke Clean Air Bylaw NO. 2186; Brantford Smoking -Clean Air Bylaw, Chapter 570.

³² City of Vancouver, Health By-Law No. 9535; Leduc Bylaw No. 581-2004, Health Bylaw.

10. Subsidies and Incentives for Testing and Mitigation

Subsidies and incentives are an important component of radon action. Many people do not know about radon and need forms of encouragement. Poorer households might need financial help, and so subsidies represent a way of ensuring equity of access. Landlords may only be responsive to fiscal incentives. Local governments may pursue subsidies and incentives as a way to achieve broader goals of reducing elevated radon in their towns and cities. Earlier in this guide we mentioned municipalities could sell or offer price subsidies on test kits as a way of spreading awareness and developing databases and maps. However, it is also important that mitigation costs not become a barrier, and disincentivize people from even taking steps to test.

There are many different ways in which subsidies can be offered. Municipalities can include a subsidy system for radon in their municipal budgets and adjust tax rates accordingly. Subsidies can take the form of low- and no-interest loans, direct payments, or reduction of other taxes or fees. Subsidies for mitigation should only be made available where mitigation is performed by C-NRPP certified radon professionals. Section 7 of the Appendix covers examples of radon incentives as part of broader sustainable building programs pioneered by municipalities such as Victoriaville, Quebec.

11. Energy Efficiency Retrofits

Green building programs are a core part of urban sustainability initiatives.³³ It is common for municipalities to have green building programs covering city-owned property,³⁴ or to have policies that catalyze low or zero emissions in new developments.³⁵ As well, many municipalities own electricity and other utilities, which commonly include efficiency programs.³⁶ Attention to radon and other indoor air quality concerns should be an important part of energy efficiency programs. Section 8 of the

³³ See for example 2020 Declaration for Resilience in Canadian Cities. Available at <https://www.2020declaration.ca> (accessed January 9, 2021). Principle 19.

³⁴ See for example City of Ottawa, 2020. Green Building. Available at <https://ottawa.ca/en/living-ottawa/environment/climate-change-and-energy/green-buildings> (accessed January 8, 2021).

³⁵ City of Vancouver, 2020. Zero Emission Buildings. <https://vancouver.ca/green-vancouver/zero-emissions-buildings.aspx#zero-emissions-building-plan> (accessed January 8, 2021).

³⁶ See for example Kingston Ontario's Utilities Kingston's conservation programs. Available at <https://utilitieskingston.com/Electricity/Conservation/Overview> (accessed January 8, 2021).

Appendix provides examples of energy efficiency guides and programs that include recommendations for radon.

Energy efficiency often relies on controlling indoor air flow, but since the 1980s building scientists have been aware that “tight” buildings can prevent radon from escaping into the outdoors.³⁷ There is evidence that in some cases increasing airtightness can elevate mean radon concentrations by over 50%.³⁸ In newer homes there may be applicable radon standards in Building Codes, but in retrofits the Code may not be engaged. The result can be that radon issues are ignored and made worse.³⁹ Alternatively, some energy efficiency initiatives, including third-party certification standards, do include radon mitigation (Appendix, Section 8).

Energy efficiency programs should be coupled with attention to ventilation rates as well as testing and mitigating for radon.⁴⁰ Radon policy should include measures to engage with energy retrofits as a way to reduce lung cancer rates and save lives and to eliminate unnecessary conflicts between reducing carbon emissions and human well-being.

Municipalities can ensure that where they promote energy efficiency, they also draw attention to radon and other indoor air quality issues, explaining the possibility of unwanted effects of a tight home. Incentive and financing programs for efficiency and other green building improvements should include covering the costs of radon testing and mitigation. There are possibilities to help link energy retrofit and radon mitigation financing—for instance, with low-interest loans which are paid back on monthly utility bills (sometimes called “on-bill financing”). Appendix 8 covers financing models.

12. New Development Areas

³⁷ United States General Accounting Office, 1986. Indoor Radon Air Pollution. GAO/BCED-S6-170. Available at <https://www.gao.gov/assets/150/144501.pdf> (accessed January 8, 2021, at page 12). More recently see Shrubsole, C., Macmillan, A., Davies, M. and May, N., 2014. 100. “Unintended consequences of policies to improve the energy efficiency of the UK housing stock,” *Indoor and Built Environment* 23(3), pp. 340-352.

³⁸ Stanley, F.K., Zarezadeh, S., Dumais, C.D., Dumais, K., MacQueen, R., Clement, F. and Goodarzi, A.A., 2017. “Comprehensive survey of household radon gas levels and risk factors in southern Alberta,” *CMAJ Open*, 5(1), pp. E255-E264.

³⁹ Collignan, B., Le Ponner, E. and Mandin, C., 2016. “Relationships between indoor radon concentrations, thermal retrofit and dwelling characteristics,” *Journal of Environmental Radioactivity* 165, pp. 124-130.

⁴⁰ Arvela, H., Holmgren, O., Reisbacka, H. and Vinha, J., 2013. “Review of low-energy construction, air tightness, ventilation strategies and indoor radon: results from Finnish houses and apartments,” *Radiation Protection Dosimetry* 162(3), pp. 351-363.

Local governments might consider radon in soil when siting, zoning, and permitting new housing.⁴¹ Municipal legislation generally does allow for specific site planning, and specific restrictions due to hazards or health and safety concerns.⁴² This enables the council of the municipality to ensure the quality of site planning and architectural integration. In some cases, such as in British Columbia's *Local Government Act*, municipalities are given powers to impose special standards asking developers to provide special reports, timing and process of construction, or added safety features as a condition to obtaining permits.

Municipalities may have information indicating particularly high radon in some areas, and as a result give special attention to any new developments. Radon mitigation using sub-slab depressurization is almost always sufficient to ensure indoor radon levels are below the Government of Canada Guideline, even where radon levels are very high pre-mitigation.⁴³ It is thus unlikely that municipalities would need to prohibit housing due to high background radon levels. However, new developments in locations known to have a high prevalence of elevated radon in buildings could be subject to specific standards or negotiated agreements, such as for radon testing prior to occupancy.

13. Conclusion

Municipal governments have many reasons to take action on radon, stemming from concern with health and safety. Municipalities have broad powers to act in municipal law and can take a leadership role acting in concert with, or ahead of provinces. Municipalities have the power to take concrete steps that will not only help prevent lung cancer and save lives but help get the ball rolling on broader provincial and territorial action. Municipalities can spread awareness, subsidize test kits and mitigation, conduct community testing, enforce building codes, permit construction, regulate indoor spaces (as they currently do for smoking), and uphold standards of maintenance for rental accommodation. Radon action fits into broader municipal planning and is a natural addendum to sustainability plans and healthy community strategies. Addressing radon

⁴¹ See BC Centre for Disease Control. 2018. Healthy built environment linkages toolkit: Making the links between design, planning and health, Version 2.0. Vancouver, BC: BC Provincial Health Services Authority. Available at <http://www.bccdc.ca/health-professionals/professional-resources/healthy-built-environment-linkages-toolkit> (accessed January 8, 2021 at p. 52 and p. 71).

⁴² British Columbia, *Local Government Act* s. 488 to 491; Alberta, *Municipal Government Act*, RSA 2000, c M-26, s. 640 (2)(c)(iv), s. 641; Saskatchewan, *Municipal Government Act*, RSA 2000, c M-26 s. 32(2)(d); Manitoba, *Provincial Planning Regulation*, Man Reg 81/2011, S, 2, Part 3, 1.1.1, Part 4; *Ontario Planning Act*, RSO 1990, c P.13, 34(1)(3 and 3.1; Quebec *Act respecting land use planning and development*, CQLR c A-19.1 s, 145.15 to 145.20).

⁴³ Health Canada, 2018. Residential Radon Mitigation Actions Follow-Up Study. Available at <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/health-risks-safety/residential-radon-mitigation-actions-follow-up-study/27-1968-Public-Summary-Radon-EN2.pdf> (accessed January 8, 2021).

is also a way to manage legal risks that municipalities may face when inspecting new construction, or as landlords, employers, owners and managers of buildings. The time for action on radon has arrived in Canada. Municipalities can collaborate with provincial governments, local health authorities, school boards, libraries and lung health and cancer organizations to take radon action and reduce the incidence of radon induced lung cancer.

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