



NRCS

National Radon Control Strategy
Straitéis Náisiúnta um Rialú Radóin

National Radon Control Strategy

National Radon Control Strategy

Report of interagency group established by the Minister for the Environment, Community and Local Government, Mr Phil Hogan T.D., to develop a National Radon Control Strategy for Ireland

February 2014



Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government



Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raideolaíoch



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive



HEALTH AND SAFETY
AUTHORITY



Suirbhéireacht Gheolaíochta Éireann
Geological Survey of Ireland



Cumann na mBainisteoirí Contae agus Cathrach
County and City Managers' Association



SUSTAINABLE
ENERGY AUTHORITY
OF IRELAND



An Roinn Sláinte
DEPARTMENT OF HEALTH



An Roinn Post, Fiontar agus Nuálaíochta
Department of Jobs, Enterprise and Innovation



Roinn Cumarsáide, Fuinnimh agus Acmhainní Nádúrtha
Department of Communications, Energy and Natural Resources

Contents

Chapter 1: Background.....	1
1.1 The scale of the radon problem in Ireland.....	1
1.2 Why a National Radon Control Strategy is needed for Ireland.....	3
Chapter 2: Reducing the risk from radon to people living in Ireland.....	5
2.1 Reference Levels for Radon in Ireland	6
2.2 Radon prevention in new buildings	7
2.3 Use of property transactions (sales & rental) to drive action on radon.....	10
2.4 Raising awareness and encouraging action on radon.....	13
2.5 Advice and guidance for individual householders and employers	17
2.6 Promoting confidence in radon services.....	18
2.7 Radon in workplaces and public buildings	20
Chapter 3: Implementation.....	24
3.1 Introduction.....	24
3.2 Coordination.....	24
3.3 Measuring the effectiveness of the Strategy	24
3.4 Review	24
3.5 Action plan	25
3.5.1 Costs associated with action plan	25
3.5.2 Timing of actions	26
3.5.3 Structure of the action plan.....	26
Annex 1: Membership of the interagency group	35
Annex 2: Working groups established by the interagency group.....	36
Annex 3: Web Appendices	38

Chapter 1: Background

Radon is a naturally occurring radioactive gas formed in the ground by the radioactive decay of uranium which is present in all rocks and soils. It is the greatest source of exposure to ionising radiation for the general public and the second greatest cause of lung cancer in Ireland. It is estimated that exposure to radon accounts for approximately 13% of all lung cancer cancers in Ireland, which equates to some 250 lung cancer cases each year.

Recognising the scale of the radon problem in Ireland the Minister for the Environment, Community and Local Government, Mr Phil Hogan T.D., in November 2011 tasked an interagency group with developing a strategy, which would comprehensively address the radon problem in Ireland. This is the final report of the interagency group.

The interagency group was chaired by an assistant secretary from the Department of the Environment, Community and Local Government (DECLG) and included representatives from 4 Departments and 6 Agencies. The membership of the interagency group is set out in Annex 1. The group met on 7 occasions between November 2011 and September 2013. In addition the interagency group established a number of working groups to develop policy proposals in different thematic areas. The working groups and their membership are listed in Annex 2. The papers prepared by the working group together with other supporting papers (stakeholder engagement, economic analysis and public consultation) are listed in Annex 3 and are available as web appendices.

Chapter 2 of this report sets out the measures recommended by the interagency group to reduce the risk from radon to people living in Ireland. Chapter 3 sets out the interagency group's recommendations concerning effective implementation of those measures.

1.1 The scale of the radon problem in Ireland

The National Radon Survey was carried out by the Radiological Protection Institute of Ireland (RPII) during the 1990s. This survey, which was based on measurements in over 11,000 homes, predicted that 7% of the national housing stock in existence at the time had radon concentrations above the National Reference Level of 200 Becquerels per cubic metre (Bq/m^3) for radon in homes¹. Based on the results of the survey, a map of Radon in Irish Dwellings was published (Figure 1)², identifying High Radon Areas³. Approximately one third

¹ The Reference Level is not a rigid boundary between safety and danger but represents a radon concentration above which action to reduce radon levels is likely to be needed.

² An interactive radon map is published on the RPII's website: www.rpii.ie.

³ A High Radon Area is one where it is predicted that more than 10% of homes will have radon concentrations above 200 Bq/m^3

of the country, mainly in the west and south-east, is classified as a High Radon Area. Due primarily to geological factors the radon problem in Ireland is greater than for many of our European neighbours. The average indoor radon concentration in Ireland is 89 Bq/m³, which is the eighth highest among 29 OECD countries surveyed by the World Health Organisation⁴. Some of the highest indoor radon concentrations, found anywhere in Europe, are in Ireland.

Since completion of the National Radon Survey, the RPII has, at the request of individual householders or building owners, measured radon in more than 44,000 additional dwellings and a similar number again have been measured by private measurement companies. This data shows that the National Radon Survey continues to be a reliable guide to indoor radon levels in Ireland.

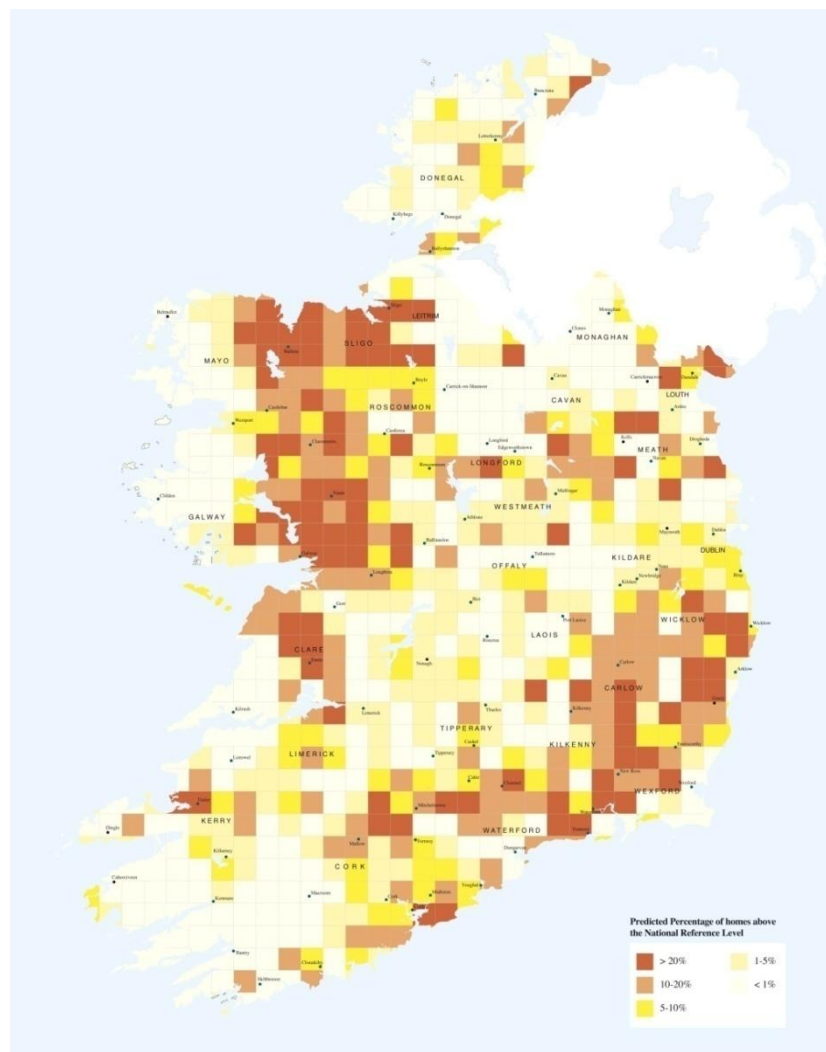


Figure 1. Radon in Irish Dwellings.

⁴ World Health Organisation, 2009, Handbook on Indoor Radon – A Public Health Perspective. This handbook is a key product of the WHO International radon project which was part funded by the Irish Government.

1.2 Why a National Radon Control Strategy is needed for Ireland

Radon is the greatest source of radiation exposure to the public. However, a range of cost effective measures exist both to prevent the problem in new buildings and to remediate existing buildings. It is therefore an area where significant public health gains can be achieved through suitable policy interventions.

Experience in Ireland and abroad has shown that an effective response to the radon problem involves a wide range of interventions including: effective prevention in new buildings, identification of existing homes and workplaces with high radon levels, remediation of existing buildings, awareness raising, training, supports and enforcement. It is clear that such a response will require action from a wide range of public bodies and other stakeholders.

Despite the significant progress already made in Ireland in some areas such as schools and social housing⁵, significant challenges remain. The rate of testing in private homes, for example, remains poor; it is estimated that to date only 8% of homes predicted to have radon problems have been identified. Recent research undertaken by the RPII⁶ on the effectiveness of radon prevention in new buildings has shown that, while the measures themselves are potentially very effective, the implementation of such measures in practice is often inconsistent.

Progress in addressing radon in workplaces has also been mixed. Since 2004, for example, the State Claims Agency has been proactive in advising state employers to measure radon in their premises and this has resulted in over 500 state workplaces being tested and remediated as appropriate. A number of large private sector employers have taken a similar approach. Despite this, however, the vast majority of Irish workplaces remain untested.

It is clear from focus group and other recent research that, if householders and other stakeholders are to be persuaded of the need to take action on radon, then a more coordinated approach needs to be taken across the relevant government departments and

⁵ Between 1998 and 2004 every school in Ireland was tested for radon and all schools with high radon levels have been remediated by the Department of Education and Skills (DES). The DES continues to fund on-going measurements and remedial work as required in schools. Most local authorities in High Radon Areas have made very significant progress in testing their social housing stock. To date, approximately 20,000 local authority homes have been measured and, where necessary, remediated.

⁶ Long, S., Fenton, D., Cremin, M. and Morgan, A., The effectiveness of radon prevention and remedial measures in Irish Homes. 2013, Journal of Radiological Protection 33, 141-149

agencies. Recent research⁷ has shown that, while public awareness of radon is high, the public's understanding of the real threat presented by radon remains poor.

Recognising these issues, the HSE and the RPII published a joint position statement on radon in 2010 calling for a coordinated national response on radon to be set out in a National Radon Control Strategy⁸. The development of such a coordinated national response is in line with the WHO as set out in the Radon Handbook and the EU and set out in the 2013 revision of the Basic Safety Standards (BSS) Directive⁹.

⁷ MillwardBrown "Radioactivity & Radiation Quantitative Research", July 2013.

⁸ Radiological Protection Institute of Ireland and Health Services Executive, 2010. Radon gas in Ireland - Joint Position Statement. www.rpii.ie and www.hse.ie

⁹ A new BSS Directive, replacing the 1996 Directive, is expected to be adopted in 2013. The new Directive requires Member States to develop a national action plan to address the long term risk from radon. The National Radon Control Strategy for Ireland will meet this requirement.

Chapter 2: Reducing the risk from radon to people living in Ireland

The aim of the National Radon Control Strategy is to minimise the exposure to radon gas for people in Ireland and to reduce to the greatest extent practicable the incidence of radon related lung cancers. The Strategy aims to reduce both the overall population risk and the individual risk for people living with high radon concentrations. The Strategy recognises that an effective response to the radon problem will involve a range of measures to reduce high radon levels in existing buildings and to prevent high radon levels occurring in new buildings. Furthermore, it recognises that such a response will require input from a range of public bodies and other stakeholders and can be best achieved within the framework of a coordinated Government-led strategy.

In accordance with the Government Decision of 14 September 2011 to establish an inter-agency group to develop a National Radon Control Strategy for Ireland, this Strategy has been developed using health economics tools to ensure that the measures proposed are cost effective and stakeholder engagement to ensure that the measures proposed are practicable. While the economic analysis demonstrates that in general the radon intervention measures proposed are cost effective, it also shows that dealing with radon through prevention in new buildings is by far the most cost effective approach. However, the Strategy also takes into account the need to address radon in the existing housing stock of approximately 1.6 million homes. Consequently, the Strategy recommends a broad range of measures aimed at reducing the risk from radon to people living in Ireland. These recommendations are set out in six thematic areas as follows:

- Radon prevention in new buildings;
- Use of property transactions (sales and rental) to drive action on radon;
- Raising radon awareness and encouraging individual action on radon;
- Advice and guidance for individual householders and employers with high radon results;
- Promoting confidence in radon services; and
- Addressing radon in workplaces and public buildings.

2.1 Reference Levels for Radon in Ireland

Existing Reference Levels

Advisory or statutory reference levels have already been established for workplaces, homes, schools and long-stay residential institutions.

Workplaces

The Reference Level¹⁰ for radon in workplaces in Ireland is 400 Bq/m³, measured over any consecutive three-month period¹¹. This Reference Level is specified in the Radiological Protection Act 1991 (Ionising Radiation) Order, 2000, (S.I. No. 125 of 2000), which is regulated by the RPII. Statutory Instrument No. 125 of 2000 implements the 1996 EU Basic Safety Standards (BSS) Directive¹². The Safety, Health and Welfare at Work Act 2005, which is regulated by the Health and Safety Authority (HSA) requires employers to identify all hazards in their workplace, including radon, to assess the risk from such hazards and to put in place measures to eliminate or reduce the risk. According to the HSA, all occupied indoor workplaces in High Radon Areas located at ground floor or basement level must assess the risk from radon and determine the radon levels, if necessary by measurement¹³. In respect of workplaces located in other areas, radon must be referred to in the company's safety statement.

Homes

The Reference Level for the long-term exposure to radon in homes is 200 Bq/m³ measured in accordance with the RPII's measurement protocol. This Reference Level, which was set by Government in 1990, is in line with the recommendations of the World Health Organisation¹⁴.

Schools

The statutory Reference Level for radon in workplaces of 400 Bq/m³ also applies to schools. However, in order to provide the same level of protection as in the home, the RPII recommends a Reference Level of 200 Bq/m³ in all schools. This advice covers pre-schools as well as primary and post-primary schools.

¹⁰ The Reference Level is not a rigid boundary between safety and danger but represents a radon concentration above which action to reduce radon levels is likely to be needed.

¹¹ The Radiological Protection Institute of Ireland (RPII) has published guidance material on how to measure radon in workplaces, homes and schools as well as on the remediation of high radon levels on its website www.rpii.ie.

¹² Council Directive 96/29/EURATOM - European Commission. www.europa.eu.

¹³ Health and Safety Authority, 2009, Annual Report. www.HSA.ie.

¹⁴ World Health Organisation, 2009, Handbook on indoor radon – A public health perspective. The is available at: http://www.who.int/ionizing_radiation/env/radon/en/index1.html. The handbook is a key product of the WHO International radon project which was part funded by the Irish Government.

Long-stay residential institutions

While the majority of radon exposure situations are covered by the Reference Levels for homes, schools and workplaces, there are some instances where there is not a clear distinction between residential areas and workplaces. These include long-stay institutions such as, prisons, nursing homes and live-in training centres. In these cases the RPII recommends that the 200 Bq/m³ Reference Level should apply to those areas that are clearly residential in nature. In areas that are clearly workplaces, the workplace Reference Level of 400 Bq/m³ should apply. Where there is a doubt as to whether the area is residential or a workplace, it is recommended that the lower Reference Level of 200 Bq/m³ be used.

Recommendation

R.1 It is recommended that the existing reference levels for workplaces, homes, schools and long-stay residential institution are retained. These should be further reviewed following implementation of the revised BSS Directive into Irish law.

2.2 Radon prevention in new buildings

Need for Action

There is strong international evidence indicating that the correct installation of passive preventive measures in new buildings is the most cost effective way of protecting the population against radon. This finding is supported by the economic analysis undertaken for Ireland of different radon intervention options, which demonstrates that the incorporation of such measures in new buildings is cost effective in all parts of the country¹⁵.

Since 1998, Irish Building Regulations have required that reasonable measures be taken during the construction of new buildings to avoid danger to health due to radon. Specific technical guidance to these regulations (Technical Guidance Document C - Site Preparation and Resistance to Moisture) published by the Department of the Environment, Community and Local Government (DECLG) established that all homes built since July 1st 1998 in High Radon Areas, be fitted with a radon barrier. While the implementation of such measures can never guarantee that radon in an individual building will be below the appropriate reference level, surveys⁶ have shown that on average radon concentrations in houses built after 1998 in high radon areas are lower than in those built before 1998 by approximately 50% on average. However, such surveys also suggest significant variability in the reduction achieved in individual houses, indicating that the implementation of such measures may not

¹⁵ Radiological Protection Institute of Ireland, 2012, Economic Evaluation of potential interventions to reduce radon exposure in Ireland. Report to Inter-Agency group tasked with developing National Radon Strategy for Ireland (Available as web appendix 8).

always be successful in practice. This is not unexpected considering the strong findings from the stakeholder consultation, which demonstrates poor understanding of radon preventive measures among many stakeholders including building professionals and trades people¹⁶.

In addition the technical guidance states that new houses in all parts of the country be fitted with a standby radon sump, which can be activated at a later stage to reduce any high radon concentrations subsequently found. A standby sump is not of itself a preventive measure but is intended to reduce the cost of remediation.

Ensuring that building trades' people and building professionals have a good understanding of radon preventive techniques is crucial to ensuring the successful implementation of such measures in new buildings. Given the findings of the stakeholder consultation it is clear that the establishment of an appropriate framework for training of building trades and professionals is necessary. Given the nature of radon preventive techniques it is not considered necessary or practical in most building projects to confine this work to specialist installers. It is necessary, therefore, for a wide range of building and design staff to have an understanding of the necessary preventive measures and of how such measures can be compromised by other works on the site. Consequently the training framework should target a wide range of building staff and should take into account the practical needs of different site and building design staff.

The stakeholder engagement also points to some practical difficulties associated with the implementation of the current technical guidance on radon prevention. These difficulties relate to the correct installation of radon barriers under site conditions, protection of the integrity of radon barriers once installed and identification of radon preventive measures on site. The stakeholder engagement also indicated the system of building control in place prior to 2012 did not provide adequate assurance that radon preventive measures had been correctly installed. Furthermore the economic analysis demonstrated that the cost effectiveness of standby sumps as they are currently being implemented is extremely poor due to the very small proportion of the installed sumps, which are ultimately converted into working remediation systems.

Recommendations

Training:

R.2 Short targeted training courses should be provided for all relevant site staff covering both the correct installation of radon preventive measures and good site practice aimed at

¹⁶ Radiological Protection Institute of Ireland, 2012, Stakeholder consultation and input to the development of the National Radon Control Strategy Report to Inter-Agency group tasked with developing National Radon Strategy for Ireland. (Available as web appendix 7).

ensuring that the integrity of barriers or other preventive measures are preserved during construction. It is noted that the suite of training modules currently being developed by the construction industry on the Building Control (Amendment) Regulations 2012 may be a useful vehicle for delivery of such training in radon prevention.

R.3 Basic information on radon should be included on undergraduate courses related to the construction industry. It is important that new graduates should have an awareness of radon as a significant public health issue and a basic understanding of preventive and remedial measures.

R.4 In cooperation with the relevant professional bodies, education on radon should be integrated into the existing system of continuous professional development (CPD) for building professionals. It is noted that the professional bodies already have well developed systems for CPD including webcasts, on-line training, seminars and event notifications. The learning objectives should include: radon as a public health issue, legal requirements, designing buildings to minimise radon entry, remedial options and new developments in construction practice or technology relevant to radon.

R.5 A web-based knowledge resource on radon should be developed for the building industry. This should include: background information, technical guidance, case studies, etc.

Technical guidance:

R.6 The relevant Technical Guidance should be amended and strengthened to take account of experience with the existing guidance and more recent research on radon prevention. The interagency group recommends that in developing the updated guidance, regard should be given to the following.

- The interagency group believes the current requirement for a barrier in high radon areas should be retained.
- A standby sump is a potential means of mitigation and so only provides a health benefit when activated. A passive sump on the other hand, in addition to acting as a potential means of mitigation also provides a basic level of protection in new buildings at a small incremental cost (as compared to a standby sump). The interagency group, therefore, believes there is a case for replacing the current guidance on standby sumps with guidance on passive sumps in all new dwellings.
- Recent international research into radon prevention, together with anecdotal reports based on remediation in Ireland using passive methods, indicates that

the effectiveness of passive sumps is enhanced by appropriate sealing across the base of the building (passive soil depressurisation (PSD) systems)¹⁷. The interagency group recommends that further technical investigative work be undertaken now to determine the optimum specifications for PSD systems taking into account Irish building practices. This work should take account of recent evidence concerning, *inter alia*, fill material, construction details and sealing between the subslab and the occupied space.

- Stakeholder consultation points to difficulties in identifying prevention systems on site. The interagency group, therefore, believes there is a case for new measures which would allow radon preventive measures to be more easily identified on site. Such measures are likely to include both marking of pipe work associated with passive sumps and appropriate certification of radon barrier systems.

R.7 Research should be undertaken into better barrier systems and placement methods, which would both improve barrier success rate and decrease post-installation damage. This research should take account of new and emerging construction practices.

Building control:

R.8 The interagency group recommends that the installation of radon preventive measures be signed off by a competent person. It is noted that the Building Control (Amendment) Regulations 2013 will result in new building certification procedures requiring sign off by competent persons on a wide range of measures.

2.3 Use of property transactions (sales & rental) to drive action on radon

Need for Action

To date some 5% of private homes in Ireland have been tested for radon. This means that there are very many householders living in homes with high radon levels, who are completely unaware of the problem in their own home. Similarly RPII measurement data indicates that the proportion of Irish workplaces tested is also very low. At the current rate of testing it would take hundreds of years for all buildings in Ireland to be tested. Increasing this rate of testing is crucial, therefore, to effectively address the problem of radon in existing buildings. One approach, which has been applied successfully in other jurisdictions, is to require the exchange of information on radon when buildings are bought or sold. It is recognised that any significant measures to encourage exchange of information on radon

¹⁷ For a description of PSD see Chapter 3 of the WHO Radon handbook¹⁴ or Angell, W. J. 2012. Radon control in new homes: a meta-analysis of 25 years of research. http://www.aarst.org/radon_research_papers.shtml (Accessed 16th September 2013).

when selling buildings would need to be accompanied by a comprehensive education programme aimed at raising awareness and understanding of the new measures among key stakeholders (solicitors, auctioneers, surveyors, radon measurement companies, etc).

The 2011 Census shows that at present approximately 29% of all housing stock is currently rented either privately or through social housing programmes. It is clearly important, therefore, to address this sector in any comprehensive radon control strategy. General standards for rented houses are set out in the Housing (Standards for Rented Houses) Regulations, which were most recently updated in 2008 and 2009. Currently these standards do not address radon.

There is currently no data regarding the number of privately rented properties that have been measured for radon and there are no legal requirements on landlords concerning either testing or reduction of radon levels in rental properties. It is noted that the Private Residential Tenancies Board (PRTB) have in place a comprehensive stakeholder consultation framework and conduct quarterly stakeholder meetings with a large cohort of landlords and tenants. It is recognised that this framework would be a useful vehicle for raising awareness within the rental sector of the radon issue.

It is noted that with respect to social housing the State itself acts as a landlord and that local authorities have already carried out significant work in addressing radon in social housing. To date, approximately 20,000 local authority homes have been tested and, where necessary, remediated. It is important that this work is continued into the future.

Recommendations

Property sales:

R.9 Measures should be introduced, which would require that information on radon testing of a building is passed on from the vendor to the purchaser when it is sold. It is noted that further work is required to determine how such measures would work in practice in Ireland. However, it is also noted that raising questions on radon during the conveyancing process has been found in other jurisdictions to be both practical and effective in raising the rate of radon testing of existing houses.

R.10 In conjunction with the measures set out in R.9 above, a targeted information programme should be undertaken to raise awareness and understanding of the need for and the implications of the new measures among key stakeholders. The key stakeholders are likely to include individual solicitors, estate agents, surveyors, home buyers and vendors.

R.11 The advisory report, which accompanies the Building Energy Rating (BER) certificate, should be amended during its next review to include generic advice that the building be

tested for radon and a link to the RPII website. The SEAI Contractors Code of Practice should be amended accordingly.

The private rental sector:

R.12 Radon should be addressed by DECLG in the next revision of the Housing (Standards for Rented Houses) Regulations.

R.13 Awareness of radon should be raised with the rental sector using the PRTB stakeholder consultation framework.

R.14 A targeted survey of landlords, tenants and other relevant stakeholders should be carried out to assess the baseline levels of awareness on radon. A follow-up survey should be carried out at appropriate intervals to monitor the effectiveness of the above recommendations in raising awareness.

R.15 It is noted that local authorities inspect thousands of privately rented houses each year for compliance with the Housing (Standards for Rented Houses) (Amendment) Regulations 2008 and 2009. In advance of any amendment to the Housing Regulations, therefore, questions should be included on the checklist used by local authorities for these inspections regarding the rate of radon testing and the levels found. It is noted that the national compilation of this information would both contribute to awareness and provide important information in the context of the proposed amendment to the Housing Regulations.

Social housing:

R.16 The programme of testing and remediation of social housing should be continued.

R.17 All inspections by local authorities of privately owned accommodation used for social housing should address radon. Specifically this would include: homes receiving rent supplement, privately owned homes for which local authorities have taken out long-term leases for provision as social housing and privately owned homes taken on by local authorities under the Rental Accommodation Scheme for provision as social housing.

Workplaces and other commercial premises:

R.18 Guidance material aimed at employers or persons in control of a workplace and those responsible for commercial buildings should include advice on addressing radon in building rental/ lease/ insurance agreements.

2.4 Raising awareness and encouraging action on radon

Need for Action

The spectrum of parties concerned with the management of the radon problem is broad and includes householders, employers, local authorities, builders, architects and health care professionals. The decision to test or to take remedial action lies primarily with these stakeholders. Decisions in relation to smoking cessation lie with individual smokers (smoking greatly increases one's risk from radon). Many of the decisions relating to radon proofing of new buildings are taken primarily by building designers and builders. Decisions in relation to funding, regulations and education programmes lie primarily with Government and public bodies. The aim of the radon communications strategy, therefore, must be to encourage this broad range of "decision makers" to take action to reduce the health risk from radon.

In addition to the "radon decision makers", there is a range of individuals or groups who through their role in society are in a position to influence the general public to take action on radon. These "influencers" typically include health care professionals, solicitors, local authorities, etc. Many individuals or groups act at different times as both decision makers and influencers. The communications strategy should also aim to encourage action on radon indirectly through key influencers.

Research¹⁸ into attitudes to radon and other health hazards indicates that the public are unlikely to consider radon as a serious issue unless the Government is seen to be clearly behind the message. This will only happen if a clear and consistent message is presented by all of the relevant departments and agencies so that the message from across Government is seen to be coordinated and coherent.

Research into public attitudes to radon also indicates that a mixture of national and local publicity is likely to be most effective in persuading the public to take action. In general this research shows that the public are unlikely to be persuaded that radon is a serious risk unless they hear about it nationally but are more likely to take action in their own home if they hear about it locally.

It is recognised that for many people the issues involved in addressing a radon problem in an existing building are outside of their day to day experience and so are often difficult to understand. It is essential that the public are provided with clear and understandable

¹⁸ Dillon AM., Millward Browne Lansdowne and Radiological Protection Institute of Ireland, 2010. Understanding the public's view of radon: Learnings from focus groups. National Radon Forum. www.rpii.ie

information so that each stage of the process (testing, remediation, retesting, etc) is made as easy and as accessible as possible in order that the “healthy choice becomes the easy choice”.

Surveys undertaken by RPII show that of householders, who have tested their houses and found them to be high, less than 25% actually go on to remediate¹⁹. This low remediation rate clearly undermines the cost effectiveness of any radon awareness campaign as there is absolutely no health benefit associated with radon testing unless it leads to remediation. Both stakeholder consultation and RPII householder surveys have identified cost as a significant disincentive to carrying out remediation. It is also clear from stakeholder research that many individuals falsely believe that remediation is considerably more costly or disruptive than is actually the case. A comprehensive radon communications strategy should address both testing and remediation in a coherent way.

Current smokers, past smokers and those exposed to passive smoke are all at a greater risk from radon than non-smokers. For an average smoker, for example, the radon risk is 25 times greater than for an individual who never smoked^{20 21}. A smoker living in a house with high radon levels can reduce their radon attributable cancer risk by quitting smoking. It is essential that information given to householders with high radon levels in their houses includes clear advice on the risks associated with smoking and points towards smoking cessation programmes as appropriate.

Recommendations

Delivering a coherent message on radon across Government:

R.19 A clear branding strategy should be developed for the NRCS, which aims to support public awareness of the strategy and to demonstrate that the strategy is supported and driven by a number of Government departments and other public bodies. The branding should include a clear identifiable logo. All publicity material associated with the NRCS should make use of this branding.

¹⁹ Fenton, D., 2011, What do we know about the current rate of remediation and costs in Ireland. National Radon Forum. www.rpii.ie.

²⁰ Darby, S., *et al.*, 2004. Radon in homes and risk of lung cancer: collaborative analysis of individual data from 13 European case studies. *British Medical Journal*, 330, 223-228.

²¹ Radiological Protection Institute of Ireland and National Cancer Registry of Ireland, 2005. Health risks due to exposure to radon in homes in Ireland - the implications of recently published data. Dublin: Radiological Protection Institute of Ireland. www.rpii.ie

R.20 A dedicated NRCS website should be established as a comprehensive source of impartial information and advice on radon for stakeholders including: householders, employers, the building industry and radon service providers. The design, branding and content of the website should reinforce the message that the NRCS is supported by all of the relevant public bodies from across Government. The websites of relevant public bodies together with all NRCS publicity/educational material (leaflets, booklets, websites, etc) should link to the NRCS website.

R.21 It is essential that a clear and consistent message on radon be communicated by all public authorities. The NRCS should articulate a simple core message and to the extent practical and appropriate all public bodies should seek to support and reinforce this message. While the radon message communicated by different public bodies needs to be consistent with their own sectoral responsibilities, it should be complementary and linked with the information provided by other public bodies. For example, while the message communicated by health authorities is likely to focus on health issues, it should include clear links to sources of information on prevention, remediation, legal responsibilities, etc. In general, the strategy should aim to maximise coherency with other related public programmes such as: smoking cessation, cancer prevention, energy efficiency and general environmental hazards.

R.22 A group comprising representatives from the key Departments and agencies responsible for implementation of the strategy should be established to ensure effective coordination. The degree of coordination and coherence between the different public bodies should be reviewed periodically by this group. In undertaking such reviews every effort should be made to: promote synergies between different public programmes, demonstrate to the public that Government is fully behind the message and ensure that publicity initiatives of different public bodies are effectively coordinated.

Influencing radon decision makers:

R.23 A multi-annual awareness raising programme should be adopted based on a two-stranded communications strategy. The information should be targeted and delivered primarily through a programme of locally based communication initiatives aimed primarily at high radon areas. This should be supported by the national communications programme aimed at underpinning and supporting local public communications. The sender of the message should be known, credible and respected. It is important, for example, that when the message is seen to be coming from a public body, the body is well known and respected by the target audience. Where appropriate, consideration should be given to using an individual, who is well known to the public, to champion the message.

R.24 Local communications campaigns should address the broad range of actions necessary to effectively protect the population from radon including: radon prevention in

new build, radon testing, remediation and smoking cessation. The local information campaigns should include the following elements:

- Broad and inclusive coverage of the target area with clear and comprehensive information;
- Joint branding with local authorities, public health authorities and other Government departments and agencies, as appropriate;
- Information sessions on good radon prevention practice targeted at local builders;
- Information sessions on remediation aimed at householders/employers with high radon measurements;
- Coordination with smoking cessation campaigns should be investigated. This might include making smoking cessation information available during the radon campaign; and
- Where practicable, local authority premises should be used to host radon information sessions as this would reinforce the perception of local authority support for the radon message.

R.25 It is noted that local authorities are in a unique position to influence householder/ employer behaviour in their areas. Local authorities should have arrangements in place to provide basic information in response to public enquiries and to refer more detailed radon enquiries to the appropriate authority. In addition, local authority websites should include basic information on testing and remediation as well as referral contacts. Clear guidelines should be prepared for local authorities to help them to deal with requests for information on radon.

R.26 Consideration should be given to the introduction of tax-based financial incentives to encourage radon testing and remediation. In addition to providing direct assistance, such measures would send out a strong message that the Government views radon as a serious public health issue. Given the current low rates of testing and remediation, the impact of such measures on the public finances is likely to be negligible. In fact, if such measures were to increase the rate of testing, then the overall tax take may even increase as a result.

R.27 It is recognised that for some individuals cost may be a genuine disincentive to remediating high radon levels. Consideration should be given to the introduction of a scheme to provide some form of means-tested financial assistance covering remediation. Consideration should also be given to the targeted and strategic use of free radon measurement campaigns as a means of boosting the response rate to local public awareness campaigns.

Raising awareness among influencers:

R.28 A multi-annual programme should be implemented aimed at increasing awareness among different groups of “influencers”. It is considered that a targeted campaign with clear objectives, which focuses on a finite set of groups or professions with the most influence, is likely to be more cost effective than trying to address many groups at the same time, some of which may have only very limited real influence on the public. For each group the programme should set clear goals regarding the nature of the influence that the NRCS expects them to exert.

R.29 The school curriculum is an important means of influencing the general public on health matters. Consideration should be given to including basic information on radon on the curriculum of relevant subjects. It is noted that relevant subjects may not be limited to science and might, for example, include more general subjects such as home economics or geography.

2.5 Advice and guidance for individual householders and employers

Need for Action

Customer surveys, focus group research and RPII experience acquired over many years of responding to householder queries, all point to a number of disincentives to remediation. These include: fear of being taken advantage of by unscrupulous contractors and not knowing where to turn for knowledgeable, impartial and independent advice. A comprehensive and effective radon strategy should include arrangements to provide impartial and authoritative information and support to individuals (householder, employer, building manager or person in control of the workplace) with high radon results covering both radon remediation and smoking cessation. The information provided should encourage action on radon and should empower the receiver to take the necessary measures to protect themselves and their family or employees. These arrangements should cover both the provision of generic information through information packs, websites, etc and reasonable facilities to answer specific queries from individuals.

Recommendations

R.30 A protocol for dealing with individuals with high radon measurements should be agreed between: RPII, DECLG, HSE, local authorities and HSA (in the case of workplaces), which sets out the relevant roles of the various public bodies²². The protocol should include

²²Radiological Protection Institute of Ireland and Health Services Executive, 2010. Radon gas in Ireland - Joint Position Statement.

provisions for individuals with high radon results to speak directly with an impartial expert and should ensure that these individuals are dealt with in a coordinated and coherent fashion by the different public bodies. The protocol should address the need for ongoing risk assessment and specific follow-up measures concerning individuals with extremely high radon levels to help them understand the significance of their results.

R.31 All measurement services should provide consistent, clear and accurate information on remedial options to their clients with high radon result reports. It is likely that the quality and content of the information provided by measurement services could be standardised through some form of validation or registration of measurement services.

R.32 Local radon awareness campaigns should include information sessions on remediation aimed specifically at individuals who have already tested for radon and found high radon levels. In advance of the campaign all individuals who had previously had a high result could be invited to attend a session with an impartial expert on radon remediation. This might be done through a public meeting or through scheduled one to one appointments with a remediation expert. These information sessions should be seen to be endorsed by the local authority and so should preferably be based at the offices of the local authority.

R.33 Health care professionals have a key role to play both with regard to smoking cessation advice and the provision of targeted medical advice where an individual has health concerns arising from their radon exposure. The NRCS should include a programme of measures to ensure health care professionals are kept aware of radon and have access to specialised information as appropriate.

2.6 Promoting confidence in radon services

Need for Action

There is currently no objective assessment of the suitability of radon remediation contractors operating in Ireland. This is not a sustainable situation as it fails to promote high standards of radon remediation and undermines public confidence, which ultimately acts as a disincentive to undertaking remedial work.

Successful remediation of high radon levels in existing buildings is required if the risk from radon is to be reduced. It is important when remediating to match the radon reduction system to the unique characteristics of the individual building being remediated. It is important, therefore, that radon remediation contractors have a sound knowledge of building construction techniques and practices.

Long-term measurement (greater than 3 months) of average radon concentrations using passive radon detectors, such as track-etch detectors, is the preferred technique for carrying out radon measurements used for comparison with the Reference Levels for radon in buildings in Ireland. Radon measurements are straightforward to perform but need to be based on standardised protocols that ensure accurate and consistent results. It is clear that a framework is needed to promote quality and expertise in radon measurement techniques to ensure the consistency and quality of radon measurements and to underpin public confidence in the results produced by Irish services.

Recommendations

Training in radon remediation:

R.34 A targeted training course on radon remediation should be developed. A steering group should be set up to establish the course syllabus, entry level requirements and pass criteria. This group should also be responsible for monitoring and overseeing delivery of the training. It was considered that delivery of the training might be outsourced either directly by the steering group or by a designated public body to a private training provider and that the outsourcing contract could cover: design of course material, delivery of set number of courses at agreed locations, assessment of applicants to ensure they meet both the entry level and pass requirements.

R.35 Once the syllabus has been established the guide “Radon in existing buildings corrective options” published by the Department of Environment, Community and Local Government should be updated.

R.36 A web-based knowledge resource on radon remediation should be maintained. It is envisaged that this would include technical guidance and case studies on complex or difficult remediation cases. Other channels such as the National Radon Forum²³ or contractor meetings should also be used to promote good practice in remediation.

Listing of radon remediation contractors:

R.37 A steering group should be established to develop a set of transparent criteria, which remediation contractors must meet in order to be included on any Government list or website or to be considered for any Government funded remediation work. It is envisaged that such criteria would include: completion of appropriate training, appropriate trade or professional qualification, adherence to a code of practice, tax compliance, appropriate insurance, etc. The steering group should also set out the type of evidence to be provided

²³ The National Radon Forum is an annual event hosted by the RPII. It provides an opportunity for those with a role to play in reducing the risk from radon in Ireland to meet and discuss radon activities and concerns. Reports of all Fora is on the RPII’s website www.rpii.ie.

by contractors to demonstrate compliance, transitional arrangements for existing contractors and procedures for removing contractors from Government lists who no longer meet the criteria. Consideration should be given to including in the contractor criteria a requirement to provide statistical information to a designated public body on the buildings remediated. It is envisaged that a list of contractors who have provided satisfactory evidence of compliance with the criteria would be maintained by a designated public body.

Registration of radon measurement services (RMS):

R.38 A validation or registration scheme should be established in Ireland for radon measurement services meeting set criteria. Successful participation in such a scheme should be a pre-requisite for inclusion on any Government funded website listing or for applying for any Government funded work. The cost of running the scheme should be met by the participating RMS. The registration scheme should apply equally to measurement laboratories based in Ireland and suppliers of radon detectors sourced from elsewhere. The registration scheme should set out clear and transparent criteria for measurement services wishing to participate together with a process by which applicant services should demonstrate their compliance with those criteria. These criteria should address: adherence to national measurement protocols, technical standards, quality standards, successful participation in inter-comparison/ performance tests, provision of statistical information, standard of information provided to their clients and legal compliance issues (tax, insurance, etc).

R.39 The public body operating the registration scheme should seek to maximise cooperation with similar services operating in other EU Member States to avoid duplication. Consideration should be given to acceptance of approval in other jurisdictions as evidence of compliance with Irish registration criteria where it is relevant to do so.

R.40 It is essential that the public have a high degree of confidence in the work of both measurement and remediation services. It is important, for example, where a company provides both measurement and remediation services, that any perception of conflict of interest is avoided. In particular, such a perception could arise were the remediation company also undertakes the post-remediation measurement. The advice given to householders, employers or building managers of buildings with high radon levels should refer to the importance of having independent post-remediation measurements.

2.7 Radon in workplaces and public buildings

Need for Action

An effective strategy for dealing with radon in workplaces will include both regulatory or enforcement type actions and awareness raising or educational measures. In line with best

practice both in radiation protection and occupational health and safety, the strategy for dealing with radon in workplaces should involve a graded approach to risk and a careful targeting of resources.

The principal regulations governing radon in workplaces are set out in the Radiological Protection Act 1991 (Ionising Radiation) Order, 2000. (S.I. No. 125 of 2000), which implements the 1996 EU Basic Safety Standards (BSS) Directive. Based on the experience gained since 2000, it is clear that there is now a need to update and modernise these regulations. A new BSS Directive is expected to be adopted by 2014 and it is likely that any modernising of radon regulations could be done in tandem with the implementation of this new Directive into Irish legislation.

It is noted that while there has been significant success in addressing radon in the State and multinational employment sectors, the number of radon measurements made in small businesses has remained relatively low.

It is noted also that to date a multi-agency approach in addressing radon in workplaces has been very successful. This approach has included targeting multiple risks in a single inspection (e.g. raising awareness of radon as a workplace hazard by HSA in general workplace health and safety inspections) and collaboration in relation to promotion and awareness activities.

In general public buildings are also workplaces and in most cases the measures for the protection of workers are likely to provide adequate protection for the public also. However, in certain types of public building, where the public occupancy is high such as schools, specific measures may also be required to protect the public. It is noted that the Department of Education and Skills has already tested radon levels in Irish schools in the free education system.

Recommendations

Legislation:

R.41 Current regulations covering radon in workplaces should be reviewed and updated following publication of the revised BSS Directive. This review should take into account, *inter alia*, the NRCS, the lessons and experience gained in implementing the current Ionising Radiation Order (S.I. 125 of 2000), experience in implementing the Safety, Health and Welfare at Work Act, 2005 and other relevant regulations and current international guidance on radon. The new/ amended regulations should incorporate the graded approach. Such an approach might, for example, include mandatory testing in High Radon Areas and a risk-based approach elsewhere. It is anticipated that new specific provisions will be necessary in relation to the duties of employers (testing, remediation, ongoing risk assessment, etc), issuing directions, enforcement, penalties and underground workplaces. It is noted that the new BSS, will in any event necessitate major amendment to the current Ionising Radiation Order. In revising the regulations, it is important to ensure coherence with Health and Safety and other relevant legislation. Following the implementation of the revised BSS, consideration should be given to the development of a cross-agency Enforcement Strategy for radon in workplaces.

Enforcement:

R.42 RPII and HSA should continue to address radon during all relevant general inspections of above ground workplaces. Consideration should be given to extending this type of cooperation to other inspectorates and that this cooperation be formalised in memoranda of understanding between the relevant organisations. Furthermore, developments in relation to the Risk Based Enforcement Group²⁴ should continue to be monitored.

R.43 A targeted and risk-based inspection programme should be implemented to specifically address radon in underground workplaces, which are particularly vulnerable to high levels of radon.

Awareness:

R.44 Specific objectives should be included in memoranda of understanding between RPII, HSA, HSE and other relevant public bodies in relation to: raising radon awareness; inter-agency cooperation on health and safety promotion activities for workplaces; and monitoring the progress on radon interventions in workplaces.

²⁴ The Risk Based Enforcement Group is an informal group led by the Department of Jobs Enterprise and Innovation, which encourages cooperation among inspection and enforcement agencies to reduce the administrative burden on business.

R.45 Further online guidance tools and materials should be developed for employers. Consideration should be given to the use of new delivery methods such as social media. This information should be accessible both through the new business regulation portal website and the proposed NRCS website. Opportunities to make use of cross-sectoral initiatives such as the HSA's BeSmart online risk assessment tool for SMEs (which includes radon as a workplace risk) should continue to be exploited.

R.46 Public bodies should ensure that awareness/ educational material or activities reinforce a joined-up Government message on radon and should promote an integrated approach to indoor air quality. Cross-departmental guidance for employers on management of indoor air quality should be considered. The use of annual regional events co-hosted by relevant public bodies and other stakeholders to address implementation of workplace regulations covering a range of workplace hazards should be explored.

R.47 A targeted multi-annual programme should be implemented aimed at working with employer and employee representative bodies to promote radon awareness in workplaces.

Public Buildings:

R.48 The Department of Education and Skills (DES) and other public bodies should continue to measure radon in new or renovated schools or other public buildings and to fund remediation where high radon levels are found.

Chapter 3: Implementation

3.1 Introduction

This Strategy sets out a broad range of measures to reduce the risk from radon to people living in Ireland. Successful implementation of this strategy will require action from a range of Government Departments, public bodies and other stakeholders and so will require clear identification of responsibilities, good coordination between the various stakeholders and effective monitoring of progress. The interagency group has recommended a number of supporting measures to assist the implementation process. The group has also devised an action plan, setting out the specific actions needed to implement the Strategy, high level responsibilities for delivery of those actions, costs and timeframe.

3.2 Coordination

It is recommended that a coordination group be established to oversee and guide the implementation of the Strategy. This group should comprise representatives of the key departments and agencies responsible for delivery of the Strategy and should be chaired by DECLG. The responsibilities should include;

- Coordinating the work on radon across the relevant departments and agencies,
- monitoring the implementation of the Strategy;
- reporting annually to Government on progress; ensuring that the effectiveness of the plan is assessed at appropriate intervals, and
- at the end of the period covered by the action plan, making recommendations to Government on what further actions it considers necessary at that time.

3.3 Measuring the effectiveness of the Strategy

Appropriate metrics should be developed to enable the impact of the measures to be assessed. These should include baseline data compiled or, where necessary gathered, at the start of the Strategy and repeated at appropriate intervals through the lifetime of the Strategy. The metrics should include, *inter alia*, the national average indoor radon concentration, the levels of householder awareness of and attitudes to radon assessed through focus group research, remediation rates and testing rates. Additional metrics may need to be developed to assess the evolution of key factors influencing radon risk (such as: location, geology, age of construction, building type, etc).

3.4 Review

The action plan envisages that the recommendations set out in this Strategy will be addressed over a 4-year period. It is recognised that the full impact of the Strategy may not be realised within the 4-year period as many of the measures implemented will continue to

reduce the radon risk in subsequent years. Changes to requirements for new buildings will continue to reduce the risk as new construction takes place. The group recommends that at the end of the 4 years, a detailed review be undertaken covering:

- status of each action;
- impact of the measures taken to date;
- likely effectiveness of the Strategy in the longer term in reducing the risk from radon;
- updated assessment of the cost effectiveness of the interventions recommended in the Strategy;
- review of stakeholder experience of the Strategy;
- lessons learnt and outstanding issues and
- identification of further actions appropriate at that time.

3.5 Action plan

The action plan sets out a series of specific actions needed to implement the measures proposed in the National Radon Control Strategy (NRCS). Each action described in the plan is measurable and has clear milestones and end points. This action plan is intended as a practical management tool to support implementation of the NRCS. The individual actions in the plan are clearly linked to specific measures in the NRCS. In some cases there is a one-to-one relationship between the NRCS measure and the action, while in others a series of measures have been covered by a single action. A number of NRCS measures, for example, refer to the need to provide web-based resources for various stakeholders while in the action plan these are covered by a single action to develop the dedicated NRCS website.

3.5.1 Costs associated with action plan

The costs arising from the measures proposed in the NRCS may, depending on the nature of the proposal, fall either on the State, industry or individuals. The nature of the resource required to successfully implement the various measures will vary. A number of the measures involve the development of guidance or protocols, which will primarily require the commitment of time and expertise from specialist staff. On the other hand public awareness and publicity measures are generally dependent on the availability of funding.

It should be noted that the health economics analysis undertaken in support of the strategy development demonstrated that the measures proposed to reduce indoor radon levels in Ireland are cost effective when compared with other public health interventions. Many of the actions proposed in this plan can be achieved by the incorporation of radon issues into existing programmes and so can often be achieved for relatively modest additional cost.

The costs to industry are generally modest and are typically associated with training or the development of new guidance. In some cases the training requirements can be satisfied by increasing the scope of existing training programme or schemes.

The cost to individuals relate to the incorporation of radon preventive measures into new buildings at the time of construction, testing of existing buildings or remediation of existing buildings with high radon levels. These costs typically range from approximately €50 for radon testing to a few hundred euro for preventive measures to approximately €1,000 for remediation.

3.5.2 Timing of actions

It is proposed that all of the actions set out in this plan will be delivered within a four year period from the adoption of the Strategy. The action plan sets out strategic phasing for each action, which takes into account the priority associated with the action, the pragmatic need to get some quick wins and the natural sequence in which some of the actions need to happen. (The training scheme for remediation contractors must, for example, be in place before the criteria for listing contractors can be enforced.) The phasing distinguishes between actions which need to take place in advance of the launch of the strategy and post launch or implementation actions. Pre-launch actions include the development of NRCS branding and communications strategies. Post-launch or implementation actions are classified as phase one, two or three, depending on the order in which they need to be addressed. While there is clearly significant overlap between the phases, it is expected that the phase 1 actions would generally be delivered within the first 12-18 months of the strategy, while phase 2 and 3 actions would happen later than this. It is anticipated that a detailed implementation plan will be developed by the implementation group once established (Action 3).

3.5.3 Structure of the action plan

For each action the plan identifies:

- the NRCS measure(s) to which the action relates;
- the Department or Agency who needs to lead on the action;
- the other Departments of Agencies which need to be involved;
- the phasing of the action (Pre-launch, phase 1, phase 2 and phase 3) and
- key milestones.

APPENDIX 1: ACTION POINTS

No.	Action description	Recommendation addressed by action	Lead	Participants	Indicative phasing	Key Milestones
1	Develop a branding strategy for NRCS including: a clear identifiable logo and a communications programme aimed at key stakeholders around the launch of NRCS	R19	RPII	DECLG, RPII, HSE	Pre-NRCS launch	<ul style="list-style-type: none"> →gather information on strategies used for other comparable programmes →agree branding strategy with DECLG → Logo and design template → Communications strategy
2	Develop radon website as resource for various target groups (including: householders considering measuring, householders considering remediation, employers, those in control of a workplace, building industry, remediation contractors)	R5, R18, R20, R35, R36, R40, R45.	RPII	RPII, DECLG, HSE, CCMA and HSA	Pre-NRCS launch/ phase 1	<ul style="list-style-type: none"> → Develop indicative outline for discussion → Formation of steering group and agree roles and responsibilities → Develop and agree specification → Launch version 1 → agree + implement process for periodic review and update
3	Establish coordination group comprising key public bodies to oversee and coordination implementation of NRCS and agree terms of reference.	All	DECLG (ERP)	RPII, HSE, HSA, CCMA, key Government Departments (similar composition to	Phase 1	<ul style="list-style-type: none"> →Recommendation to Government on implementation group included in final report. →Formation of group →Delivery of implementation plan.

				interagency group)		
4	Amend and strengthen technical guidance on radon prevention in new buildings	R6	DECLG (Building Standards)	DECLG, RPII, NSAI,	Phase 1/2 dependent on the scheduling of the next revision of tech guidance doc C.	→establish steering group →draft recommendations →Public consultation →recommendations published
5	Action to be defined to promote radon as a sign off measure within the Building Control (Amendment) Regulations 2013	R8	DECLG (Building standards)		Phase 1/2. Dependent on timeline for development of new building control procedures.	
6	Work with key stakeholders to ensure that short targeted training for site staff on radon prevention are developed and delivered.	R2	DECLG (Building standards)	DECLG, CIF, RPII	Phase 1	→Formation of steering group →Agree framework with CIF and develop contract/ agreement →Agree course content →Develop course →Pilot delivery →Course rollout
7	Work with universities to include radon awareness in relevant undergraduate courses (including: architecture, civil engineering)	R3	RPII	DECLG, RPII, HSE, professional bodies	Phase 3	→Define objectives and scope →Set out programme of contacts with Universities →programme rollout

8	Develop CPD module on radon in cooperation with the relevant professional bodies	R4	RPII or DECLG (Building Standards)	DECLG, RPII, HSE, professional bodies	Phase 1/ 2	<ul style="list-style-type: none"> →agree scope →Formation of steering group →Agree framework with professional bodies →Agree course objectives →Agree course content →Develop course →Pilot delivery →Rollout CPD module
9	Promote targeted research on radon to support effective and efficient implementation of strategy	All	RPII	Research working group	Pre-NRCS launch	<ul style="list-style-type: none"> →Establish working group →Report identifying and prioritising current knowledge gaps relevant to strategy implementation →research forum →Develop recommendations re future funding of research priorities
10	Update national assessment of indoor radon levels. This updated assessment will act as a baseline against which the success of the strategy can be evaluated.	All	RPII	GSI, HSE	Phase 1	<ul style="list-style-type: none"> → Review possible methodologies. Define scope and project plan. → Implement pilot to test methodology. → Roll out of full study.
11	Research to assess the combined effectiveness of passive sumps and sealing the base of the building.	R6	RPII	DECLG, (CCMA)	Phase 1/ 2	<ul style="list-style-type: none"> → Review existing evidence → Define scope and project plan. → Assess if external funding is required for implementation. → Implement

12	Implement broadly based multi annual programme of local radon awareness campaigns	R21, R23, R24, R32,	RPII	RPII, HSE, DECLG, HSA, Local Authorities, SEAI	Phase 1, 2 & 3	→establish priorities and programme →annual roll out →Review and revise campaigns
13	Develop and implement national communications strategy to underpin local campaigns	R21, R23	DECLG	RPII, HSE	Phase 2 & 3	→Develop proposal setting out options for national campaigns with detailed costs. →Develop business case for preferred option →establish steering group →establish priorities and programme →annual roll out
14	Implement targeted multi-annual programme aimed at increasing awareness among different groups of “influencers”.	R10, R13, R14, R28, R29, R33, R45, R47	RPII	RPII, HSE, DECLG, HSA, PRTB, CCMA	Phase 1, 2 & 3	→Complete stakeholder mapping →survey of landlords, tenants and other relevant stakeholders to assess baseline levels of awareness →establish priorities and programme →annual roll out
15	Promote the continuation of the programme of radon testing and remediation of social housing.	R16	DECLG	RPII, CCMA	Phase 1, 2 & 3	

16	Develop guidelines for local authorities on dealing with requests for information on radon (including: basic information on radon, available resources, referral for further or more detailed information)	R21, R25, R30	RPII	RPII, CCMA, HSE	Phase 2	<ul style="list-style-type: none"> →Develop proposal re scope and means of delivery (Booklet, web, etc) →establish steering group (to include: HSE & CCMA) →identify key staff for dissemination of information/ training needs →draft guidelines →guidelines agreed →Develop information pack distribution/ deliver training
17	Develop a protocol for dealing with individuals with high radon measurements between: RPII, DECLG, HSE, local authorities and HSA (in the case of workplaces)	R31, R30	RPII	RPII, DECLG, HSE, CCMA and HSA	Phase 1	<ul style="list-style-type: none"> → Paper setting out proposed scope and outline → establish steering group → draft protocol → protocol agreed
18	Amend the advisory report which accompanies the BER certificate to include advice on radon	R11	SEAI	SEAI, RPII, DECLG	Phase 1	<ul style="list-style-type: none"> →Liaise with SEAI re revised text for Advisory Report →Liaise with SEAI re revised text for contractors CoP →Agree text

19	Develop a detailed strategy to progress recommendations on conveyancing	R9, R10	RPII	DECLG	Pre-NRCS launch	<ul style="list-style-type: none"> →agree high level approach with DECLG →Report to interagency group setting out strategy (including: seeking political support, information campaigns, review of legislative options)
20	Amend the Housing (Standards for Rental Houses) Regulations to address radon	R12	DECLG (Housing)	RPII, HSE, CCMA	Phase 2 dependent on timescale for the next revision of Regulations	<ul style="list-style-type: none"> → Proposed amending text → Consultation with key stakeholders → Proposal for amendment
21	Amend checklist used by local authorities for inspection of rental properties (private & social) regarding the rate of radon testing and the levels found.	R15, R17	CCMA	CCMA, DECLG	Phase 1	<ul style="list-style-type: none"> →Consult with CCMA and Housing Standards regarding amendment of checklist →Checklist amended as agreed →Process for collation of data agreed
22	Develop detailed paper on financial incentives to encourage action on radon. Consideration should be given both to tax based measures as well as to direct financial supports.	R26, R27	DECLG	RPII, HSE	Phase 2	<ul style="list-style-type: none"> → Business case in relation to VAT → Business case in relation to means tested grant assistance for remediation → Business case in relation to strategic free measurement campaign

23	Develop framework for training in radon remediation	R34, R35, R36	DECLG (Building standards)/ RPII	Industry stakeholder	Phase 1	<ul style="list-style-type: none"> →Set up steering group →Establish syllabus, entry requirements and pass criteria →Establish arrangements for course development and delivery →Develop course material →pilot →rollout
24	Update “Radon in existing buildings – corrective options” published by DECLG	R35	DECLG (Building standards)		Phase 3	<ul style="list-style-type: none"> →Define scope and mode of delivery (booklet, web, video, etc) →Establish steering group →develop and publish →promote
25	Develop criteria which remediation contractors must meet in order to be included on any Government list or website	R37	DECLG	Building standards, RPII	Phase 1/ 2	<ul style="list-style-type: none"> →Set up steering group →Establish criteria which contractors must meet →Establish arrangements for publication of list
26	Develop validation or registration scheme for radon measurement services in Ireland	R31, R38, R39, R40,	RPII		Phase 2/ 3	<ul style="list-style-type: none"> →Consultation paper setting out proposed scope and outline of scheme →Consult with key stakeholders →Develop terms, conditions and detailed arrangements →promote scheme →implement scheme →publish list of successful participants

27	Review existing legal requirements concerning radon in workplaces together with any new requirements arising from BSS and recommend changes.	R41	RPII	RPII, DECLG, HSA	Phase 2 (Dependent on timescale for finalisation of BSS Directive)	→ Identify problems with current regulations and proposes solutions consistent with revised BSS → Contribute to drafting of revised regulations → Revised regulations in place.
28	Coordinated programme to enforce regulations re radon in workplaces	R42, R43	RPII	RPII, HSA	Phase 1,2 & 3	→ Continue to coordinate "advisory" approach to radon during RPII and HSA inspections → In the context of new regulations arising from the revised BSS develop coordinated enforcement policy
29	Enhance cooperation on radon with other state agencies	R42, R44, R45, R46, R47, R48	RPII	HSE + other relevant agencies	Phase 2 & 3	→ Review current public body roles with respect to radon → Identify potential for enhanced cooperation
30	Develop guidance on the need for retesting of previously remediated buildings.	R30, R41	RPII	DECLG, HSA	Phase 2	→ Review evidence from the literature, Irish schools, Thoron survey, etc. → Define scope of guidance. → Draft guidance.

Annex 1: Membership of the interagency group

Member	Affiliation
Mary Moylan (Chair 2011 to mid-2013)	Department of the Environment, Community and Local Government (DECLG)
David Walsh (Chair 2013)	
Úna Ní Dhubhghaill	DECLG
Paul Mc Donald	DECLG
Terry Dunne	DECLG
Kevin O'Donoghue	DECLG
Caroline O'Loughlin	DECLG
Eamonn Smyth	DECLG
Aidan O'Connor	DECLG
Colette Bonner	Department of Health (DH)
John Hughes	Department of Jobs, Enterprise and Innovation (DJEI)
Margaret Lawless	Department of Jobs, Enterprise and Innovation (DJEI)
Bob Hanna	Department of Communications, Energy and Natural Resources (DCENR)
Ann McGarry	Radiological Protection Institute of Ireland (RPII)
David Fenton	RPII
Stephanie Long	RPII
David Pollard	RPII
Alison Dowdall	RPII
Mary O'Mahony	Health Services Executive (HSE)
Darren Arkins	Health and Safety Authority (HSA)
Ray Scanlon	Geological Survey of Ireland (GSI)
Paul Martin	Sustainable Energy Authority of Ireland (SEAI)
Kevin O'Rourke	SEAI
James O'Leary	SEAI
Michael Nicholson	City and County Managers Association (CCMA)

Annex 2: Working groups established by the interagency group

Working Group on Radon Prevention in new build

Member	Affiliation
Eamonn Smyth (Chair)	DECLG
Oliver O'Brien	DECLG
Gary O'Sullivan	National Standards Authority of Ireland (NSAI)
David Pollard	RPII
David Fenton	RPII

Working Group on use of property transactions to promote action on radon

Member	Affiliation
Stephanie Long (Chair)	RPII
Paul Martin	SEAI
Harry Mooney	Solicitor
David Pollard	RPII
Cian Ó Lionáin	DECLG

Working Group on raising awareness of radon health risks

Member	Affiliation
David Pollard (Chair)	RPII
Ina Kelly	HSE
Colette Bonner	DH
Stephanie Long	RPII
Marie Kelly	RPII
Michael Nicholson	CCMA

Working Group on competence of radon remediation contractors

Member	Affiliation
David Fenton (Chair)	RPII
Eamonn Smyth	DECLG
Bob Hanna	DCENR
Paul Martin	SEAI
David Pollard	RPII

Working Group on the competence of radon measurement services

Member	Affiliation
David Fenton (Chair)	RPII
Eamonn Smyth	DECLG
Paul Martin	SEAI
Veronica Smith	RPII
David Pollard	RPII
Alison Dowdall	RPII

Working Group on radon in workplaces

Member	Affiliation
Darren Arkins (Chair)	HSA
David Fenton	RPII
John Hughes	DJEI
Ann Marie Part	HSE
Hugh Synnott	RPII
Alison Dowdall	RPII

Working Group on economic evaluation of radon intervention options

Member	Affiliation
David Pollard (Chair)	RPII
Anne Dee	HSE
Mary O'Mahony	HSE

Annex 3: Web Appendices

No.	Appendix description	URL
1	Report of working group 1.1 on Radon Prevention in new Build	Radon Prevention in new Build
2	Report of working group 1.2 on Increasing testing rate through admin or legal measures	Increasing rate of testing through admin or legal measures
3	Report of working group 1.3 on Public information	Public Information
4	Report of working group 1.4 on Improving competence of radon remediators	Improving competence of radon remediators
5	Report of working group 1.5 on Improving competence of radon measurement services	Improving competence of radon measurement services
6	Report of working group 1.6 on Radon in Workplaces	Radon in workplaces
7	Report on stakeholder and public consultation on the strategy	Stakeholder and public consultation
8	Report on health economic analysis	Health economic analysis
9	Report of the research needs working group	Knowledge gaps and research needs

