



NRCS

National Radon Control Strategy
Straitéis Náisiúnta um Rialú Radóin

National Radon Control Strategy

National Radon Control Strategy – Phase 1

April 2014 to 2018

Final Report

Key Highlights

Of the 31 actions set out in the National Radon Control Strategy:

- 17 actions are fully complete;
- 7 have commenced and are recommended for continuation in Phase 2 of the NRCS;
- 7 further actions have not yet commenced and are recommended for inclusion in Phase 2 of the NRCS.

Key achievements during the period of the NRCS (April 2014 to April 2018) include:

- The establishment and launch of a dedicated website www.radon.ie. This website was launched in 2016 and it received 95,000 hits in 2017;
- The completion and rollout of a short targeted training course for construction site staff on radon prevention. This course is now run by the Construction Industry Federation and it was attended by 78 people in 2017;
- Completion and rollout of a targeted training course for local authorities, public bodies and radon contractors on radon remediation. This course was attended by 87 people in 2016;
- The establishment of two registration schemes for radon services. There are currently 5 EPA registered radon measurement services and 11 EPA registered radon remediation services;
- A programme of local radon awareness campaigns was held in all twelve priority counties. In addition, an annual “Radon Day” has been established in November of each year to maintain awareness of radon on an ongoing basis. These campaigns have resulted in the measurement of over 5,000 homes in high radon areas and the identification of over 800 homes with high radon levels;
- The development and rollout of a research survey, to assess the uptake of free radon testing where offered in conjunction with a 50% grant towards necessary remedial work. The learnings from this research will be used to inform the development of a proposed national grant scheme;

- The imminent strengthening of regulations requiring workplace testing in High Radon Areas.

A significant body of research has also been carried out. Highlights include:

- Research showing that implementation of the Building Regulations since 1998 has resulted in a 13% reduction in the average level of exposure to radon;
- Research showing that the number of radon related lung cancers is now approximately 300 per year;
- The development of a high-resolution radon risk map by combining geological parameters with radon measurement data.

Key Challenges for Phase 2 of the NRCS

Establishing drivers for action on radon

Research has shown that information campaigns alone will not result in a further increase in the number of homes that test for radon. It is advised that regulatory or other policy approaches, supported by financial incentives and combined with high quality information programmes, are more effective. It is vital to ensure that this combination of approaches is integrated into Phase 2 of the Strategy.

Supporting householders with the cost of radon work

The first steps have been taken to establish the cost of a national scheme to provide financial support to homeowners for radon testing and remediation. The establishment of this financial support is considered critical for the long-term effectiveness of the National Radon Control Strategy in reducing the number of radon-related lung cancers.

Introduction and Background

Radon is a radioactive gas formed in the ground by the radioactive decay of uranium present in the underlying rocks and soils. It is the greatest source of exposure to ionising radiation for the general public in Ireland and the leading cause of lung cancer after smoking. It is estimated that exposure to radon accounts for approximately 300 lung cancer cases each year.

Recognising the scale of the radon problem in Ireland, the Government published the [National Radon Control Strategy](#) (NRCS) in February 2014 (Summary of Actions attached at Annex 1). Successful implementation of the NRCS required coordinated action from a range of Government Departments, public bodies and other stakeholders, clear identification of responsibilities and effective monitoring of progress. Accordingly, a National Radon Control Strategy Co-ordination Group was established in 2014, led by the Department of Communications, Climate Action and Environment, and comprising representatives from key Departments

and Agencies, to implement and track the recommendations of the Strategy over its four-year lifetime. Membership of the Co-ordination Group and associated Steering Groups is listed in Annex 2.

The primary objectives of the Co-ordination Group were to:

- Act as a point of contact between all bodies with responsibility for delivery of the Strategy;
- Develop an annual work plan consistent with delivery of the overall Strategy;
- Monitor the implementation of the Strategy against both the annual work plan and overall progress on the Strategy recommendations;
- Report annually to Government;
- Identify issues or difficulties in relation to any of the Strategy's recommendations as they arose and seek to facilitate resolution as appropriate;
- Put in place arrangements to ensure that the effectiveness of the plan was assessed at appropriate intervals; and,
- At the end of the four-year period, make recommendations to Government on what further actions the Group considers necessary.

Deliverables

The Strategy contains recommendations on a broad range of measures aimed at reducing the risk from radon to people living in Ireland. These are set out in six thematic areas, as follows:

- Installation of passive preventive measures in new buildings;
- Use of property transactions (sales and rental) to drive action on radon;
- Raising awareness of radon and encouraging individual action on radon;
- Provision of advice and guidance for individual householders and employers with high radon readings;
- Promoting confidence in radon services; and,
- Addressing radon in workplaces and public buildings.

Good progress was made in addressing the actions set out across all six thematic areas. There are 30 actions set out in the NRCS (these are listed at Annex 1, and one additional action has been added). Of these 31 actions, 17 are fully complete and 8 have commenced. Those that are ongoing and those that have not yet commenced should be incorporated into Phase 2 of the NRCS.

The following provides some detail on progress made on each of the 31 actions:

Action 1: Develop a branding strategy and communications programme for the launch of the NRCS.

This action is complete.

Action 2: Develop a dedicated Radon website.

This action is complete: the dedicated website (www.radon.ie) was launched in 2016. A public relations campaign to publicise this has been undertaken by the EPA. In 2017 there were 95,000 hits on this website. The effectiveness of this website will be monitored on an ongoing basis.

Action 3: Establish a coordination group comprising key public bodies to oversee and coordinate implementation of the NRCS.

This action is complete.

Action 4: Make recommendations to the Department of Housing, Planning and Local Government (DHPLG) on the amendment and strengthening of technical guidance on radon prevention in new buildings.

This action is dependent on the outcome of ongoing research to investigate optimal radon preventive and remediation techniques (Action 9). It is recommended for inclusion in NRCS Phase 2.

Action 5: Promote radon as a sign off measure within the Building Control (Amendment) Regulations 2014.

This action will be incorporated into the delivery of Continuing Professional Development modules on radon (Action 8). It is recommended for inclusion in NRCS Phase 2.

Action 6: Develop short targeted training courses for site staff on radon prevention.

This course has been developed and is being rolled out by the Construction Industry Federation as part of their suite of courses offered to the construction industry.

Action 7: Work with universities to include radon awareness in relevant undergraduate courses.

This is recommended for inclusion in NRCS Phase 2.

Action 8: Develop a Continuing Professional Development module on radon in cooperation with the relevant professional bodies.

This is recommended for inclusion in NRCS Phase 2.

Action 9: Promote targeted research on radon to support effective and efficient implementation of the NRCS.

Research required to support the implementation of the NRCS was set out in the supporting paper ‘Knowledge Gaps and Research Needs’. A significant body of research as outlined in this paper has been completed and is further research is underway. This is summarised in Annexes 3 and 4.

Action 10: Update the national assessment of indoor radon levels.

This action is complete. Two surveys have been carried out, to estimate:

- (a) The current national average indoor radon concentration for homes in Ireland;

- (b) The population weighted national average indoor radon concentration for homes in Ireland and the associated number of radon-related lung cancers.
- (a) A new survey protocol was developed and implemented in collaboration between the EPA and University College Dublin. This research shows that the current national average indoor radon concentration for homes in Ireland is 77 Bq/m³, a decrease from the 89 Bq/m³ published following the 2002 National Survey. Consequently, this work has shown a decrease in indoor radon levels since the introduction of the amended Building Regulations in 1998. [Update of Ireland's national average indoor radon concentration - Application of a new survey protocolⁱ](#).
- (b) This research was also carried out between the EPA and University College Dublin and shows that the current population weighted average indoor radon concentration for homes in Ireland is 98 Bq/m³ and the associated number of radon related lung cancers is around 300. The reason for the increase in the estimated number of lung cancers from 250 is related to factors such as the significant increase in population and changes in population distribution. Publications of this research are in preparation.

Action 11: Research to assess the combined effectiveness of passive sumps and sealing the base of the building.

This three-year project (An investigation of optimal radon preventive and remediation techniques) (2016 - 2019) is being carried out by researchers in NUI Galway funded through the EPA's research programme. This project will identify the optimum conditions to ensure new buildings in Ireland are protected from radon. Two journal articles have been published and the final report is due in 2019. The output from this research will inform the planned 2019/ 2020 amendment and strengthening of technical guidance on radon prevention in new buildings (see Action 4).

Action 12: Implement multi-annual programme of local radon awareness campaigns.

Twelve priority counties have been identified as being at high risk of having elevated indoor radon levels. These are Carlow, Clare, Galway, Kerry, Kilkenny, Louth, Mayo, Sligo, South Tipperary, Waterford, Wexford and Wicklow. Between March 2010 and November 2016, awareness campaigns were successfully carried out in all twelve of these counties.

A review of these awareness campaigns has been carried out from the perspective of Health Psychology by TCD. This review concluded that *“the awareness campaigns are broadly comparable to similar multi-media community education programmes in content and process, follow the best practice guidelines for radon risk communication, and their level of impact on radon testing and remediation is comparable to those reported in the peer-reviewed empirical literature”*. However, the review pointed out that *“the extent to which awareness programmes can address these gaps to change behaviour remains unclear – the programmes can provide knowledge but ... such information may not translate into behaviour in the face of psycho-social and financial barriers to action”*. The review advises that the State has an important role to play in managing the risk from radon and that increased governmental regulation, supported by financial incentives, combined with high quality information programmes are required to significantly increase the rate of testing and remediation.

Action 13. Develop and implement a national communications strategy to underpin local campaigns.

A Communications and Advocacy Strategy has been developed and finalised by the Coordination Group.

Action 14. Implement a targeted multi-annual programme aimed at increasing awareness among different groups of “influencers”.

This action is ongoing. A “Radon Day” is being held on 7th November annually to maintain established awareness of radon among targeted groups (this was launched in 2017).

Action 15. Promote the continuation of the programme of radon testing and remediation of social housing.

This work is ongoing. Tailored information for local authorities is available on www.radon.ie, technical advice is provided to support local authorities as required, and the remediation training course has been attended by some local authority housing staff. This action is recommended for inclusion in Phase 2 of the NRCS to ensure that testing of social homes remains a priority for local authorities.

Action 16. Develop guidelines for local authorities on dealing with requests for information on radon.

This action is complete.

Action 17. Develop a protocol for dealing with individuals with high radon measurements between: EPA, DCCAE, HSE, local authorities and HSA.

This action is complete. Communications and Advocacy Strategy provides for more targeted support of householders with high radon levels.

Action 18. Amend the advisory report which accompanies the BER certificate to include advice on radon.

The Sustainable Energy Authority of Ireland will address this action which will ensure that all BER advisory reports prepared for homeowners will include information and advice about radon.

Action 19: Develop a detailed strategy to progress recommendations on conveyancing.

This action is complete. The 2017 edition of the Law Society of Ireland’s Conditions of Sale was revised to include three questions regarding radon:

- (a) Has a radon test been carried out?
- (b) If a radon test has been carried out, please supply the report.
- (c) Has any action to reduce radon levels been undertaken?

The effectiveness of this action will be monitored on an ongoing basis.

Action 20: Amend the Housing (Standards for Rented Houses) Regulations to address radon.

Submission regarding the inclusion of radon in these regulations was made during the 2016 review. Radon was not included during this review. This action is recommended for inclusion in Phase 2 of the NRCS to ensure that a submission regarding radon is made during the next review.

Action 21: Amend checklist used by local authorities for inspection of rental properties (private and social) regarding the rate of radon testing and the levels found.

This action is recommended for inclusion in Phase 2 of the NRCS.

Action 22: Develop a paper on financial incentives to encourage action on radon.

Cost has long been identified as a disincentive to householders to test and remediate their homes. A research survey to estimate uptake (and associated costs) of potential financial incentives is underway. The outcome of this research survey will be reviewed to make recommendations regarding the development of a national scheme. This action is recommended for inclusion in Phase 2 of the NRCS.

Action 23: Develop framework for training in radon remediation.

This action is complete. The ongoing provision of this course, as required, is recommended for inclusion in Phase 2 of the NRCS.

Action 24: Update “Radon in Existing Buildings – Corrective Options”, published by DHPLG.

This action has been partially addressed through the rollout of training courses on preventive measures and remediation (Actions 6 and 23). It is recommended that it be further addressed through the development of Continuing Professional Development modules on radon in cooperation with the relevant professional bodies in Phase 2 of the NRCS (Action 8).

Action 25: Develop criteria which remediation contractors must meet to be included on any Government list or website.

This action is complete. A registration scheme for remediation contractors has been developed in consultation with the radon industry and was established in January 2017. The resulting list of registered contractors is available to the public on www.radon.ie. A public relations campaign to publicise this has been undertaken by the EPA and homeowners and employers are strongly recommended to engage contractors from this register.

Action 26: Develop registration scheme for radon measurement services in Ireland.

This action is complete. A registration scheme for radon measurement services has been developed and was established in February 2017. The resulting list of [registered services](http://www.radon.ie) is available to the public on www.radon.ie. A public relations campaign to publicise this has been undertaken by the EPA and homeowners and employers are strongly recommended to engage services from this register.

Action 27: Review existing legal requirements concerning radon in workplaces together with any new requirements arising from BSS and recommend changes.

This review is complete and requirements are being addressed through the transposition of the revised EU Basic Safety Standards into Irish legislation (Radiological Protection Act 1991 (Ionising Radiation) Regulations of 2018).

Action 28: Coordinated programme to enforce regulations regarding radon in workplaces to be put in place.

This action is ongoing and will be addressed in implementation of Regulation 66 of the Radiological Protection Act 1991 (Ionising Radiation) Regulations of 2018.

Action 29: Enhance cooperation on radon with other state agencies.

This action is ongoing. Cooperation between state agencies is organised through the Coordination Group of the NRCS. Bilateral cooperation is ongoing between the EPA and state agencies including the HSA, HSE, Building Standards (DHPLG), NSAI, GSI, SEAI and other state agencies as required.

Action 30: Develop guidance on the need for retesting of previously remediated buildings.

This action is complete. This guidance recommends the retesting of rooms that have been remediated following testing above the reference level every five years. This has been incorporated into guidance on www.radon.ie and relevant guidance documents. The effectiveness of this action will be monitored on an ongoing basis.

Action 31 (New Action): Work with TUSLA to develop a training course for those with responsibility for radon in crèches.

This action is recommended for inclusion in Phase 2 of the NRCS.

Evaluation of the Strategy – Baseline Metrics

The overall objective of the NRCS 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*”. To measure progress towards this goal a set of metrics was agreed by the Coordination Group. These metrics are made up of two types:

Leading indicators: These give a real-time measure of progress towards reducing exposure. These indicators can be used as reliable evidence that the long-term objective will be achieved.

Lagging indicators: These complement the leading indicators and provide information that may not be sufficiently timely to helpfully direct ongoing actions.

Baseline metrics, i.e. the starting point for these metrics and the agreed frequency for their repetition, are set out below.

Leading Indicators

Metric	Metric Value	Year Measured	Repeat Frequency	Proposed year	Comment
No. of domestic radon tests	1327	Average for 2014 -2017	Annually	2018	Source: EPA data
No. of radon tests linked to conveyancing	To be established	N/A	Annually	TBC	Method to collect data to be developed
Remediation rate	22%	2015	5 years	2020	Source: EPA survey
Rate of successful outcome for those who remediate	70% on first attempt	2015	5 years	2020	Source: EPA survey
No. of courses held & attendance at Remediation Training	5 courses held 87 attendees	2016	Dependent on scheduling of training course	As course is scheduled	Source: EPA
No. of courses held & attendance at Radon Prevention Training	5 courses held (including 1 pilot) 78 attendees	2017	2 years	2019	Source: CIF

Lagging Indicators

Metric	Metric Value(s)	Year measured	Repeat frequency	Proposed year
Population weighted national average indoor radon concentration	98 Bq/m ³ (Arithmetic mean)	2017	8 years	2025
Geographic weighted national average indoor radon concentration	77 Bq/m ³ (Arithmetic mean) Mean for homes built pre-98 vs post-98 86 Bq/m ³ vs 64 Bq/m ³	2015	8 years	2023
Radon awareness levels	75% with 21% likely to test their home	2017	3-5 years	2020-2022

Next Steps

Much progress has been made to implement the 31 actions set out in the National Radon Control Strategy, however, it is important to ensure that work to tackle this important public health issue continues. A number of the actions detailed above will be implemented on an ongoing basis, a number have commenced and others are yet to begin. At the same time, the research required to support the implementation of these actions is ongoing. It is also important to note that Regulation 64 of the Radiological Protection Act 1991 (Ionising Radiation) Regulations of 2018 requires that radon be tackled on an ongoing basis through the implementation of the National Radon Control Strategy, stating that:

(1) The Minister shall establish and maintain a National Radon Control Strategy aimed at minimising exposure to radon which shall include the following elements:

- (a) measures to promote the identification of dwellings with radon concentrations above the national reference level established by the Agency for radon in dwellings (pursuant to Regulation 64), as measured in accordance with guidelines as may be issued by the Agency;
- (b) where dwellings with radon concentrations above the national reference level are identified, the provision of information aimed at encouraging remedial work to reduce those levels;
- (c) local and national information on indoor radon exposure and the associated health risks, on the importance of performing radon measurements and on the technical means available for reducing existing radon concentrations.

(2) The National Radon Control Strategy shall take into account the issues set out in [Schedule 14](#) and be updated on a regular basis.

(3) The National Radon Control Strategy shall include provisions to identify high radon areas.

Consequently, work to develop Phase 2 of the National Radon Control Strategy should begin with a review of Phase 1 of the Strategy as set out above by all stakeholders that have contributed to this work. The feedback from this review can feed into the development of Phase 2 of the Strategy. In parallel, a review of radon research may be carried out in collaboration with the radon research community with the aim of developing a “Knowledge Gaps – Phase 2” paper which will set out the research required to support Phase 2 of the NRCS. Phase 2 of the NRCS and the Knowledge Gaps have a target launch date of 2019.

Annex 1 – Summary NRCS Action Plan

No.	Action	Status
1	Develop a branding strategy and communications programme for the launch of the NRCS	Complete
2	Develop a dedicated radon website as resource for stakeholder groups	Complete
3	Establish a co-ordination group comprising key public bodies to oversee and co-ordinate implementation of the NRCS	Complete
4	Make recommendations to the DHPCLG on the amendment and strengthening of technical guidance on radon prevention in new buildings	This action is dependent on the outcome of ongoing research to investigate optimal radon preventive and remediation techniques (Action 9). Recommended for inclusion in NRCS Phase 2.
5	Promote radon as a sign off measure within the Building Control (Amendment) Regulations 2014	This action will be incorporated into the delivery of Continuing Professional Development modules on radon (Action 8). Recommended for inclusion in NRCS Phase 2.
6	Work with key stakeholders to ensure that short targeted training for site staff on radon prevention are developed and delivered	Complete
7	Work with universities to include radon awareness in relevant undergraduate courses	Recommended for inclusion in NRCS Phase 2.
8	Develop a Continuing Professional Development module on radon in cooperation with the relevant professional bodies	Recommended for inclusion in NRCS Phase 2.
9	Promote targeted research on radon to support effective and efficient implementation of the NRCS	A number of research projects complete.
		Others are ongoing.
10	Update the national assessment of indoor radon levels	Complete.

11	Research to assess the combined effectiveness of passive sumps and sealing the base of the building	Research was commissioned in 2016 and is underway in NUI Galway.
12	Implement a broadly based multi annual programme of local radon awareness campaigns	Complete.
13	Develop and implement a national communications strategy to underpin local campaigns	Complete
14	Implement a targeted multi-annual programme aimed at increasing awareness among different groups of “influencers”	Annual “Radon Day” being held on 7 th November each year to maintain established awareness of radon among targeted groups.
15	Promote the continuation of the programme of radon testing and remediation of social housing	Dedicated information for local authorities published on www.radon.ie . Technical advice provided to support local authorities as required. Remediation Training Course attended by local authority housing staff. Ongoing work in local authorities has been collated.
16	Develop guidelines for local authorities on dealing with requests for information on radon	Complete: www.radon.ie provides tailored advice for local authorities.
17	Develop a protocol for dealing with individuals with high radon measurements between: EPA, DCCAE, HSE, local authorities and HSA	Complete: Communications and Advocacy Strategy provides for more targeted support of householders with high radon levels.
18	Amend the advisory report which accompanies the BER certificate to include advice on radon	Scheduled for action in NRCS Phase 2.

19	Develop a detailed strategy to examine recommendation on conveyancing	Complete: revised Contract for Sale published by Law Society for use in January 2017 and publicised.
20	Amend the Housing (Standards for Rented Houses) Regulations to address radon	Complete: Review of Regulations carried out Jun/ July 2016. EPA submitted comments re inclusion of radon. Can be included in Phase 2 of the NRCS.
21	Amend checklist used by local authorities for inspection of rental properties (private and social) regarding the rate of radon testing and the levels found	Recommended for inclusion in Phase 2 of the NRCS.
22	Develop a detailed paper on financial incentives to encourage action on radon	A pilot scheme to estimate uptake (and associated costs) of potential financial incentives is underway.
23	Develop framework for training in radon remediation	Complete
24	Update “Radon in existing buildings – corrective options” published by DECLG	Addressed through the rollout of training courses on preventive measures and remediation (Actions 6 and 23).
		Recommended for inclusion in Phase 2 of the NRCS.
25	Develop criteria which remediation contractors must meet to be included on a Government list or website	Complete
26	Develop validation or registration scheme for radon measurement services in Ireland	Complete
27	Review existing legal requirements concerning radon in workplaces together with any new requirements arising from BSS and recommend changes.	Complete
28	Co-ordinated programme to enforce regulations re radon in workplaces to be put in place.	This action is ongoing.

29	Enhance cooperation on radon with other state agencies	Ongoing.
30	Develop guidance on the need for retesting of previously remediated buildings	Complete.
31	New Action - Work with TUSLA to develop a training course for those with responsibility for radon in crèches.	Recommended for inclusion in Phase 2 of the NRCS.

Blue – Complete

Green – Action underway

Orange – Recommended for inclusion in Phase 2 of the NRCS.

Annex 2 – Inter-departmental Co-ordination and Steering Groups

Note: membership of these groups changed between 2014 and 2018, however, the full list of membership is provided for completeness.

Co-ordination Group

Member of Group	Agency/ Department
Brian Carroll (Chair)	Department of Communications, Climate Action and Environment (DCCAE)
David Walsh (Chair)	Department of Housing, Planning and Local Government
Beatrix Aigner	Department of Communications, Climate Action and Environment
Damien Allen	Department of Housing, Planning and Local Government
Barry Bolger	Department of Communications, Climate Action and Environment
Nordine Chigara	Department of Communications, Climate Action and Environment
Robert Doyle	Department of Communications, Climate Action and Environment
Bob Hanna	Department of Communications, Climate Action and Environment
Paul McDonald	Department of Communications, Climate Action and Environment
Kevin O'Donoghue	Department of Communications, Climate Action and Environment
Paula O'Reilly	Department of Communications, Climate Action and Environment
Paul Shortt	Department of Communications, Climate Action and Environment
Neil Maher	Department of Housing, Planning, Community and Local Government
Earnan O'Cleirigh	Department of Housing, Planning, Community and Local Government
Eamonn Smyth	Department of Housing, Planning, Community and Local Government
Alison Dowdall	Environmental Protection Agency
David Fenton	Environmental Protection Agency
Micheál Lehane	Environmental Protection Agency
Stephanie Long	Environmental Protection Agency
Ann McGarry	Environmental Protection Agency
Ciara McMahan	Environmental Protection Agency
Barbara Rafferty	Environmental Protection Agency
Eamonn Cusack	Department of Education and Skills
Jackie Hynes	Department of Education and Skills
Colette Bonner	Department of Health

Margaret Lawlor	Department of Business, Enterprise and Innovation
Karl Cashen	City and County Managers Association
Willian Purcell	City and County Managers Association
Ray Scanlon	Geological Survey of Ireland
Jim Hodgson	Geological Survey of Ireland
Darren Arkins	Health and Safety Authority
Sheena Notley	Health and Safety Authority
Ina Kelly	Health Services Executive
Mary O'Mahony	Health Services Executive
Paul Martin	Sustainable Energy Authority of Ireland
James O'Leary	Sustainable Energy Authority of Ireland

Steering Group on radon preventive measures

Objective: To progress priority actions related to improving radon prevention in new buildings

Member of Steering Group	Agency/ Department
David Fenton (Chair)	Environmental Protection Agency
Robin Byrne	National Standards Authority of Ireland
Tim O'Neill	Radon Industry Association
Eamonn Smyth	Department of Housing, Planning and Local Government
Robert Butler	Construction Industry Federation
Mary O'Mahony	Health Services Executive

Steering Group on radon remediation

Objective: To progress priority actions related to promoting confidence in radon remediation services.

Member of Steering Group	Agency/ Department
Eamonn Smyth (Chair)	Department of Housing, Planning and Local Government
Stephanie Long	Environmental Protection Agency
Karl Cashen	City and County Managers Association
Eugene Monahan	Radon Industry Association
David Doyle	Radon Industry Association
Kevin Sheridan	Ex-FAS

Steering Group on awareness raising

Objectives: To progress priority actions related to raising awareness and encouraging individual action on radon.

Member of Steering Group	Agency/ Department
Bob Hanna (Chair)	Department of Communications, Marine and Natural Resources (now DCCAIE)
Paul McDonald	Department of the Environment, Community and Local Government (now DCCAIE)
Miriam Owens	Department of Health
Ina Kelly	Health Services Executive
Stephanie Long	Environmental Protection Agency
Valerie Kavanagh	Environmental Protection Agency
Ray Cullinane	Environmental Protection Agency
Barbara Rafferty	Environmental Protection Agency

Researchers working to support the National Radon Control Strategy

Researcher	University/ Agency
Alison Dowdall	Environmental Protection Agency
David Fenton	Environmental Protection Agency
Stephanie Long	Environmental Protection Agency
Michael Murray	Environmental Protection Agency
Barbara Rafferty	Environmental Protection Agency
Ina Kelly	Health Services Executive
Mary O'Mahony	Health Services Executive
Paul Walsh	National Cancer Registry of Ireland
Christopher Kennedy	NUI, Dublin
Patrick Murphy	NUI, Dublin
Miriam Byrne	NUI, Galway
Mark Foley	NUI, Galway
Jamie Goggins	NUI, Galway
James McGrath	NUI, Galway
Le Chi Hung	NUI, Galway
Quentin Crowley	Trinity College Dublin
Javier Elio	Trinity College Dublin
Eric Finch	Trinity College Dublin
Gillian Gunning	Trinity College Dublin
David Hevey	Trinity College Dublin
Barry McCarron	Queen's University Belfast
Robert Smyth	University College Hospital, Galway

Annex 3 – Status of research carried out to support the NRCS 2014 -2018

No.	Knowledge gap deliverable	Identified as Phase 1 knowledge gap?	Current Status	Knowledge gap for phase 2 identified?
1	Updated geographic weighted national average	Yes	Complete	No
2	Updated population weighted national average radon concentration	Yes	Complete	No
3	An improved radon risk map	Yes	On-going	Yes
4	Research on radon and increased airtightness/energy efficiency carried out	Yes	Complete	Yes
5	Development of a more robust radon preventive system	Yes	On-going	Awaiting results
6	Investigation into the long term effectiveness of radon remediation systems	Yes	Complete	No
7	Optimum positioning of radon fan exhaust on buildings being remediated and optimum fan power that should be used in active radon systems	Yes	Not commenced	To be considered for phase 2
8	Review of public information programmes to enhance home radon screening uptake and home remediation.	Yes	Complete	No
9	Assessment of the level of awareness of radon among solicitors, surveyors, landlords and new home owners is unknown.	Yes	Not commenced	To be considered for phase 2
10	Rate of testing and remediation when financial incentives are provided	No	On-going	Yes
11	Study of building characteristics and indoor radon levels carried out	No	On-going	Awaiting results
12	Study of radon concentrations in passive homes carried out	No	On-going	Awaiting results
13	Development of seasonal correction factors for workplaces	No	Complete	No

14	Survey of radon awareness levels amongst the public carried out	No	Complete	No
15	Update the rate of radon remediation	No	Complete	No
16	Tellus survey	No	On-going	No
17	Radon awareness and testing in patients of a rapid lung cancer clinic	No	Complete	To be considered for phase 2
18	High radon areas and lung cancer prevalence in Ireland	No	Complete	No
19	Economic cost of radon related lung cancer in Ireland	No	Complete	No
20	An outdoor radon survey and minimizing uncertainties in low level measurements using CR-39 detectors	No	Complete	No
21	Inter-comparison of radon detectors for one to four week measurement periods	No	Complete	No
22	Remediation of homes in karst limestone regions.	No	Complete	No

Key:

Blue – Complete

Green – Action underway

Orange – To be considered for Phase 2 of the NRCS Knowledge gaps

Annex 4 – Research publications in support of implementation of the NRCS

Dempsey, S., Lyons, S. and Nolan, A. (2018). High radon areas and lung cancer prevalence: evidence from Ireland. *Journal of Environmental Radioactivity*, Vol. 182, February 2018, pp. 12–19.

Dowdall, A., Fenton, D. and Rafferty, B. (2016). The rate of remediation in Ireland 2011-2015: establishing a baseline rate for Ireland's National Radon Control Strategy. *Journal of Environmental Radioactivity*. 162-163: 107-112.

Dowdall, A., Murphy, P., Pollard, D. and Fenton, D. (2017). [Update of Ireland's national average indoor radon concentration - Application of a new survey protocol](#). *Journal of Environmental Radioactivity*, Vol 169-170, April 2017, pp. 1-8.

Dowdall, A., Murphy, P., Fenton, D. and Pollard D. (2018). Establishing Ireland's current population weighted national average radon concentration using a new survey protocol. International Radiation Protection Association conference. (The Hague, The Netherlands). *In press*.

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