

radon

ENVIRONMENT AND HERITAGE SERVICE

radon
Don't live with the risk

This booklet, published by the Environment and Heritage Service (EHS), provides information about methods for radon reduction. Every effort has been made to ensure that the information is accurate, but the EHS cannot accept liability for the application of this advice. EHS cannot endorse or recommend any particular supplier, product or service.

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Don't live with the risk

a householder's guide

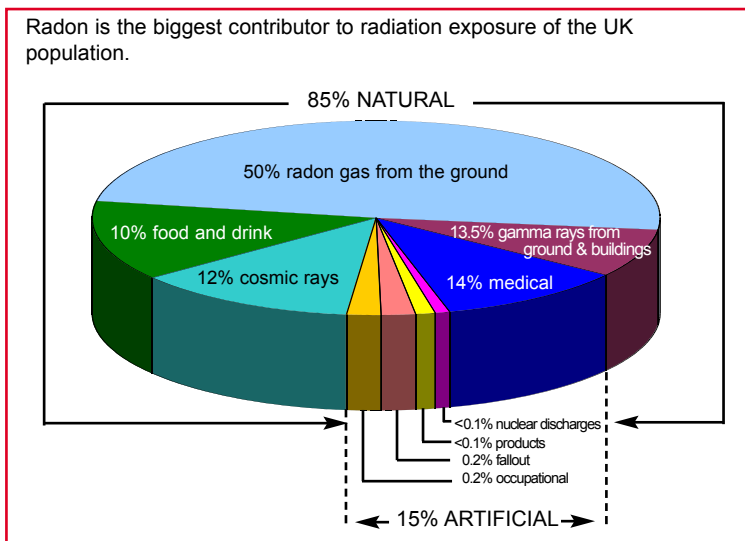
Perhaps you have heard about radon affecting your area, and are wondering whether you should take the test. Perhaps you have taken the test but feel you don't know enough about what it means. Either way, this booklet is for you. It tells you what radon is, where it is found, what the dangers are - and explains the good news that **the measures needed to get rid of radon problems are easy, inexpensive and effective.**

In some areas of the UK, naturally occurring radon poses a health risk to a relatively small number of people in their homes. In Northern Ireland areas where houses may have higher than average radon levels have been mapped based on almost 18,000 Government funded measurements carried out by the National Radiological Protection Board (NRPB).

The Government wants people who may be at risk to test their homes for radon, and to follow up with radon reduction measures if they find there is a problem. Even though only a small proportion of the UK population are actually affected by radon, everyone should know the facts - so read on.

➤ Radon - back to the facts

Radon is a radioactive gas that occurs naturally. It has no taste, smell or colour; in fact, special devices are needed to detect it. Radon is everywhere, usually at levels that pose negligible risk.



Where does radon come from?

When uranium decays, it becomes radium, and when radium decays, it becomes radon. Uranium is found in small quantities in all soil and rocks, but amounts vary from place to place. Variations are on a very small scale: there may be different levels of radon even between neighbouring buildings.

Radon rises from soil into the air; outdoors, radon is diluted and the risk it poses is negligible. When it stays in enclosed spaces, however, concentrations can build up.

From some 18,000 test results in Northern Ireland, the NRPB has drawn up maps of radon affected areas. Most homes, even in these areas, will not have a radon problem, but a proportion will do so. As you can see, in many places radon is found in small pockets.

Radon can be dangerous

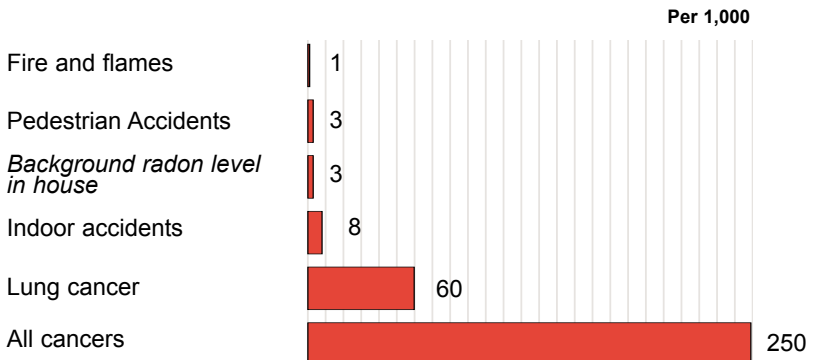
It should be emphasised when radon concentration is high, it does pose a serious risk to your health. Radioactive decay of radon forms particles called 'radon daughters', and if you breathe these in they damage your lung tissues. Health studies from around the world have linked radon and lung cancer. The lung cancer radon causes proceeds in exactly the same way as cancer caused by smoking. The NRPB measures radon level in Becquerels per cubic metre (Bq/m³) of air, and has advised the Government that the level of 200 Bq/m³ should be considered the **Action Level** (the level at which action should be taken to reduce radon concentration).

The table below gives some idea of how radon risk compares with other risks when radon is at the average level found in the UK which is 20 Bq/m³ - that is 1/10 of the Action Level. However, as this is an average value, many homes will have higher levels than this. You need not be concerned if your home has a radon level above 20 Bq/m³ unless it approaches or exceeds the 200 Bq/m³ Action level.

Table 1

Lifetime risks of death from common causes

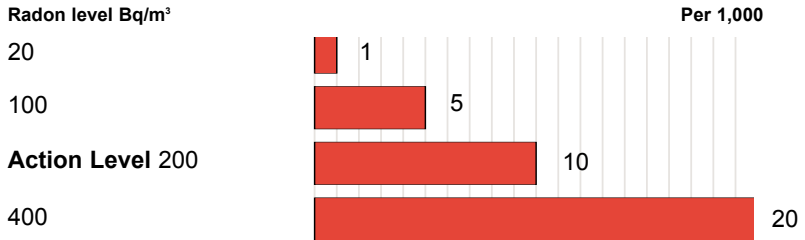
(UK average for smokers and non-smokers)



This table shows that, for example, you are more likely to die as a result of an accident indoors, than from lung cancer caused by the background level of radon.

As radon concentration increases, however, the risk of lung cancer increases. A comprehensive study by the Imperial Cancer Research Fund has confirmed the level of risk from radon in houses in the UK.

Table 2
Lifetime risk of lung cancer potentially induced by radon
 (for non smokers)



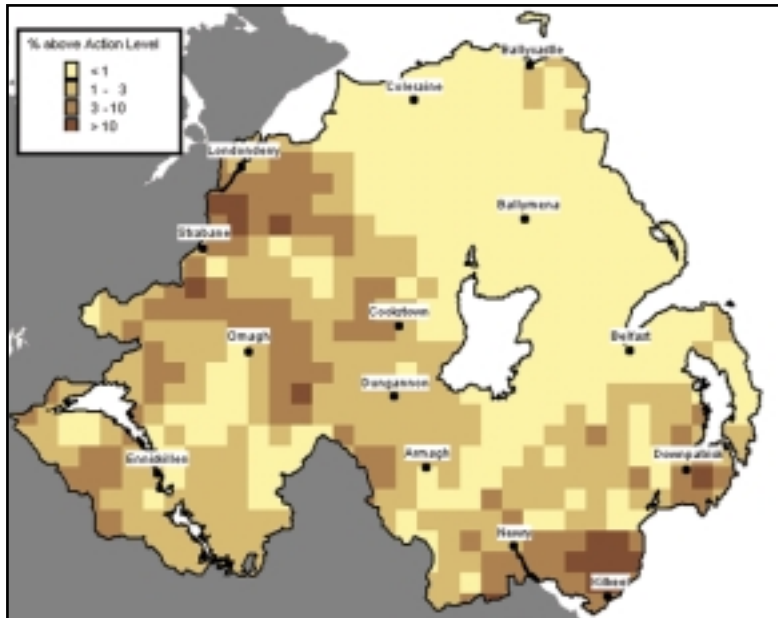
'Lifetime risk' is of course a long-term hazard. Radon risk increases with time. When taking steps to reduce it, it is far better to plan carefully than take the wrong precautions. After brisk but sensible planning, action should be taken as soon as practical.

Table 2 applies only to non-smokers. Smoking makes the risk of cancer from radon far worse. If you smoke 15 cigarettes a day, you can multiply the risk factor by 10, so for example at the Action Level your risk is 100 in 1000.

Smokers should remember this, however: whereas they might find it very hard to give up smoking, households at risk from radon can easily take small and effective steps to make their home safe.

Radon in Northern Ireland

The following radon map of Northern Ireland is based on measurements of radon levels in homes in 5 km x 5 km squares. Squares where 1 percent or more of homes are likely to have radon levels above the Action Level are radon Affected Areas. Even outside the designed areas, there may be some homes which exceed the Action Level.



Radon levels in Northern Ireland

How does radon get into your home?

Because the effects of wind and temperature, the air pressure in your house is usually lower than air pressure in the soil beneath it. Just as air rushes in to fill a vacuum because the pressure is lower, the same effect happens (much less dramatically) with houses - air from the soil creeps into the lower pressure area of the house through cracks and gaps in the floor or walls and around service openings. This air contains radon, and in areas where radon levels in the soil are quite high, indoor radon levels can rise above the Action Level.

➊ What should be done by people in affected areas?

The Government recommends that people in affected areas test their houses for radon. There is a test available that involves monitoring radon in the home with simple, safe devices for a period of three months. The test costs around £36, including VAT, for two detectors and anyone can order it. If you have not taken it and are worried about radon write to **Environment and Heritage Service** to ask for a leaflet about the test. *Radon: you can test for it.* The address is at the end of this booklet.



The radon test pack

The Government, the NRPB and the Building Research Establishment Ltd (BRE) all recommend that if householders' indoor radon levels test above the Action Level, they should take radon reduction measures as soon as practical - and then take the test again to give themselves peace of mind.

Who gets to see my radon test results?

Only you, the occupier. You needn't pass them voluntarily to anyone, but if you are selling your house you may be asked if you have had a radon test and what the result was.

However, radon problems are nothing to be ashamed of, and it could be helpful to your district council if you chose to inform them of your house's radon test results (even if you have tested below the Action Level). They will be keen to build up a picture of the radon problem in the area.

When the NRPB does a test and knows that a householder is a tenant, it sends two copies of the results. The idea is that you may wish to pass a copy to your landlord - again, whether or not the house has a radon problem. In some cases the terms of your lease may mean that the landlord is responsible for radon reduction work. In other cases the responsibility may not fall to the landlord; you should consult with him or her about the lease.

What can I do if I find my house has a radon problem.

Remember that it is your average exposure to radon that matters. Short exposure to high levels is not important if over the long term your average exposure is low. This means that you have time to plan for the solution that is best for you, your house and your radon level. But having found the best solution, you should implement it as soon as practical.

It is best to stop radon entering a house or, if that is not possible, to try to remove it if it gets in. The aim in both cases should be to reduce indoor radon levels at least to significantly below the Action Level. There are five main ways to achieve this; they are described briefly below and dealt with in greater detail in the free booklet *Radon - A guide to reducing levels in your home*, available from the Environment and Heritage Service (see page 16 for details).

Choice A Install a radon sump system

The average cost of a system is about £750. It can be installed in a day or two. The sump is a small void (about the size of a bucket) dug under a solid ground floor, or sub floor concrete in the case of a suspended timber floor, to which a pipe and usually a fan are attached. The system limits the amount of radon that enters the house, and for a typical house it is by far the most effective method. Modern sumps are often constructed from the side of the house, so there is no disruption inside.

Choice B Improve ventilation under suspended timber floor

Costs could be in the region of £200-£500, but may vary considerably. New air bricks are installed in walls just above ground level. This can be as little as £20-£50 per air brick, or less if you do the work yourself. In some cases a fan system is also installed. The system again limits the amount of radon that enters the house.

Choice C Use positive ventilation in your house

The average cost of the system, which is designed to change the air pressure in your house by blowing air in from the loft level, is around £450. The system both dilutes the radon to acceptable levels, and stops some of it getting in. It can be installed in a day.

Choice D Seal cracks and gaps in solid concrete floors

Costs for this work vary a lot: you could spend as little as £25, but it does depend on the house and could cost five or ten times as much. The seals prevent radon entering the house through the floor. However, it is essential that all cracks are sealed. This will involve removing for example carpets and skirting boards. Sealing even, say, 90 percent of cracks is likely to have little effect on radon levels.

Choice E Change the way your house is ventilated

This solution is only suitable in quite special cases, and has drawbacks, but can prove quite inexpensive.

Some choices are more suitable for some houses than others. The costs of many of them can be reduced by do-it-yourself work - see the Environment and Heritage Service booklet *A Guide to Reducing Levels in Your Home* for more details. BRE publish useful guides about most of the choices; the ordering address is on page 16.

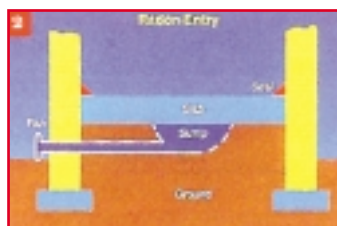
Building Regulations and Radon

Since 1994, the Building Regulations have required measures to be taken to prevent or limit the ingress of radon into any new dwelling in certain areas. The regulations also apply to any extension to a dwelling where the ground floor area of the extension is greater than 30 m².

The Building Regulations for radon do not apply retrospectively to any existing dwellings nor to dwellings which had received approval before the radon regulations came into effect.

If you want to know whether or not a dwelling incorporates radon protection measures the building Control Department of your district council will be able to help. They will also be able to show you a map defining the areas where Building Regulations for radon apply.

How can I keep costs manageable?



1. Sump systems are generally the most effective method of reducing high levels of radon. The system pictured was installed in one day.
2. A radon sump system works by drawing air from the soil beneath your home and redirecting it harmlessly into atmosphere.
3. Positive ventilation fans blow air from a loft - or fresh air from outside - into your house.
4. Modern plastic louvred airbricks are a cheap and simple way to help dilute radon beneath suspended concrete or timber floors.

As you have read, costs can vary a great deal because so much depends on the amount of radon reduction you need to achieve and the design of your house. However, the equipment and material needed are not complex or expensive: most of the costs are in the labour needed. This is why do-it-yourself work can be so significant in reducing costs.

It may be cheaper to have several things done at once. Builders have fixed overheads that they charge per job, such as hiring plant; if your builder can carry out all the work in one visit he will probably charge less than for several separate visits.

Similarly, if you plan to make other alterations to your home (for example to extend the ground floor) radon reduction measures may be cheaper if you carry them out at the same time.

The other important aspect of managing costs is that of written quotations, dealt with below.

Finding a builder and drawing up a contract

There is nothing complex about the methods used to bring radon down to below the Action Level, and so a local builder that does good quality general building work should have no problems carrying out the work. But because widespread knowledge of the risks posed by radon is quite new in some parts of the country, builders may not have worked on radon reduction before. If you choose to use a builder, further expert advice is available to help you and your builder. The National Radiological Protection Board (NRPB) advises on health risks posed by radiation and how to guard against them. The Building Research Establishment (BRE) has developed practical advice about how building work can reduce radon levels to within safe limits. The Radon Council Ltd, an independent voluntary regulatory body, keeps a list of companies experienced in radon reduction work. Addresses and other information available are listed at the end of this booklet.

The following points are useful when you are looking for a builder:

- **You can draw up a lump sum contract**

Many people employ builders to do minor jobs without professional advice and radon work need to be no different. The best plan is to write down in advance the work you need to be doing. If you need help doing this, phone the BRE radon hotline.

Then get at least three written quotations from the different builders, asking them to quote on a 'lump sum' basis. This means their price will include everything they think necessary to complete the job as you have described it. It won't include unexpected costs (for things they could not have foreseen, such as discovering dry rot in floor joists), but these aside you will be reasonably sure of the final cost of the work.

- **You can draw up a time-and-materials, or dayworks contract**

If you cannot write down an accurate list of what needs doing, because you don't yet know how much work it will take, a lump sum contract will not be possible. (For example if you need to seal the floor, you may not know how much work needs doing until you take out all the furniture and remove all the carpets and skirting boards.) In this case you could get the builder to quote an hourly rate for labour and a rate for the supply and fixing of materials (for example, so many pounds per metre for sealing edges of floors, so many pounds for sealing around service pipe), and also ask for an estimate of overall cost.

This estimate doesn't have the same legal force as a written quotation. A quotation commits the builder to do the job at a certain cost or rate. An estimate is an approximate guide that helps you to budget but does not commit the builder; of course you may find his or her costs come in lower than the estimate.

- **Some builders have trained or worked on radon reduction**

The Radon Council Ltd has a list of builders who are experienced in radon work. The builders abide by the Council's Code of Practice and its guidelines on carrying out remedial work. Builders must also have at least one employee who has attended the Council's training course. The Council's address is on page 14.

- **You can get professional advice**

Even if you cannot find a builder experienced in this kind of work, high quality workmanship and good materials are the essential foundations of successful work. An architect or quantity surveyor can advise you on the quality of local builders' work, help you to draw up a contract, assess the quality of work and ensure that the final sum you are charged is right for the work done. However, you will have to pay for these professional services.

On page 15 you will find lists of professional bodies and trade associations whose members are committed to high quality work and submit to a complaints procedure.

Can I get a grant to help pay for the work?

In some cases grants are available, and loans are possible:

- the building societies have agreed in principle to provide loan finance for radon work, subject to the applicant's status;
- if you cannot afford to pay for the work, discretionary 'house renovation' grants are available from the Northern Ireland Housing Executive. The NIHE will assess your eligibility and will determine how much, if any, of the cost you will have to pay.

For information about discretionary grants contact your local NIHE Grants Office.

Do I need permission to carry out the work?

- **If you own your house but have a mortgage**
you may need the lender's permission before carrying out these changes to the house. Your lender will be able to tell you what the mortgage agreement says and you should check this before starting work.
- **If you are a tenant**
you will need to discuss the work with your landlord before you start. You may be able to carry out some of the jobs yourself, but others, especially if they affect the building's structure, might have to be carried out by the landlord.
- **Planning permission or building Control approval**
are not usually necessary for small radon reduction jobs (unless you are making bigger changes at the same time). Your district council's Building Control Officer can give you the advice you need. However, if your house is a listed building, or in a designated area of outstanding natural beauty, or a conservation area, you may need permission for any work that alters its external appearance. Check with the Planning Service, of DoE in your local area.

Landfill gases

In very rare cases where a house needing radon work is on or next to a landfill site or old mine, additional precautions may be needed to deal with methane rising from the site. If you have any reason to think that this applies to your house, ring your district council's Environmental Health Department to check. If there is a problem, you will be able to get expert advice from BRE's radon hotline.

What should I do if I am buying or selling a house?

The Environment and Heritage Service has published a booklet dealing with these issues: Radon - a guide for homebuyers and sellers (details on page 16).

Might there be radon in my workplace?

Radon can affect workplaces and public buildings in the same way as houses. Where the workplace is occupied for a normal working day and the average radon levels are below 400 Bq m⁻³, no further action is likely to be required, taking into account that most people spend much more time in the home than in work.

In buildings where radon is at a level over any 24 hour period exceeding 400 Bq m⁻³, employers have a legal responsibility under the Ionising Radiations Regulations 2000 to ensure that any consequential risk to health is restricted as far as reasonably practicable for those using the building. If you have concerns, you should take them up with the employer, you can get more advice from the Health and Safety Executive Northern Ireland or the Environmental Health Department of your district council. HSE, BRE and NRPB publish information on radon in the workplace.

Further information

Having read this leaflet, you may well have further questions.

- you can get an information pack on radon in the home, with advice about radon, its health risks and details of how to order the test from the **NRPB Radon Freephone** on **0800 614529**; or by post from **NRPB, Chilton, Didcot, Oxon OX11 0RQ**; and
- you can approach your local district council (the Environmental Health Officer or the Building Control Officer) for advice.

You can also write or call:

The Radon Council Ltd
PO Box 39
Shepperton
Middlesex TW17 8AD

Tel: 01932 221212
Fax: 01932 229779

For more advice about Building Regulations; write to:

Construction Service
Estate Maintenance and Advisory Division
River House
48 High Street
Belfast BT1 2AW

Tel: 028 9054 7585

The following professional organisations unite and regulate members practising their respective trades:

Builders

Construction Employers Federation
143 Malone Road
Belfast BT9 6SU
Tel: 028 9087 7143
Fax: 028 9087 7155

National House Building Council
59 Malone Road
Belfast BT9 6SA
Tel: 028 9068 3131
Fax: 028 9068 3258

Federation of Master Builders
44A New Row
Coleraine
Co Londonderry BT52 1AE
Tel: 028 7034 0999
Fax: 028 7034 0998

Architects

Royal Society of Ulster Architects
2 Mount Charles
Belfast BT7 1NZ
Tel: 028 9032 3760

Quantity Surveyors

Royal Institute of Chartered Surveyors
9-11 Corporation Square
Belfast BT1 3AJ
Tel: 028 9032 2877

Trading Standards
Branch

Department of Enterprise, Trade & Investment
176 Newtownards Road
Belfast BT8 4QS
Tel: 028 9025 3900

For more advice about radon in the workplace, write to:

Health & Safety Executive
83 Ladas Drive
Belfast BT6 9FR
Tel: 028 9024 3249

Useful publications

Radon - you can test for it

Radon - a guide to reducing levels in your home

Radon - a guide for homebuyers and sellers

the above are published by **Environment and Heritage Service**.

Free copies can be obtained by ringing 028 9025 4709 or writing to:

Environment and Heritage Service

Calvert House

23 Castle Place

Belfast

BT1 1FY

BRE sells easy to follow guides, and a video:

Video: *Radon - No Problem*

For builders and householders, it offers easy to follow guidance on how to go about reducing radon levels in existing homes

1994 £13.50 inc VAT and p&p

More information about the guides, and the video are available from:

Construction Research Communication Ltd

151 Rosebery Avenue

London EC1R 4QX

Tel: 020 7505 6622

Fax: 020 7505 6606

NRPB also provides the following video

Radon - The Home Video

£3.00 inc p&p



*Our aim is to protect and conserve the
natural and built environment and to
promote its appreciation for the benefit of
present and future generations.*



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