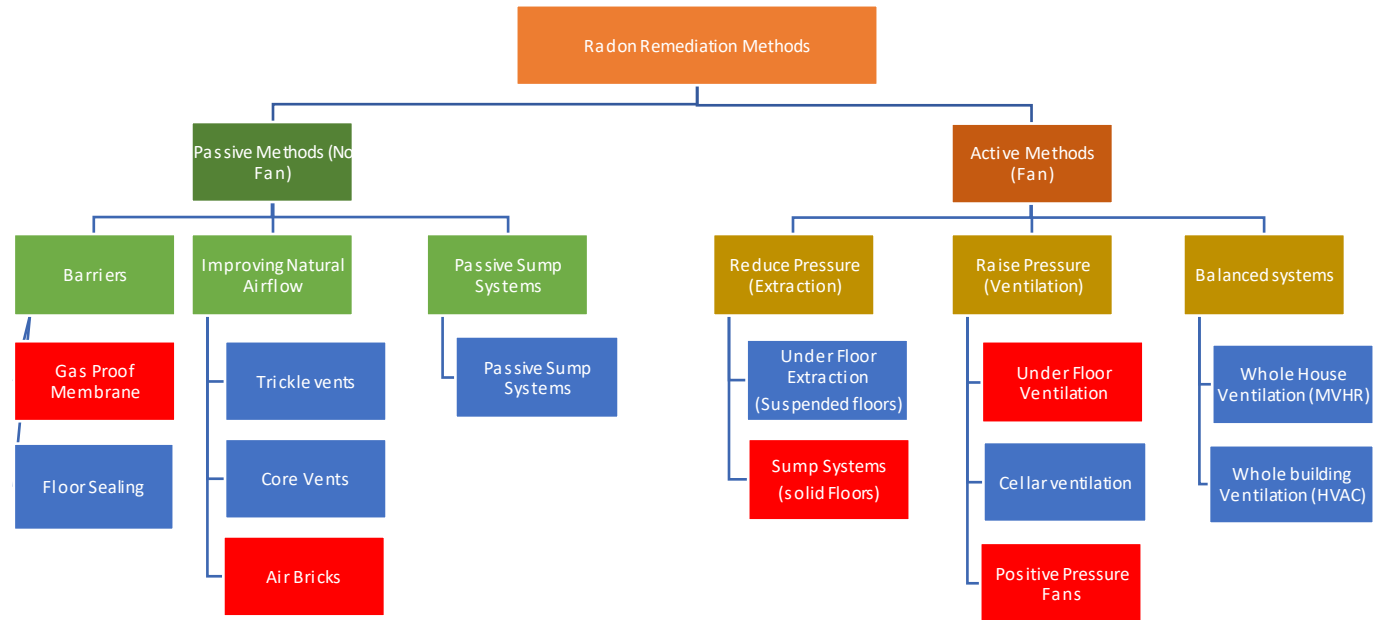


# Comparing Radon Remediation Methods

There are many different types of radon remediation



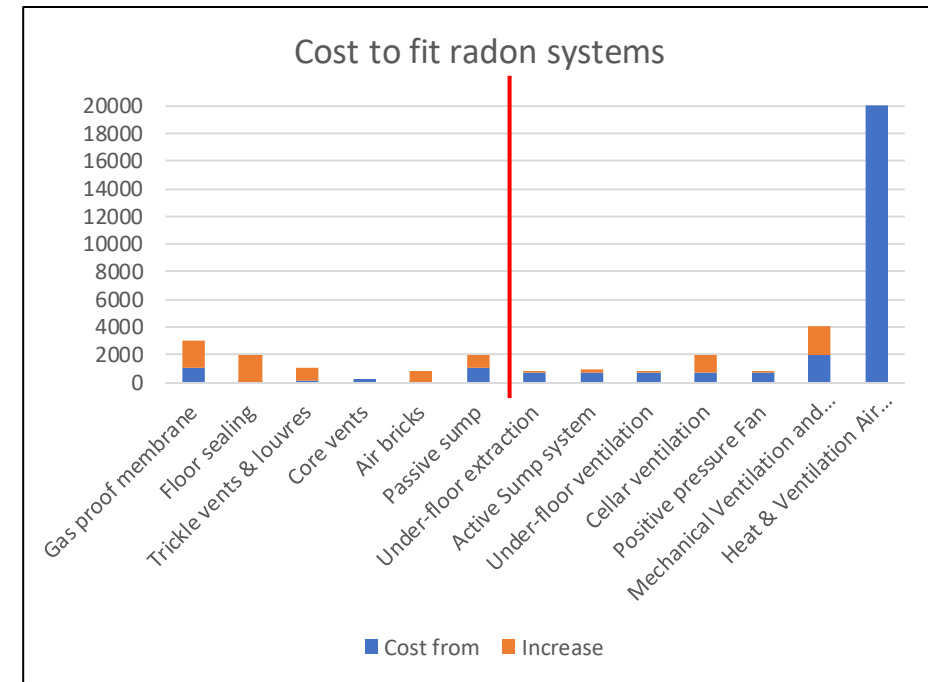
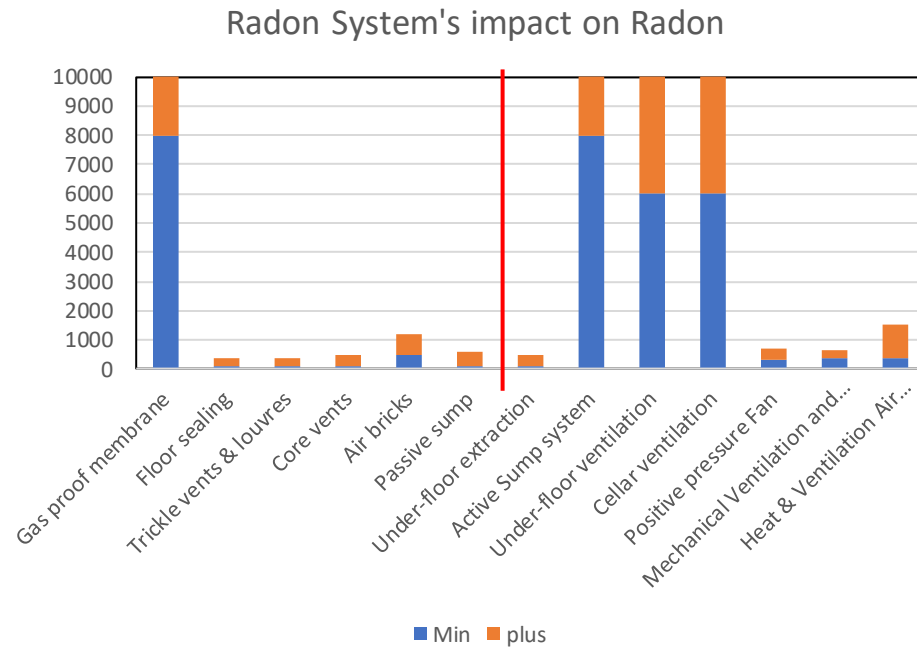
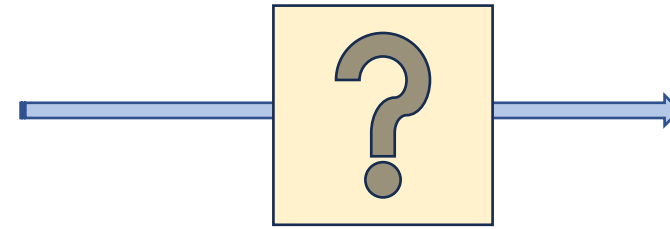
But which one should I choose?



# Comparing Radon Systems...

There are many ways to compare radon systems:

- Impact
- cost
- ease of fitment
- on-going commitments/cost
- aesthetics
- compatibility with the property/householder



# which radon system should I fit?

- Passive Radon systems: cheaper .... effective on lower radon concentrations
- Active systems: high impact on radon..... but can cost more
- Different radon systems for different:
  - Floor types (or lived-in space), and
  - Radon concentrations
- Any comparison must include the property the radon system will be fitted to, and the preferences of the householder.....

# What remediation is best for my property?

Use three steps to gather your information and determine a best value radon remediation solution:

1. Survey property
2. List what remediation is possible
3. Narrow to the 'best value' option

## 1. Property Survey

Survey the property for relevant information: Age, features (weaknesses?), location, use, layout

- Think about the ground floor type, lived-in space, and if there is a cellar/basement
- What are the radon results recorded?

Radon remediation survey sheet for:			Plan & fitting notes			
<b>Initial Contact</b>						
Contact date	Forename	Surname				
Address						
Post code						
telephone						
Mobile						
Email						
Radon LR	Radon BR	Radon Avg				
Building type			Building age			
Floor type			Wall type			
Directions/Comments						
Agent contact			<b>Quote</b>	Passive/natural		Active
telephone			<b>Measures</b>	1. LLORSS	2. HLROSS	
Email			3. FBOESS	4. UVS	5. PPF Loft/wall	
Address			6. CVS	7. AB's/CVs	8. Repair/service/mod	
Postcode			9. Replacements	10. Mon/det	11. Other	
Survey: Estimate No.			description	units	cost	total
Visit date/time						
<b>Existing features</b>						
1. solid floors	2. Suspended flrs	3. Abs				
4. Cellar/voids/basement	5. CHS/Core vent					
6. chimney/flue	7. vents/extractor systems					
8.existing system	9. other issues					
Best Location of fan/system and elec point						
Access/electrical notes						
			Totals			
Consumer box status			n/a	date sent	written	email
RCD yes	No RCD	a/ma				verbal
Earth TNCS	Earth TNS	Earth TT	<b>Fittment date &amp; Installation details</b>			
RCBs/MCBs	Cartridges	Fuses	Deposit received & date			
Good	Average	Poor	Job No			
elec. notes:			Fitting date			
			Balance received & date			

# 1. Collect property information

UK Radon Ltd - Radon remediation survey sheet

Initial Contact  
 Contact date: Forename: Surname:   
 Address: 87 MUSTER   
 Post code: PL2 9F   
 telephone:   
 Mobile:   
 Email:   
 Radon LK: 253 Radon BR: 117 Radon Avg: 265   
 Contact source:   
 Building type: Semi-det hse Building age: <1950   
 Floor type: suspended Wall type: solid   
 Directions/Comments:   
 Plan & fitting notes:   
 Existing kitchen HLBS   
 Dining room   
 LR   
 BR   
 15ms   
 16ms

Quote	Passive/natural	Active
<b>Measures</b>	1. LLORSS 2. HLROSS	
	3. FBOESS 4. UVS 5. PPF Loft/wall	
	6. CVS 7. ABs/CVs 8. Repair/service/mod	
9. Replacements	10. Mon/det	11. Other
description	units	cost total

Postcode:   
 Survey: Estimate No. K20/0188   
 Visit date/time: 10:30 to 12:30 Thurs 11/2/20   
 Existing features:   
 1. solid floors 2. Suspended fls 3. Abs   
 4. Cellar/voids/basement 5. CHS/Core vent   
 6. chimney/flue 7. vents/extractor systems   
 8. existing system 9. other issues   
 Best Location of fan/system and elec point:   
 Access/electrical notes:   
 Consumer box status: n/a   
 RCD yes No RCD a/ma   
 Earth TNCS Earth TNS Earth TT   
 RCBs/MCBs Cartridges Fuses   
 Good Average Poor   
 elec. notes:   
 Totals   
 date sent written email verbal   
 Fitment date & Installation details   
 Deposit received & date: 16th 9/1/20   
 Job No: K20/   
 Fitting date: Tues   
 Balance received & date:

BUVS 35  
 2nd BUVS 148  
 2x det F.O.C. 123  
 Low level monitor for 1 year  
 DETECTORS SENT 08.04.2022  
 3438481 - LR - 144  
 3438476 - BR - 138  
 AVERAGE - 173

## Collect information

**Floor type:** Suspended floor type

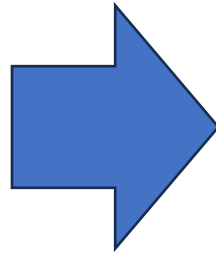
**Radon Levels:** radon levels only just above action level (265 Bqm<sup>-3</sup>)

## Other useful information:

- Under-floor extraction system already fitted
- Large House
- No electrical issues: Electrical socket available
- Access good: No pipes or cables in the way
- Customer has health concerns

## 2. List the types of remediation possible

UK Radon Ltd - Radon remediation survey sheet		Plan & fitting notes	
<b>Initial Contact</b> Contact date: Forename: Surname: Address: 87 Austen Post code: PL2 9F telephone: Mobile: Email: Radon Ltk: 253 Radon BR: 117 Radon Avg: 265 Contact source: Building type: Semi-det hse Building age: <1950 Floor type: suspended Wall type: solid Directions/Comments:			
<b>Agent contact</b> telephone: Email: Address: Postcode:		<b>Quote</b> Passive/natural Active <b>Measures</b> 1. LLORSS 2. HLROSS 3. FBOESS 4. UVS 5. PPF Loft/wall 6. CVS 7. ABS/CVs 8. Repair/service/mod 9. Replacements 10. Mon/det 11. Other description units cost total	
<b>Survey:</b> Estimate No. K20/1008 Visit date/time: 10:30 to 12:30 Thurs 11/2/20		BUVS 15 2nd BUVS 148 2x det F.o.c. 1233	
<b>Existing features</b> 1. solid floors 2. Suspended fls 3. Abs 4. Cellar/voids/basement 5. CHS/Core vent 6. chimney/flue 7. vents/extractor systems 8. existing system 9. other issues Best Location of fan/system and elec point:		Low level monitor for a few weeks detectors sent 08.04.2022 3438481 - LR - 144 3438476 - BR - 138 Average - 173	
Access/electrical notes:		Totals date sent written email verbal	
<b>Consumer box status</b> n/a RCD yes No RCD a/m Earth TNCS Earth TNS Earth TT RCBs/MCBs Cartridges Fuses Good Average Poor elec. notes:		<b>Fitting date &amp; Installation details</b> Deposit received & date: 16/02/20 9/1/20 Job No: K20/ Fitting date: Tues Balance received & date:	



### Possible remediation

**Floor type:** Suspended floor type

**Radon Levels:** radon levels only just above action level (265 Bqm<sup>-3</sup>)

**Other useful information:** Under-floor extraction system already fitted

So, many remediation options available:

- Upgrade existing Air bricks
- Trickle Vents
- Upgrade existing system with bigger fan
- Fit an Under-floor Ventilation System

# 3. Then narrow the options

UK Radon Ltd - Radon remediation survey sheet

**Initial Contact**  
 Contact date: Forename: Surname:   
 Address: 87 Austen   
 Post code: PL 9F   
 telephone:   
 Mobile:   
 Email:   
 Radon Lic: 253 Radon BR: 117 Radon Avg: 265   
 Contact source:   
 Building type: Semi-det hse Building age: <1950   
 Floor type: suspended Wall type: solid   
 Directions/Comments:

**Plan & fitting notes**  
 Existing Hatched HLOUES (X)   
 Dining room CR B 1.5m x 1.5m   
 265

**Quote**  
 Measures: 1. LLORSS 2. HLROSS 3. FBOESS 4. UVS 5. PPF Loft/wall 6. CVS 7. ABS/CVs 8. Repair/service/mod 9. Replacements 10. Mon/det 11. Other   
 description units cost total

**Survey:** Estimate No. K20/0153   
 Visit date/time: 10:30 to 12:30 Thurs 11/12/20   
 Existing features: 1. solid floors 2. Suspended fls 3. Abs 4. Cellar/voids/basement 5. CHS/Core vent 6. chimney/flue 7. vents/extractor systems 8. existing system 9. other issues   
 Best Location of fan/system and elec point   
 Access/electrical notes   
 Consumer box status: n/a   
 RCD yes: No RCD a/m   
 Earth TNCS: Earth TNS Earth TT   
 RCBs/MCBs: Cartridges Fuses   
 elec. notes: Average Poor   
 Fitting date: Tues   
 Balance received & date:

**Handwritten notes:**  
 BUUVS 85  
 2nd BUUVS 148  
 2x det F.o.c. 1233  
 Low level monitor for a few weeks  
 detectors sent 08.04.2022  
 3438481 - LR - 144  
 3438476 - BR - 138  
 Average - 173  
 Totals: date sent written email verbal

**Fitment date & Installation details**  
 Deposit received & date: 16/08 9/1/20  
 Job No: K20/  
 Fitting date: Tues  
 Balance received & date:



## Possible remediation

**Floor type:** Suspended floor type

**Radon Levels:** radon levels only just above action level (265 Bqm<sup>-3</sup>)

**Other useful information:** Under-floor extraction system already fitted

So, many remediation options available:

- Upgrade existing Air bricks
- Trickle Vents
- Upgrade existing system with bigger fan
- Fit an Under-floor Ventilation System



## Outcome

ABs could work, upgrade HLOUES possible,

but customer wanted to make sure of result because of health issues

So, we decided to support the existing system with ventilation = 2 x under-floor ventilation fans were fitted at the front of the house

**Result = 173 Bqm<sup>-3</sup>**

## Summary

- There are many ways to compare radon systems.....

*and there is no one correct way of doing it*

So,

- First, gather as much relevant information about the property as you can...
  - Radon levels
  - Floor type
  - Other constraints of the house structure

Opportunity/Choice:

list how many different radon systems will work on that property.

Best Value:

narrow down the options to the 'Best Value' choice for that owner/property



## Stage 2. Look at all the possible systems you can fit, considering the property information

Fan	Type	Floor/space	Method	Min Bqm-3	Max Bqm-3	Advantage	Disadvantage	Cost from	Cost to
Passive	Barrier	all	<b>Gas proof membrane</b>	100	10000	Very effective with new build	Difficult to fit retrospectively, and very difficult under suspended floor retro fitted	1000	4000
Passive	Barrier	Lived in space	<b>Floor sealing</b>	50	300	Effective if large holes filled	Very labour intensive, with variable results	50	2000
Passive	Natural Airflow	Lived in space	<b>Trickle vents &amp; louvres</b>	50	150	Effectitve in Summer	Must be permannent vents, so cold in winter	150	1000
Passive	Natural Airflow	Lived in space	<b>Core vents</b>	50	400	Works well with fireplaces	May not always work	100	200
Passive	Natural Airflow	suspended	<b>Air bricks</b>	50	750	Can work well with a good cross-flow	Blockages and sub-floor obstructions can reduce performance	35	800
Passive	Passive Sumps	all	<b>Passive sump</b>	50	350	A fan can be fitted to the sump if it deosn't work well	Variable results, low to medium impact	800	2000
Active	Reduce pressure	suspended	<b>Under-floor extraction</b>	50	350	Can work, especially in conjunction with a positive pressure in the lived-in area	Sometimes a poor, or even negative result	650	850
Active	Reduce pressure	all	<b>Active Sump system</b>	200	10000	The best radon system to fit under a solid floor.	Need a capping to fit under a suspended floor	700	2500
Active	Increase pressure	suspended	<b>Under-floor ventilation</b>	50	10000	The best radon system to fit under a suspended floor.	Blockages and sub-floor obstructions can reduce performance	650	850
Active	Increase pressure	cellar	<b>Cellar ventilation</b>	100	10000	Very useful in unoccupied cellars	Cannot be used in lived-in cellars	650	2000
Active	Increase pressure	Lived in space	<b>Positive pressure Fan</b>	50	400	Very useful at low to medium levels of radon. Wall mounted units good in flats or offices	Not effective in large houses, high radon levels. Can cause drafts	650	850
Active	Whole building ventilation	Lived in space	<b>Mechanical ventilation and heat recovery (MVHR)</b>	50	300	Can bring radon levels down if adjusted to a slight positive pressure	Poor adjustment can lead to radon problems. Generally can only be fitted on a new house	2000	4000
Active	Whole building ventilation	Lived in space	<b>Heat &amp; Ventilation Air Conditioning (HVAC)</b>	50	1500	Can bring radon levels down if adjusted to a slight positive pressure	Poor adjustment can lead to radon problems. Can only be fitted on a new building	20000	50000





Building	1 Bed Flat	2 bed house	3 bed house	Office	Office	Office (1 <sup>st</sup> Floor)	Large office block	Large office block
Floor type	Solid	solid	suspended	solid	suspended	n/a	solid	solid
Radon level	230	340	450	635	780	310	690	340
On-site notes	Central heating	Fireplace in living room where highest radon result comes from	Only two air bricks observed		Central heating. Single storey building, with cellar	No ground floor, so lived-in space remediation required	Two rooms above action level at corner of building	Many rooms above action level. HVAC installed
Passive	Trickle vents Core vents Passive sump	Trickle vents Core vent Passive sump Air bricks	Trickle vents Core vent Passive sump Air bricks	Trickle vents Core vent Passive sump	Trickle vents Core vent Passive sump Air bricks	Trickle vents Core vent	Trickle vents Core vents Passive sump	Trickle vents Core vents
Active	Sump system Positive pressure fan MVHR	Sump system Positive pressure fan MVHR	Under-floor ventilation Positive pressure fan MVHR	Sump system Positive pressure fan MVHR	Under-floor ventilation Positive pressure fan MVHR	Positive Pressure fan MVHR	Sump system	Adjust HVAC
Best Value	Trickle vents, may work, but cold in the winter? Positive pressure fan (wall mounted) A sump system would be very effective	A core vent may cure the problem, but a sump system would be very effective. Probably a positive pressure fan	Air bricks cheaper, and could work well. Under-floor ventilation more effective	Passive sump? Fit a fan if it doesn't work = sump system would be very effective	Probably an under-floor ventilation system, but air bricks could be tried first.	Trickle vents, may work, but cold in the winter? Otherwise, a positive pressure fan (Wall mounted?)	A passive sump, but if it doesn't work fit a fan to make a sump system, or two	Adjust HVAC and educate ventilation engineer on radon

Method	Floor Types	Effectiveness	Cost	Cost to Run (at 14p per kWh)	Maintenance and Life expectancy	Advantages/disadvantages Comments
Fan assisted sump - Low level outlet	Solid, or	High and low level outlet sumps are the most effective method, and work for the highest levels of radon.	From £645	50W fan costs about £60pa	Fans have 2 year guarantee but usually last much longer. A replacement fan costs about £120	Sometimes difficult to find suitable spot – noise, space
Fan assisted sump - High level outlet	Suspended with concrete sub-floor		+£50 for stone walls From £765 (bungalow) +£50 per storey			
Passive sump (no fan)	Solid, or Suspended with concrete sub-floor	Effective to 400bq Limited effectiveness up to 800bq	From £495	None	N/A	Can add a fan later if not effective (Cost from £395)
Positive Pressure fan	All types	Effective to 600bq Limited effectiveness up to 1000bq	From £545	Fan 5W (average speed) costs about £6 pa. 500W heater about £1.70 per day.	5 year guarantee but usually lasts longer. Replace filter after 5 years	Very quiet Helps with damp and condensation Can cause draughts House needs to be airtight for maximum effect.
Underfloor ventilation - Axial fan in wall	Suspended	All the fan-assisted underfloor ventilation systems can be very effective up to the highest levels of radon.	From £545	18w fan costs about £22 pa	Fans have a 2 year guarantee but usually last much longer.	Method used depends on the nature of the property and the level of radon. Fans under the floor can be noisy (a silencer may be fitted if necessary).
Underfloor ventilation - Fan under floor (small or large fan)	Suspended		From £545	18W fan = £20 pa 50W fan = £55 pa		
Underfloor ventilation - External fan (large)	Suspended		From £545	50W fan costs about £55 pa		
Underfloor ventilation - small fan over an airbrick (“birdbox”)	Suspended		From £545	18W fan costs about £20 pa		
Natural underfloor Ventilation (airbricks)	Suspended	Effective to 300bq Limited effectiveness up to 800bq	From £40 per airbrick	N/A	Need to check if blocked or obstructed.	Should be on opposite walls, 1.5 – 2 metres apart.
Sealing Floor gaps	Concrete floors	Effective to 400bq Less up to 500bq	DIY recommended	N/A		All gaps need to be sealed to be effective.
Sealing Floor – DPM	New concrete		From £495	N/A		
Natural ventilation trickle vents, capped chimneys, sealed loft hatches, open downstairs windows	All types	Effective to 300bg Limited effectiveness up to 500bq	Varies			General principle is to avoid a chimney effect by providing vents & opening windows downstairs, but keeping upstairs airtight.