Impact of energy retrofitting on radon concentrations in local authority homes

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International studies

- Very few studies of the impact of thermal retrofitting on radon in homes

- Studies show that energy retrofitting can increase radon concentrations by between 26% and 56%

- Particularly where multiple measures installed

No Irish data on impact of retrofitting

- Impact of energy retrofitting identified as a "knowledge gap" in development of National Radon Control Strategy – research needed

- Joint study with Building Standards, Department of Environment, Heritage and Local Government and Local Authorities

- Local authority homes previously tested for radon and then energy retrofitted were retested for radon

Study of 142 social homes

- 10 Local Authorities (Clones, Laois, Listowell, Mayo, Offaly, N. Tipperary, S. Tipperary, Thurles, Waterford, West Cork)

- Retrofitting measures included a mix of:
  - Attic insulation
  - Cavity wall insulation
  - Installation of background ventilation (where not already installed)
  - Draft proofing or replacement of doors and windows

- 142 homes where both pre and post retrofit results available

Results - overview

- Mean pre-retrofit radon concentration: **56 Bq/m^3**

- Mean post-retrofit radon concentration: **50 Bq/m^3**

- On average, retrofitting measures are having no impact on radon concentration

Results for each home

$$\frac{Radon\ level\ after\ retrofit}{Radon\ level\ before\ retrofit}$$

- Where ratio >1 retrofitting has increased radon

- Where ratio <1 retrofitting has decreased radon

Results for each home

$$\frac{Radon\ level\ after\ retrofit}{Radon\ level\ before\ retrofit}$$ for all measures ranged from 0.1 to 7.3

For each set of measures results indicated a significant decrease in some homes and a significant increase in others

Measure	No	Ratio range (after/ before)	Mean ratio (after/ before)
Attic & cavity wall insulation	73	0.1 – 3.2	0.8
Attic insulation & ventilation	4	0.5 – 1.0	0.8
Attic & cavity wall insulation & ventilation	33	0.3 – 1.6	0.8
Attic & cavity wall insulation & draught-proofing	27	0.5 – 2.9	1.5
Attic & cavity wall insulation, heating upgrade, installation of new doors and windows	5	0.7 – 2.8	1.4

Limitations of these data

- For some measures the number of homes was small

- Many homes were in low risk areas, consequently, initial radon results were low – this means that it is harder to show an increase or decrease than for homes where initial concentrations were higher

- Main insulation is cavity and attic (other methods e.g. external wall insulation or internal insulation not part of study)
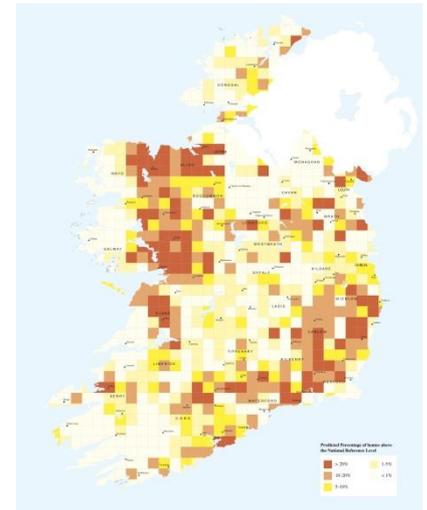
What do these results mean?

- Radon concentrations may increase or decrease due to energy retrofitting measures

- Where measures include cavity wall and loft insulation, on average, there is no impact on radon

- Where measures replacing or sealing windows and doors are combined with other measures there appears to be a greater effect on radon levels (based on a small number)

- Consistent with other studies:
  - Swiss study showed an increase of up to 1.26 (26%)
  - UK model predicts increase of 1.56 (56%) following installation of measures where no ventilation installed

Impact on advice to homeowners?

- Results are consistent with EPA and SEAI advice to retest for radon following installation of significant energy retrofit measures

- Results highlight the importance of SEAI advice to maintain recommended ventilation standards during retrofitting

- Message: <u>test and re-test following energy retrofitting</u>

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