

2<sup>nd</sup> EnVie Conference , Brussels 16-17 September 2008

# INDOOR RADON :

## The Irish Experience

James P Mc Laughlin  
School of Physics  
University College Dublin



## ESTIMATED LUNG CANCER DEATHS IN EU 25 IN 2006

EU 25 POPULATION : 463 Millions

\*TOTAL CANCER DEATHS : 1,165,500

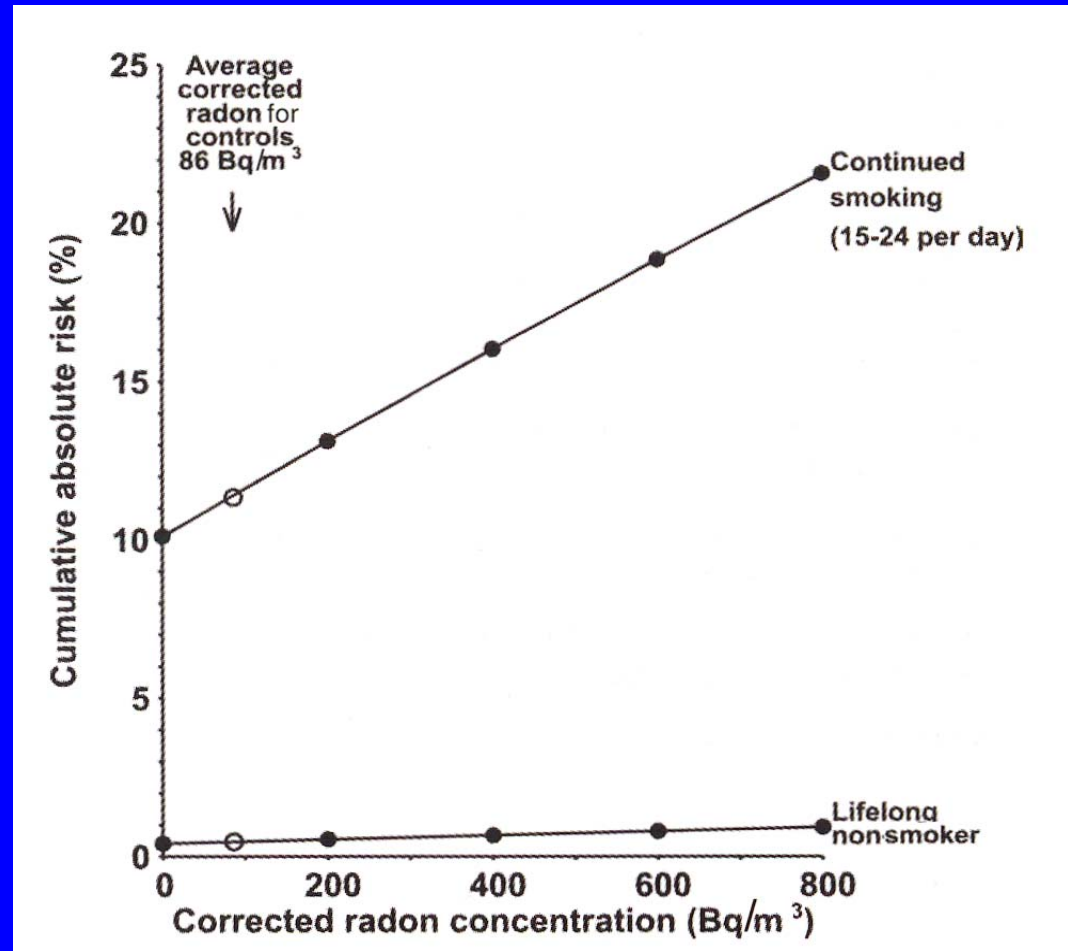
\*LUNG CANCER DEATHS : 236,000

\*\*LUNG CANCER DEATHS RELATED TO RADON : 21,000

\*Ferlay et al. *Annals of Oncology*. 2007; **18** : 581-592.

\*\*Darby.S, Hill.D, Auvinen.A et al. *British Medical Journal*. 2005; **330** : 223-7.

## Cumulative absolute risk of death from lung cancer to age 75 years



\*Darby et al Scand.J. of Work, Envir. & Health. Vol 32. Suppl 1. 2006

# REPUBLIC OF IRELAND STATISTICS 2006

Population : 4.25 million

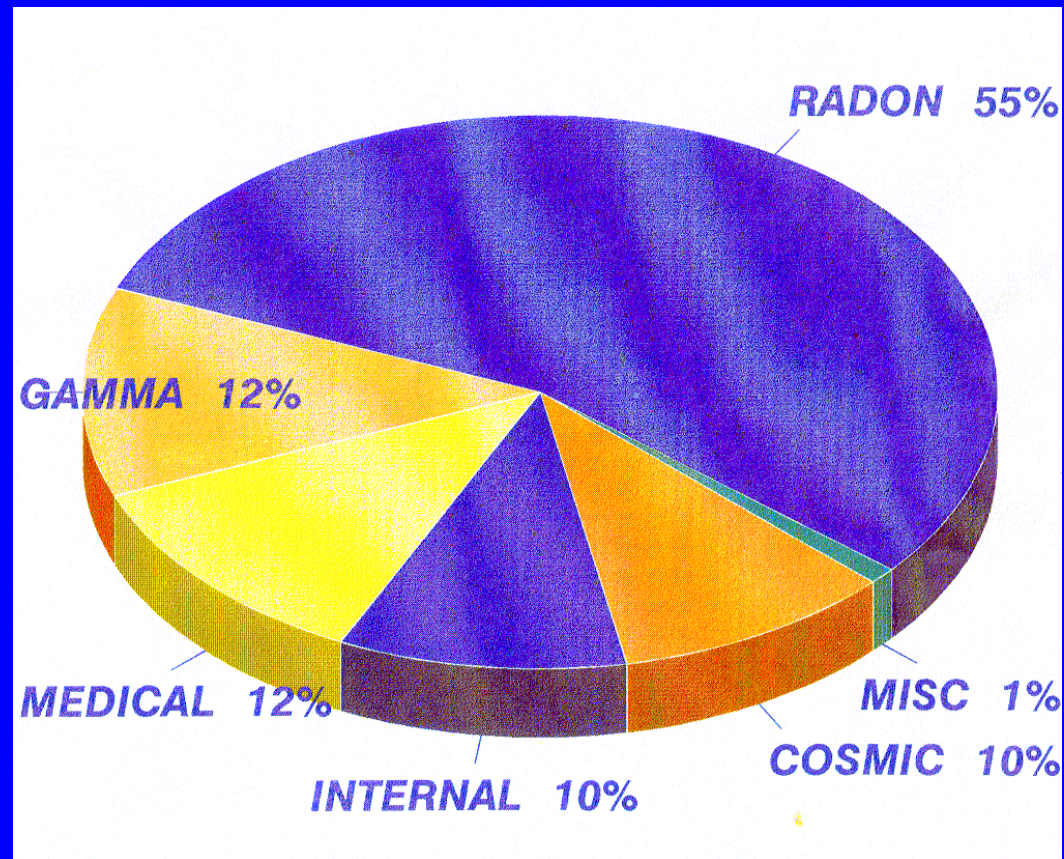
Land area : 70000 km<sup>2</sup>

Private dwellings : 1.75 million

Average no.per household : 2.8

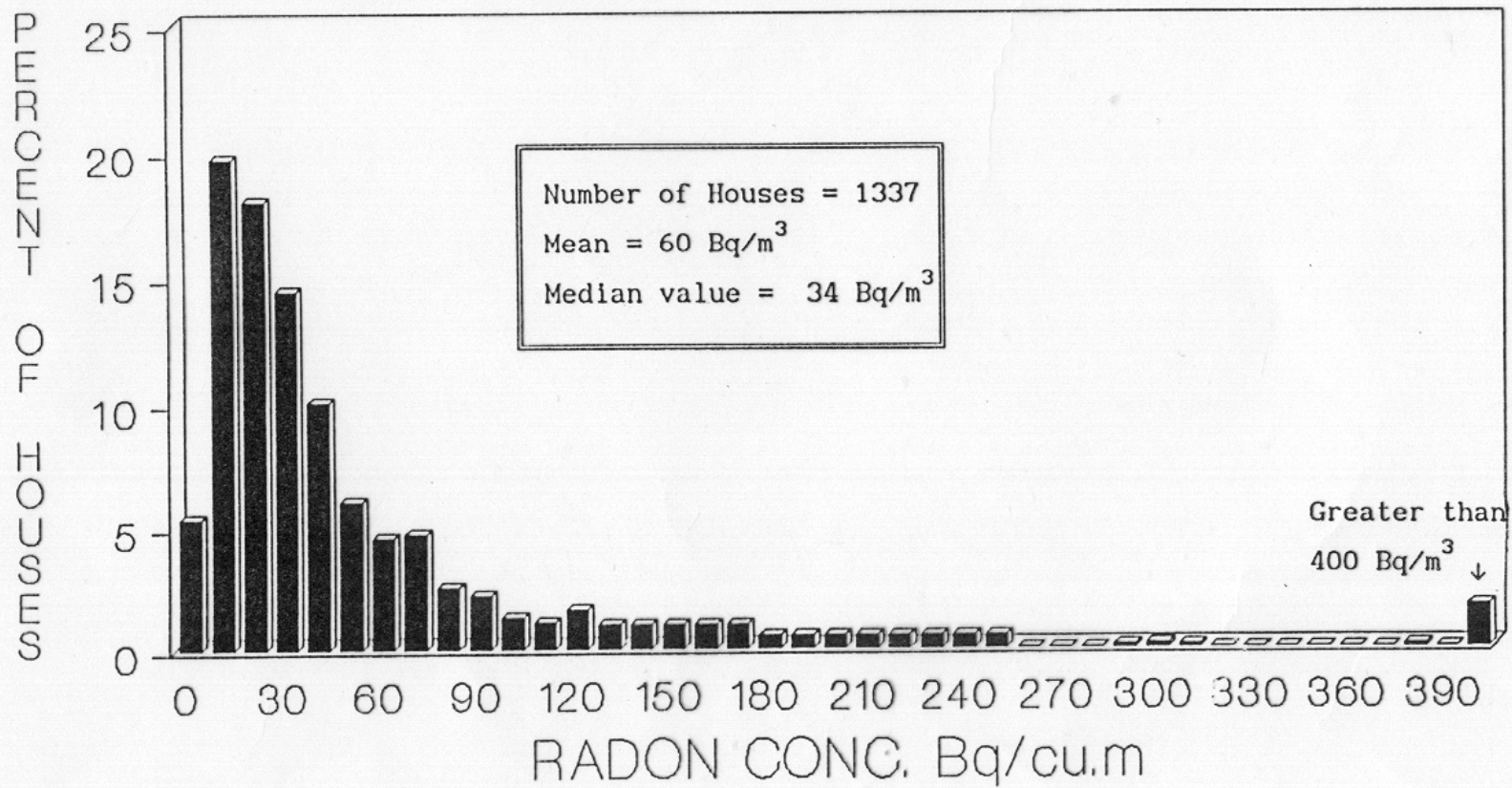


Estimated contributions to population radiation doses in Ireland. Annual average dose ~ 3.5mSv.





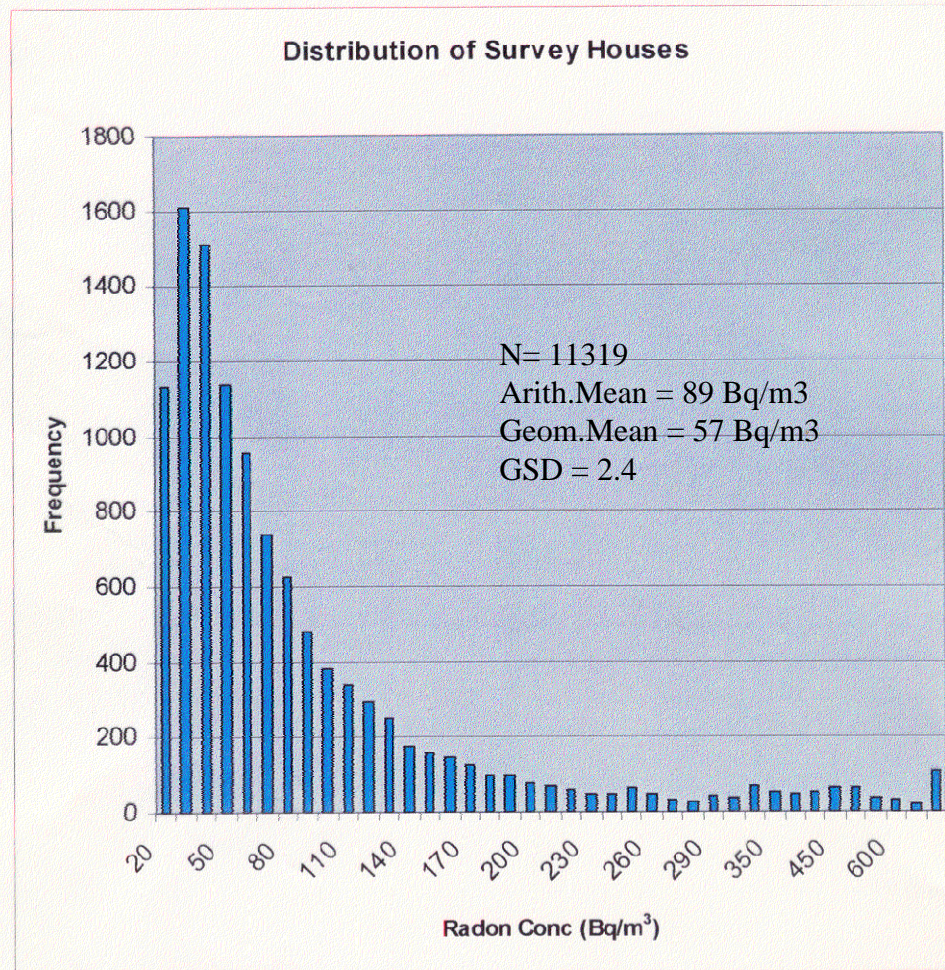
# NATIONAL INDOOR RADON SURVEY (UCD 1985-89)



# PASSIVE ALPHA TRACK RADON DETECTORS USED IN IRISH NATIONAL SURVEY

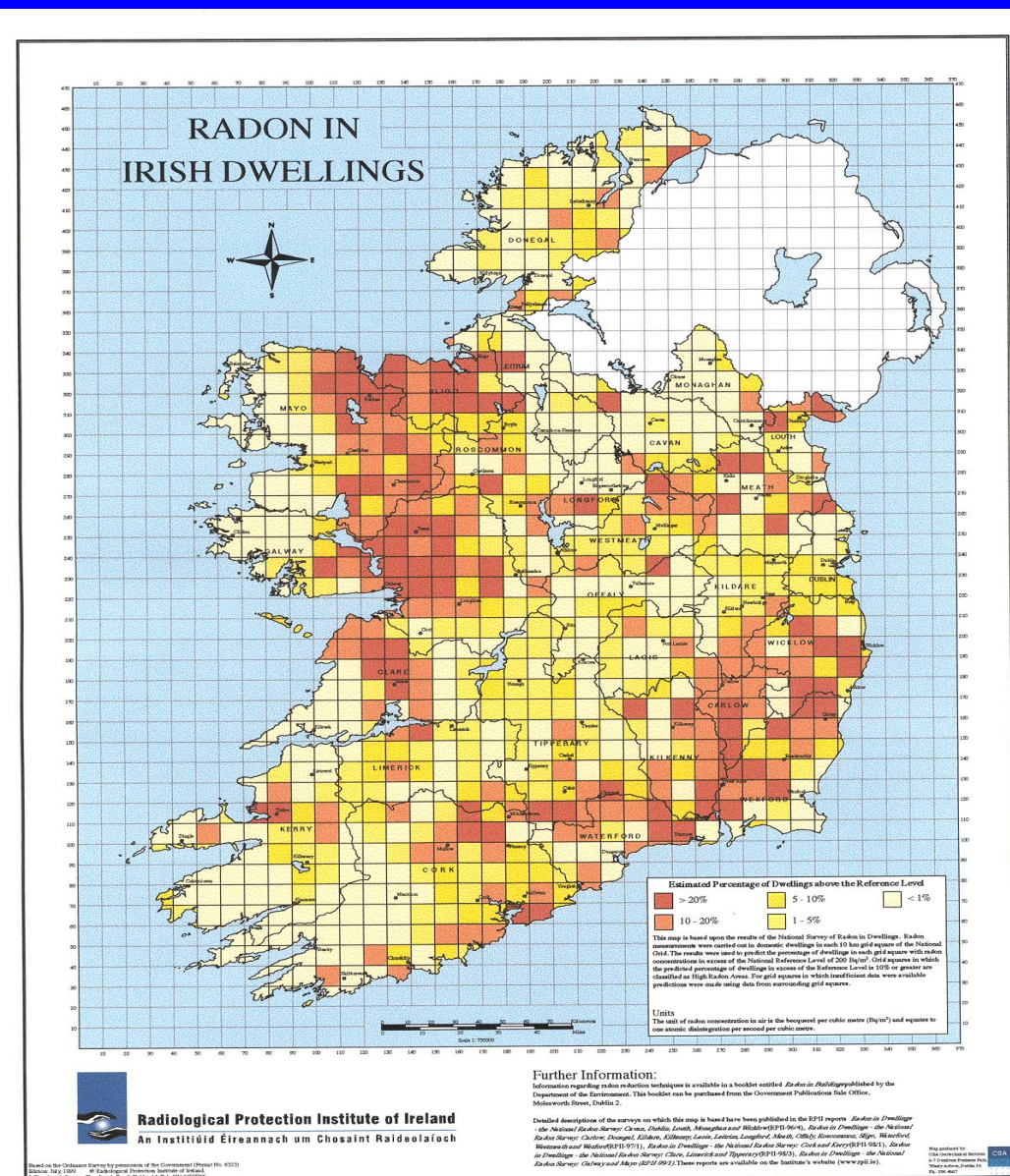


## RPII NATIONAL SURVEY 1992 - 1999





# Extent of the radon problem in Ireland



## National Radon Survey

Predictive Map of radon in Irish dwellings; 7% of homes predicted >200 Bq/m<sup>3</sup>

## High Radon Areas:

10 km grid squares in which 10% or greater of houses are predicted to exceed the national Reference Level

# Radon Reference Levels

200 Bq/m<sup>3</sup> - homes  
- schools  
- long-stay institutions  
(e.g. prisons, nursing homes)

400 Bq/m<sup>3</sup> - workplaces

# Radon in Homes\*

- Sample = 11,319 homes (1 in 116)
- Average = 89 Bq/m<sup>3</sup>
- Range = 10 – 1924 Bq/m<sup>3</sup>
- 91,000 homes (7%) exceed 200 Bq/m<sup>3</sup>

\* SOURCE : Radiological Protection Institute of Ireland

# Current Work on Irish Homes\*

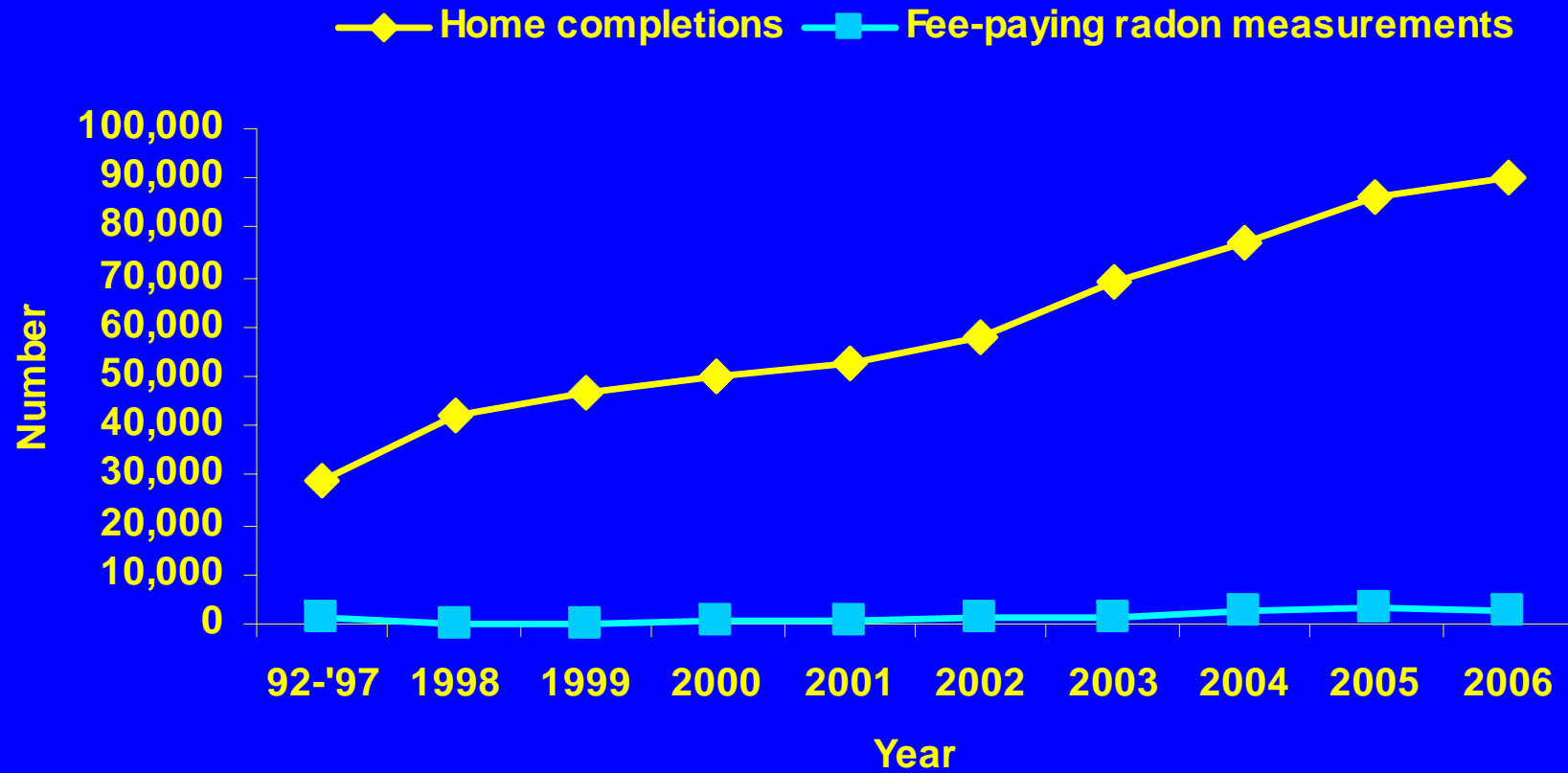
- Commercial measurement service
  - database of over 32,000 results
  - concentrations up to 49,000 Bq/m<sup>3</sup>
  - only ~4% of high homes identified
- Ongoing research, data evaluation and media/information campaign

\* SOURCE : Radiological Protection Institute of Ireland

## 1997 Building Codes

- All new homes to be fitted with a stand-by radon sump
- All new homes in HRAs to also have a radon barrier fitted
- Stand-by sump to be activated if radon concentrations exceed 200 Bq/m<sup>3</sup>
- Codes further strengthened in 2004

# New Homes -v- Radon Measurements



# Why is the Current Approach Ineffective?

- Existing Homes

- only ~4,000 (5%) homes above 200 Bq/m<sup>3</sup> identified
- homes above 200 Bq/m<sup>3</sup> increasing every year

2000 – 1.3 million homes

2006 – 1.75 million homes

- low rate of remediation

COMMUNICATION BETWEEN  
SCIENTISTS AND THE PUBLIC





# COMMUNICATION WITH THE PUBLIC AND OTHER INTERESTED PARTIES

1. Radon helpline at RPII
2. Distribution of information leaflets and brochures
3. An annual Radon Forum held at different locations
4. Radon Roadshows in identified high radon locations and at major public events

# Main Objective of Road Shows

- *To heighten the public's and employers awareness of the dangers associated with exposure to radon*
  - Increase in radon measurements carried out both in houses and workplaces
  - Increase in numbers carrying out radon remediation where high radon levels have been found

# General Format of each road show

- Visit to school which had elevated radon levels
  - General presentation on radon to students
  - Video on radon in homes and what can be done to fix homes with high radon levels
- Presentation to local Chamber of Commerce
  - To make employers aware of the dangers of exposure to radon in the workplace
  - To highlight employers obligations under current safety in workplace legislation regarding radon in workplaces.
  - To provide information to employers on carrying out radon surveys in workplaces
  - To outline to employers how to deal with workplaces with elevated radon concentrations

# General Format of each road show

- Information stand on radon in local shopping centre
  - Facilitated householders and employers looking to talk to RPII about radon
  - Reinforced the radon issue at a local level
    - People are more likely to respond to initiatives at a local level
    - People felt reassured that something was being done to address the radon issue in their locality.

# Layout of information Stand

- Banners (3) showing
  - radon map of Ireland
  - General information on radon
  - Basic remediation advice
- 2 Radon “Experts” from RPII
- Brochures on radon in homes and workplaces
- Information Sheet
  - Useful websites for further radon information
  - Information on other radon measurement services

Every day  
low prices  
on bakery

Low  
prices

Tesco  
every day  
low price

51c  
Every day  
low price

**Radiological Protection Institute of Ireland**  
An Institiúid Éireannach um Chosaint Radheolaíoch

To protect people from the harmful effects of ionising radiation, both natural and man-made, through effective regulation, monitoring of the environment and the provision of accurate and timely advice to the public and to Government

**Radon Detection**

**Building Requirements**

**National Survey**

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# RADON



- Radon is **everywhere**
- Radon is a radioactive causes **lung cancer**
- Radon **kills 150-200** year in Ireland
- 91,000 homes l
- ....yours could be

Have your home check

[www.rpii.ie](http://www.rpii.ie)  
Freephone 1800 300 6

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# RADON

RADON IN  
IRISH DWELLINGS



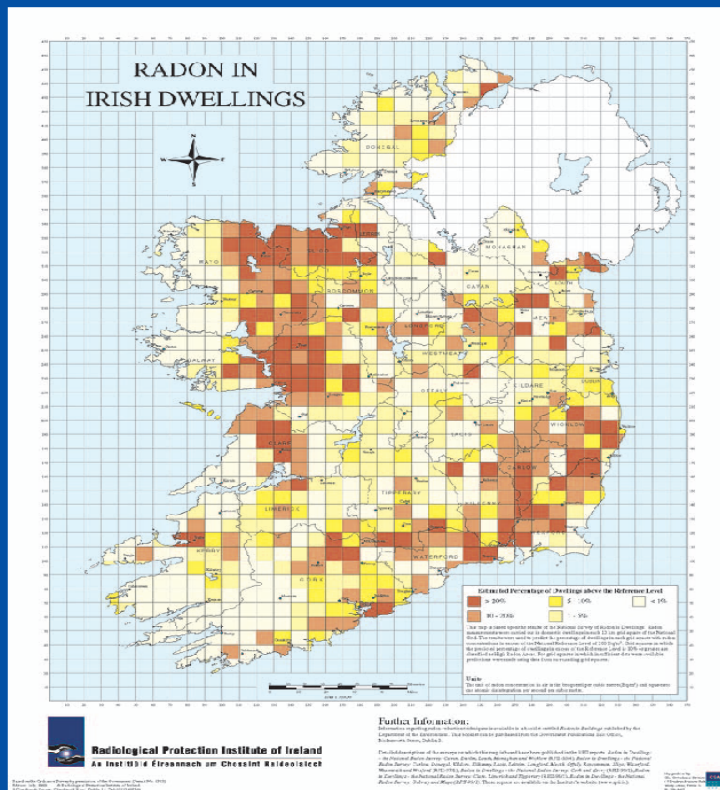
Have





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# RADON



**Have your home checked today**

[www.rpii.ie](http://www.rpii.ie)  
Freefone 1800 300 600



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# RADON



- Radon is **everywhere**
- Radon is a radioactive gas that causes **lung cancer**
- Radon **kills 150-200** people each year in Ireland
- 91,000 homes have high radon...
- ....yours could be one

**Have your home checked today**

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Freefone 1800 300 600



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## WAYS OF REDUCING HIGH RADON LEVELS

- Improving ventilation - works only for moderately high levels

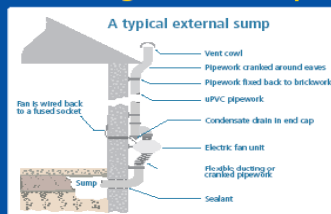


Wall Vent

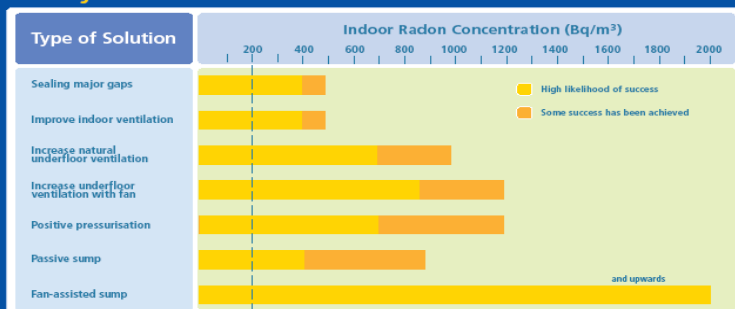


Trickle Vent

- Installing a radon sump - can work at all radon levels



- Likely effectiveness of various radon remediation solutions



Reproduced with permission of the UK Building Research Establishment

**Have your home checked today**

[www.rpii.ie](http://www.rpii.ie)

Freefone 1800 300 600



# Impact of Radon Road shows

- No of radio/TV interviews
- No of callers to RPII free phone number
- No of hits on RPII website
- No of brochures given out at information stand
  
- No of detectors issued to homes
- No of detectors issued to workplaces

# Radon in Irish Schools\*

- Programme commenced 1998
- All classrooms measured (~41,000 rooms)
- Average concentration of 93 Bq/m<sup>3</sup>
- Remediation completed or in hand

\* SOURCE : Radiological Protection Institute of Ireland

# Effectiveness of Remediation\*

## Concentration

## Reduction Factor

200-400 Bq/m<sup>3</sup>

2.1 (0.7 – 9.1)

200-400 Bq/m<sup>3</sup>

7 (1.2 - 33)

400-1000 Bq/m<sup>3</sup>

12 (1.4 - 81)

>1000 Bq/m<sup>3</sup>

23 (1.6 - 172)

\* SOURCE : Radiological Protection Institute of Ireland

# National legislation on radon in workplaces

Two Sets of Regulations are applicable:

- 2005 Safety, Health and Welfare at Work Act (HSA).
- Radiological Protection Act, 1991, S.I. No. 125 of 2000. (RPII)

## Irish legislation on radon in Workplaces

Radiological Protection Act, 1991, S.I. No. 125 of 2000. (RPII) Specifies a Reference Level of 400 Bq/m<sup>3</sup>, averaged over a minimum period of any 3 months.

Authorises the RPII to issue directions and take prosecutions.

When directed, employers have 6 months to comply - that is carry out a radon measurement and forward results to RPII

No general duty under this legislation

\* SOURCE : Radiological Protection Institute of Ireland

- RPII workplace data\*
  - 15,000 measurements in 2300 workplaces, 4% > 400 Bq/m<sup>3</sup> (majority in HRAs)
  - 41,000 school measurements, 2.3% > 400 Bq/m<sup>3</sup> (nationwide)
  - Combining both datasets some 3% of workplaces measurements are > 400 Bq/m<sup>3</sup>
- Circa 50000 Irish workers may be exposed above 400 Bq/m<sup>3</sup>

\* SOURCE : Radiological Protection Institute of Ireland

# What employers need to know

The evaluation should consider:

- If radon levels are between  $400 \text{ Bq/m}^3$  and  $800 \text{ Bq/m}^3$  and radon exposure is  $< 800 \text{ kBq/m}^3\cdot\text{h}$  then no remedial work is needed. If  $> 800 \text{ kBq/m}^3\cdot\text{h}$  remedial work to be completed within 6 months.
- If radon levels  $>800 \text{ Bq/m}^3$  remedial work needed as soon as practicable but before exposure of  $800 \text{ kBq/m}^3\cdot\text{h}$  is reached.
- Otherwise system of radiological protection needed
- Full guidance on how to carry out an evaluation is on RPII's website [www.rpii.ie/radon](http://www.rpii.ie/radon)

\* SOURCE : Radiological Protection Institute of Ireland

# Regulatory efforts

- May/June 2004, 60 employers in two Irish towns were directed to carry out radon measurements.
- Once directed each employer has 6 months to carry out measurements and send result to RPII

\* SOURCE : Radiological Protection Institute of Ireland



## Prosecutions taken

- Eight employers who had ignored the direction were prosecuted during 2006
- Three were convicted, fined and costs awarded
- Three were found guilty but not convicted  
They were ordered to pay €500 to court poor box
- Two cases were dismissed

# Other Initiatives

- Efforts by the State Claims Agency 2004-2005 to encourage state employers to measure radon
- Many public employers have carried out radon measurements. This is also true of larger employers, e.g. the Electricity Supply Board

\* SOURCE : Radiological Protection Institute of Ireland

## ACKNOWLEDGEMENT

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James P Mc Laughlin  
School of Physics  
University College Dublin



Thank you for your attention

Go raibh maith agaibh !

