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Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement

Radon remediation in dwellings : what results for simple techniques

Atmos'fair

Enora Parent - Cerema

20 juin 2018

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Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement

What is Cerema ?

Centre for Studies and Expertise on Risks, Mobility, Land Planning and the Environment

A State agency of **scientific** and **technical expertise**, in support of the definition, implementation and evaluation of public policies, on both national and local levels

Under the supervision of the French ministries in charge of sustainable development, town planning and transportation

Study and expertise areas

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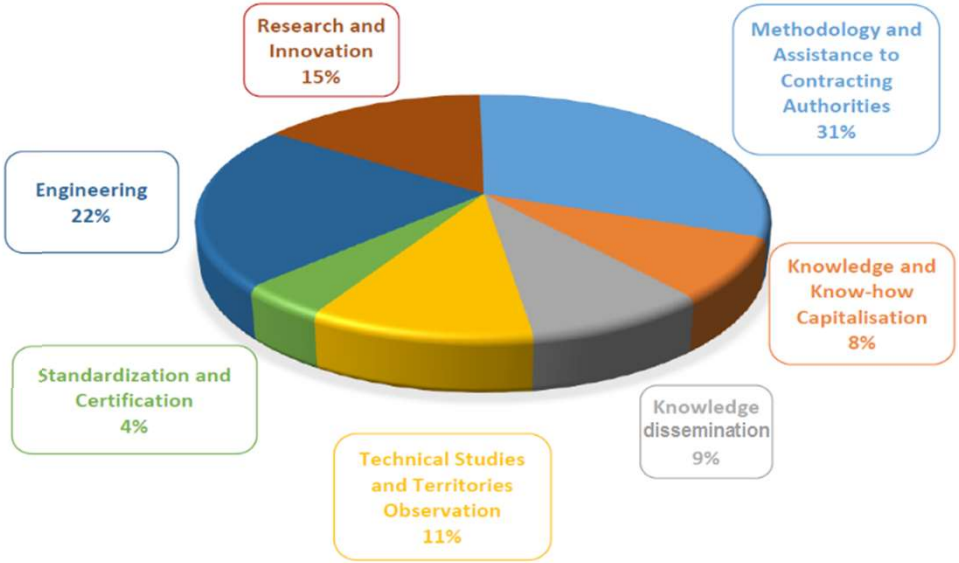
Infrastructures and mobility

Safe and sustainable infrastructures for more efficient and greener mobility



Risks

Vulnerability, prevention, resilience, crisis management

Transport infrastructures

Road infrastructures, waterways and railways

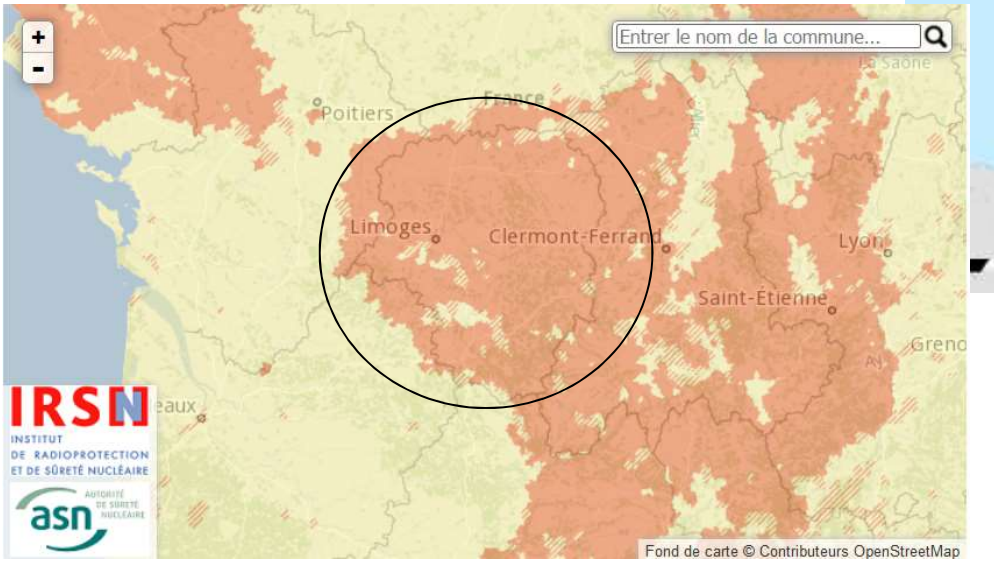
Urban and land planning

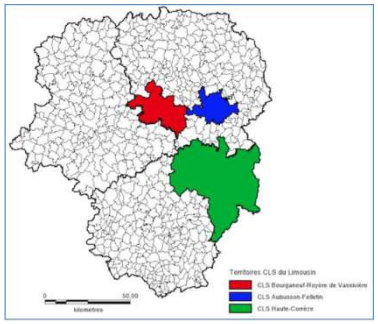
An integrated approach to sustainable development

Energy and climate

Renewable energies, energy efficiency

Radon in Limousin



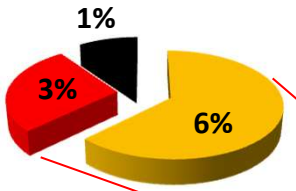


- Results from last measurement campaign on 3 territories of local health contracts, in dwellings

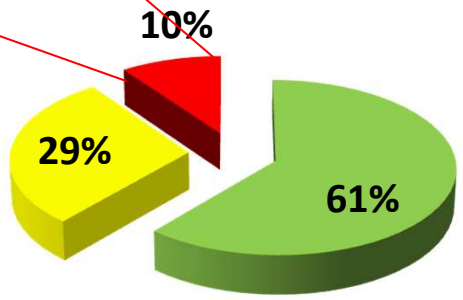
Local Health Agency, 2015

1 105 résults

69		*1000 < x < 2 000 Bq/m³*
30		*2000 < x < 5 000 Bq/m³*
11		*x > 5 000 Bq/m³*



677		*x < 300 Bq/m³*
318		*300 < x <1 000 Bq/m³*
110		*x > 1 000 Bq/m³*



Mitigation in this campaign

Low request for information…

- Over 300 Bq/m3 :
  - Mail invitation to remediation
  - Proposal of post corrective actions check
  - In 40 dwellings with the higher levels : free diagnosis

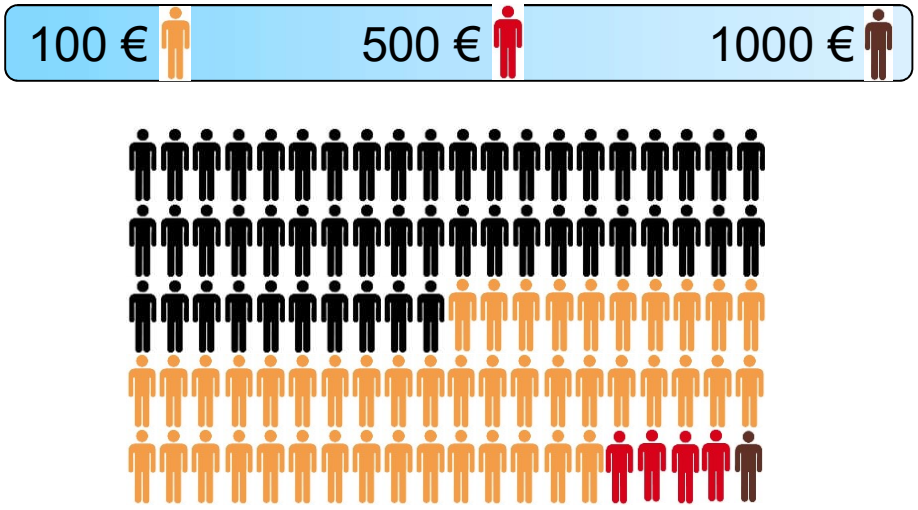
- No financial helps for remediation
- Low income population

→ Need for simple techniques

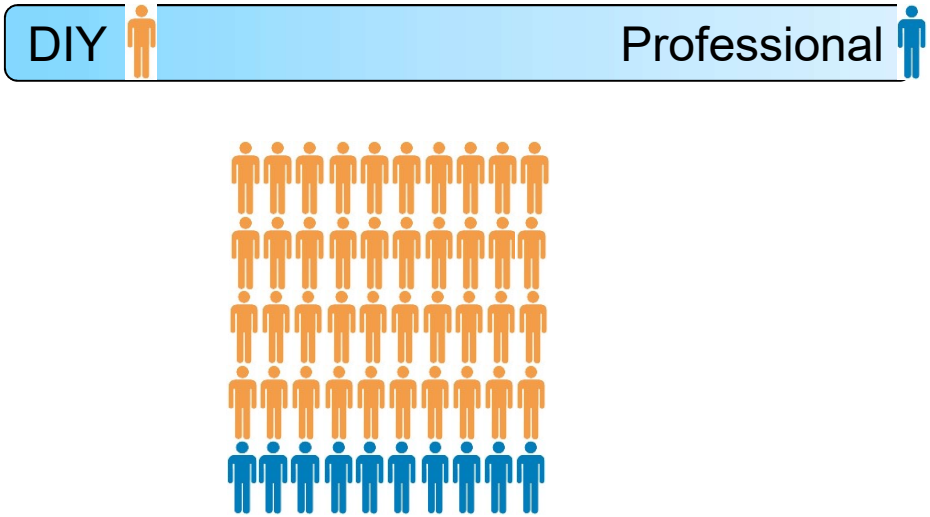
What is « simple » ?

The aim : to involve as many people as possible

- « Cheap » :



- « Easy » :



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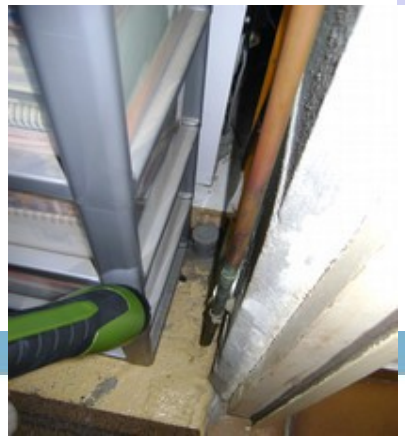
Feedbacks for 6 houses

Case 1

Recommendations :
Small sealings, ventilation, wood stove air-induct, sub slab depressurisation

Actions :
Air-inducts, passive sub slab depressurization

Living room : 3 783 Bq/m3 → Next winter :
Bedroom : 793 Bq/m3
Living room : 849 Bq/m3



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Feedbacks for 6 houses

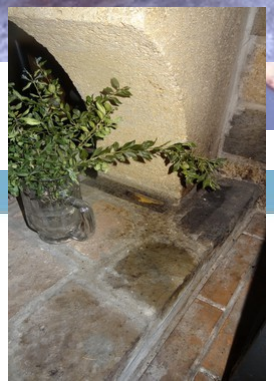
Case 2

Recommendations :
Small sealings, access to the basement sealing, basement and house ventilation

Actions :
Partial sealings

Actions :
Sealings, basement ventilation

Living room : 1 880 Bq/m3 → Winter 2016 : Bedroom : 755 Bq/m3 Living room : 1 783 Bq/m3 → Winter 2017 : Bedroom : 471 Bq/m3 Living room : 306 Bq/m3



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Feedbacks for 6 houses

Case 3

Recommendations :
Floor sealing, access to the cellar sealing, ventilation and if necessary cellar depressurisation

Actions :
Sealings, ventilation

Kitchen : 1 804 Bq/m3 → Next winter :
Bedroom : 219 Bq/m3
Kitchen : 469 Bq/m3

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Feedbacks for 6 houses

Case 4

Recommendations :
Small sealings, access to the cellar sealing, cellar airing

Actions :
All recommendations followed

Living room : 2 787 Bq/m3 →

Next winter :
Bedroom : 431 Bq/m3
Living room : 468 Bq/m3

↓

Actions :
Active cellar ventilation ?

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Feedbacks for 6 houses

Case 5

Recommendations :
Small sealings, access to the cellar sealing, cellar airing

Actions :
Cellars airing and bedroom floor restoration

Bedroom : 1 172 Bq/m3 → Next winter :
Bedroom : 564 Bq/m3
Living room : 491 Bq/m3

Feedbacks for 6 houses

House from another campaign in Tarn

Case 6

Recommendations :
Wood stove air-induct, cellar ceiling sealing, cellar depressurisation

Actions :
Cellar depressurisation and air induct for the wood stove

Living room : 821 Bq/m3 → Next winter : Living room : 388 Bq/m3

Health Impact

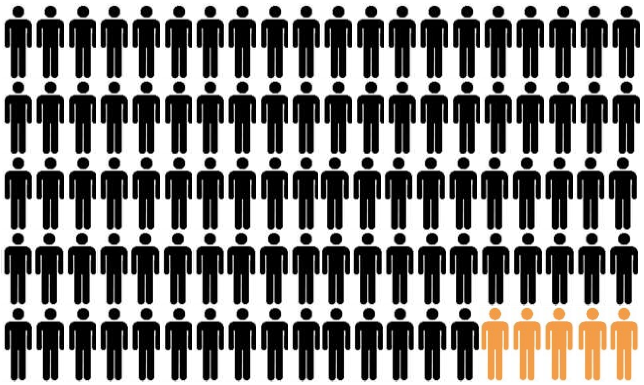
For this small group :

- All levels > 300 Bq/m3 (WHO recommendation)
- Between 100 € and 1 000 € of work

- BUT :
  - On average : levels/4, - 1 500 Bq/m3
  - According to *Darby et al. 2006 :* **lung cancer relative risk (RR) / 3**

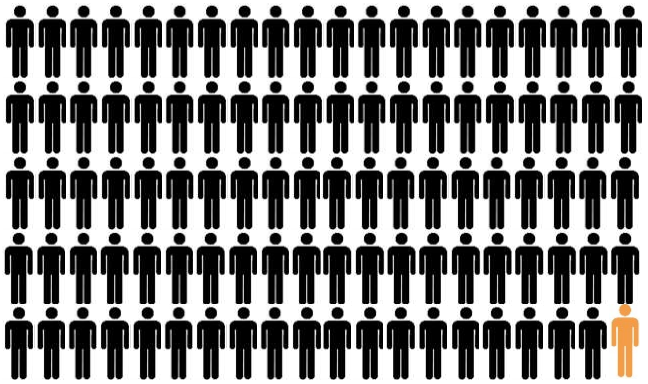
For the population (> 2 000 Bq/m3) :

Levels/ 4, RR/3 for 5 % pop. :



RR pop. :
-3,33 %

To reach 300 Bq/m3 (-200 Bq/m3, RR/4 for 1% pop.)



RR pop :
-0,75 %

« Conclusion »

Based on ground campaigns in high levels territories :

- For local health association or authorities, question of actions cost-efficiency
  - Time spend on phone calls, visits
  - A lack of professionnals

- More efficient to promote simple actions for the maximum people than to target 300 Bq/m3, only reachable for a few
  - Easiest advices
  - Fewer visits

- Simple actions : correctly and on the whole house

- A lack of epidemiological datas on high levels (>1000 Bq/m3)

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Thank you

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