Use of NORM in building materials: Challenges identified by the NORM4BUILDING project

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Societal aspects and marketing challenges of naturally occurring radioactive materials in building products

Pre-ricomet 2020 1-3rd of September – online webinar

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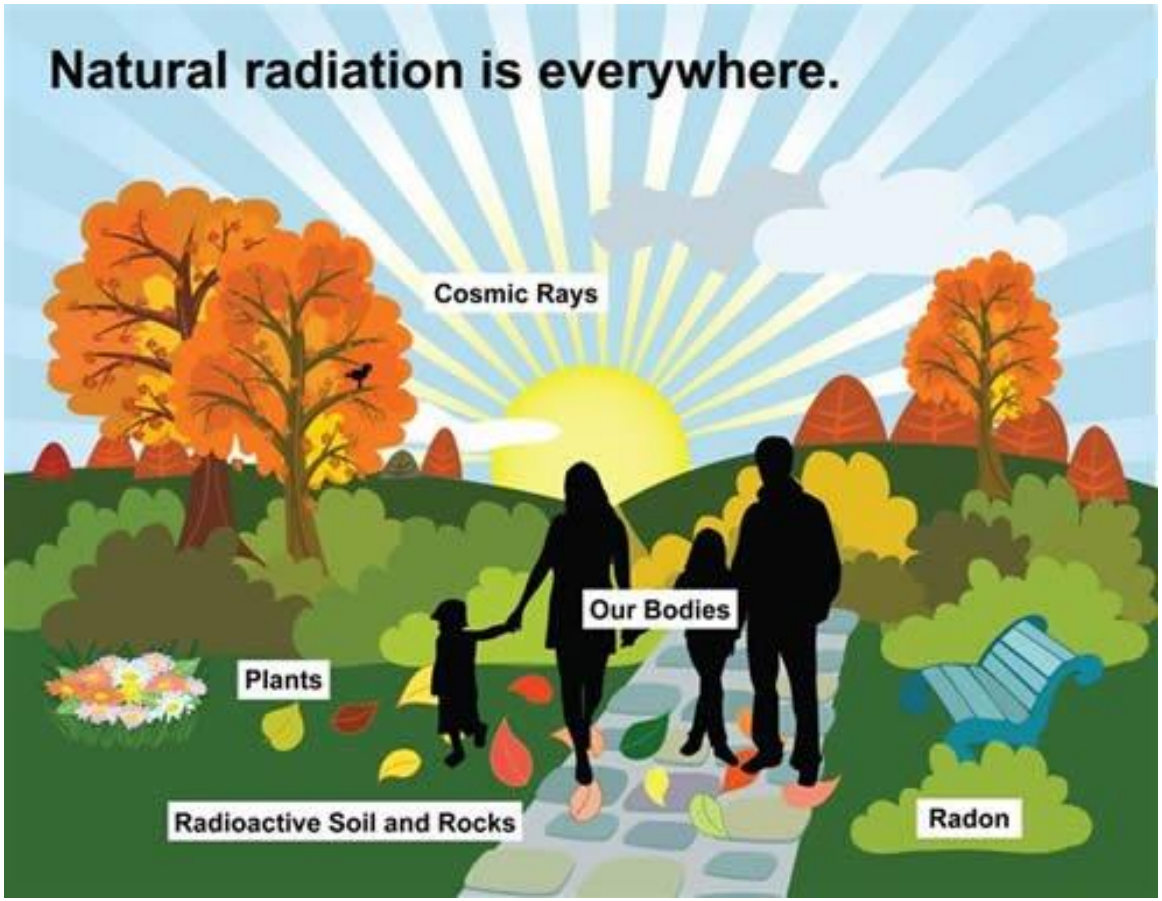
SHARE
Social sciences and Humanities in Tackling radiation Research

RadoNorm
Managing risks from radon and NORM

ENA European NORM Association

Naturally Occurring Radionuclides



- Natural ^{238}U decay chain:

Type of Radiation	Nuclide	Half-life
	Uranium-238	4.5 x 10^9 years
α	Thorium-234	24.5 days
β	Protactinium-234	1.14 minutes
β	Uranium-234	42.33 x 10^5 years
α	Thorium-230	8.3 x 10^4 years
α	Radium-226	1590 years
α	Radon-222	3.825 days
α	Polonium-218	3.05 minutes
α	Lead-214	26.8 minutes
β	Bismuth-214	19.7 minutes
β	Polonium-214	1.5 x 10^-4 seconds
α	Lead-210	22 years
β	Bismuth-210	5 days
β	Polonium-210	140 days
α	Lead-206	stable

- Natural ^{232}Th decay chain, ^{40}K

‘**N**aturally **O**ccurring **R**adioactive **M**aterials’ (NORM)

Ore: ‘Naturally Occurring Radionuclides’

Processing

By-products **Residues** **Waste**

with enhanced concentrations

From technical perspective:
Can be **valuable secondary resources** for example for use in construction materials

Lagooning Red mud

Terranova phosphogypsum deposit (DEME, Zelzate, Belgium)

http://okopoliszklaszter.hu/download/eloadasok/icemt_2011.05.24_02.janos.szepvolgyi.pdf

https://www.deme-group.com/news/terranova-solar-largest-solar-park-low-countries?lang=nl

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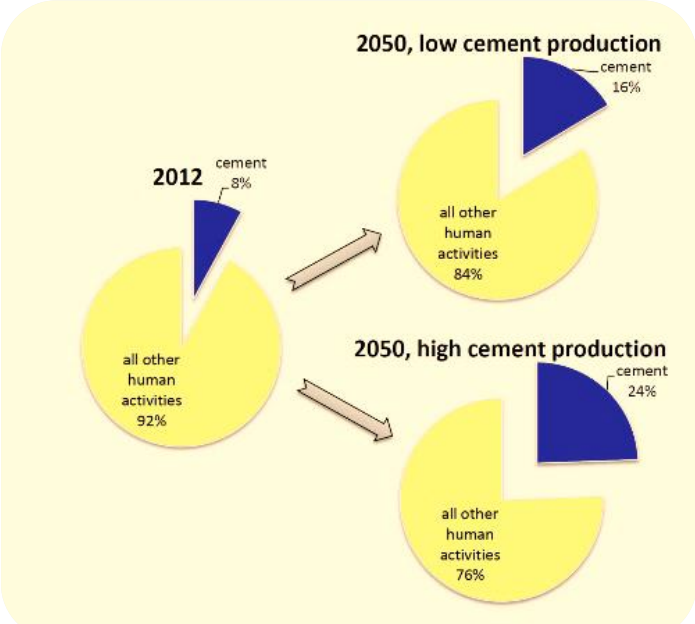
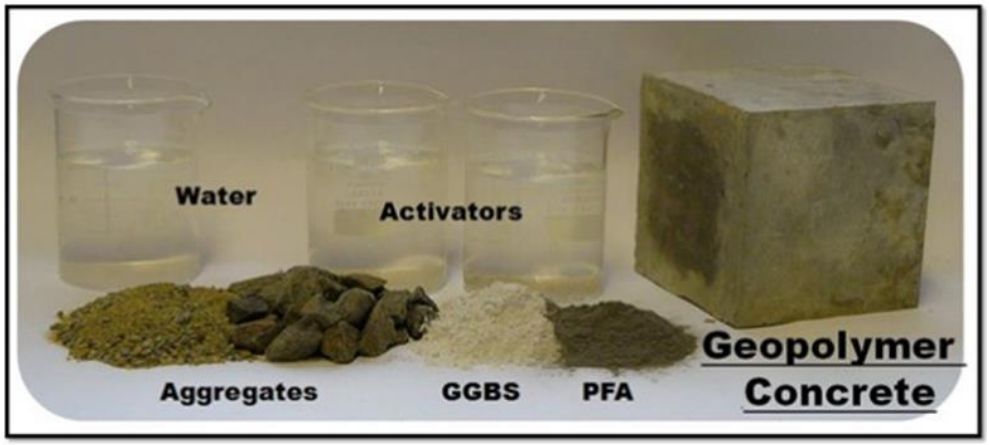
CO_2 emissions from Ordinary Portland Cement (OPC)



- **New types of cement and concrete**
  - **'Alkali Activated Materials', 'geopolymers', 'inorganic polymers'…**
- Allow incorporation and **recycling of several types of industrial residues**.
- **Reduce CO_2 emissions** from cement by up to 80%



Using NORM in construction materials?

Fly ash

Phosphogypsum

Metal slag

Red mud

Ceramics

Concrete

Cement

- Suitable chemical and physical properties?
  - Benifitial properties: immobilization?
  - (Pre)treatment of residues?
- Gamma exposure towards occupants and workers?
- Indoor air quality?
  - Radiological and chemical noxes?
- End-of-life considerations?
  - Leachability?

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The NORM4Building Network (2013-2017)

- Exchange of multidisciplinary knowledge and experiences (radiological, technical, legislative, economical, ecological, …)

Investigate the	While
reuse of by-products in new tailor-made sustainable building materials	**evaluating (radiation) protection of the population / environment**

However, social science and risk communication related experts were lacking…

While several societal challenges were identified…

- How do we **percieve radiological risks** regarding the use of NORM in construction?
- How to deal with this perception in the **communication**?
- **Stakeholders' positions** regarding the use of NORM in construction?

- **Market acceptance**?
- How to translate risk awareness of workers in the construction industry to **radiation protection behavior**?

www.Redbubble.com;
https://www.fishersci.com/