Radon Measurements: Sensor networks for big buildings and future cities

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Dr. José – Luis GUTIÉRREZ VILLANUEVA
Specialist radon measurement advisor

Tel : +46709368312
Mail : joseluis.gutierrez@radonova.com

Directive EURATOM BSS

Euratom Basic Safety Standards: Implementation

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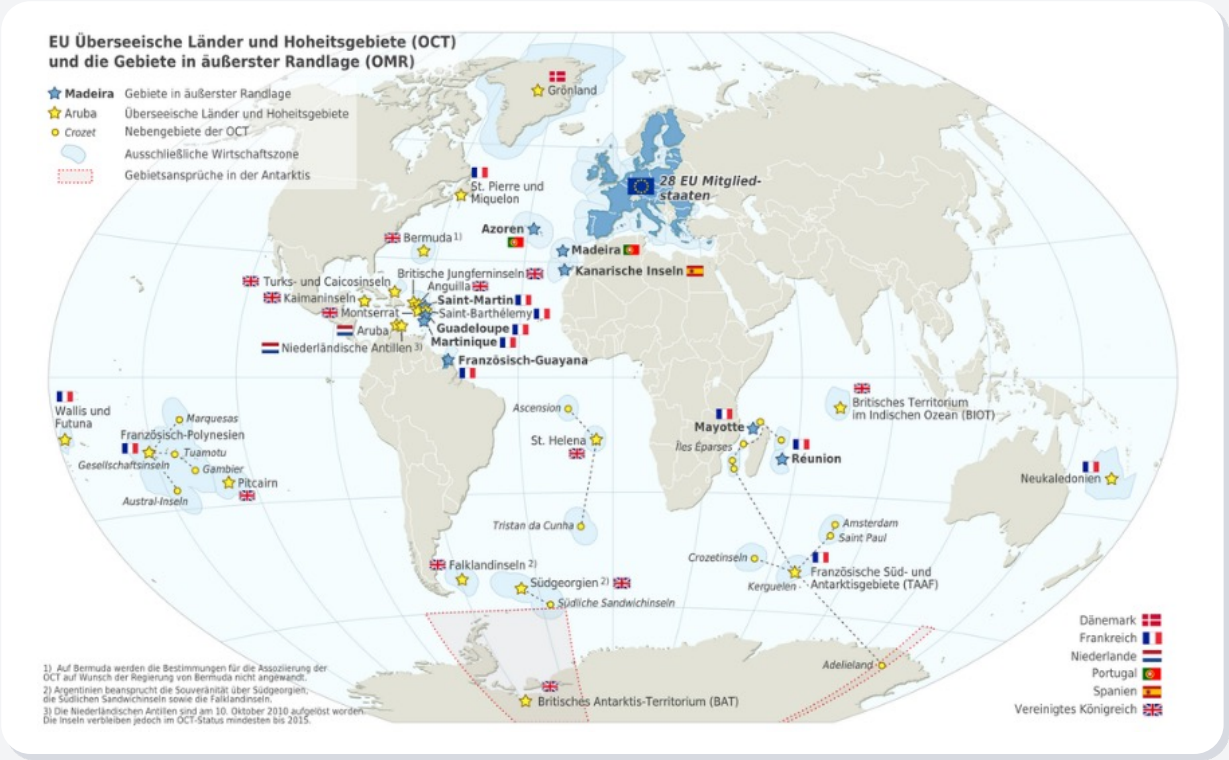
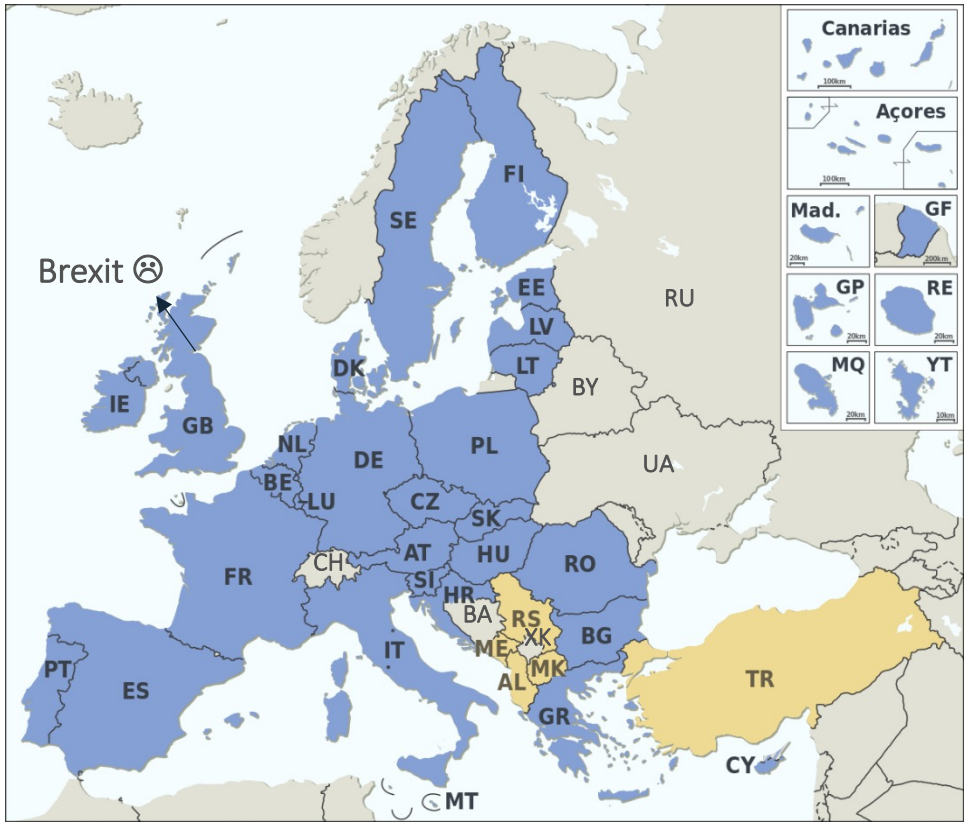


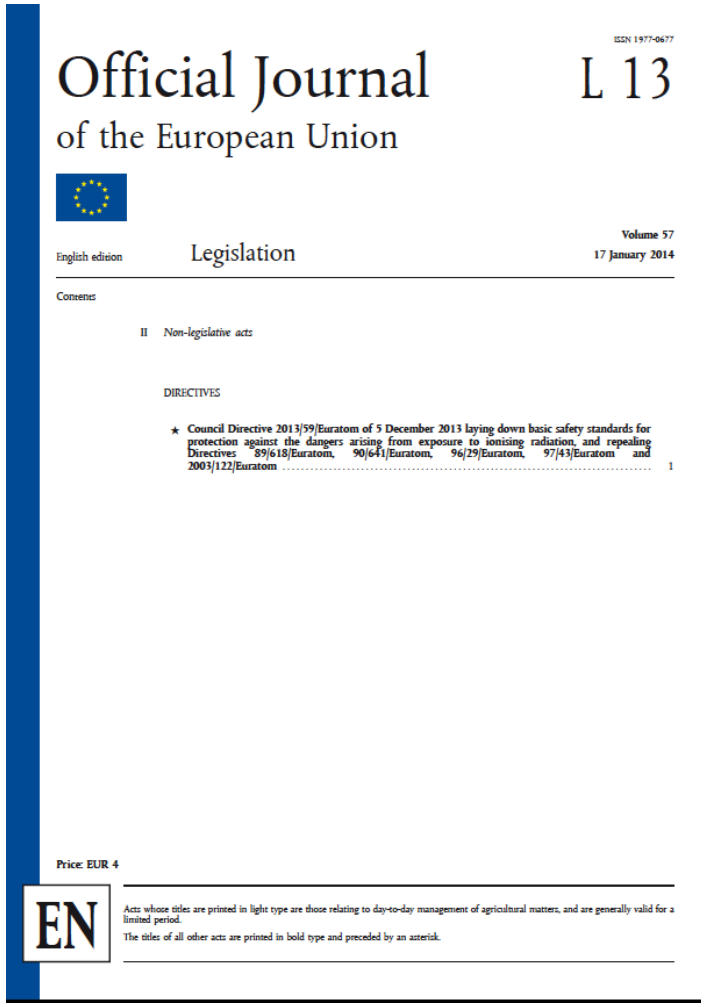
EU:
4,5 mill. km², 511 mill. pop, GDP $15 \cdot 10^{12}$ €
Source: Eurostats 2017



Yellow: candidate countries
Source: https://de.wikipedia.org/wiki/Europäische_Union; modified

The new directive

Euratom Basic Safety Standards



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Contents

II *Non-legislative acts*

DIRECTIVES

★ **Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom** 1

Price: EUR 4

EN

Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

The titles of all other acts are printed in bold type and preceded by an asterisk.

II

(Non-legislative acts)

DIRECTIVES

COUNCIL DIRECTIVE 2013/59/EURATOM

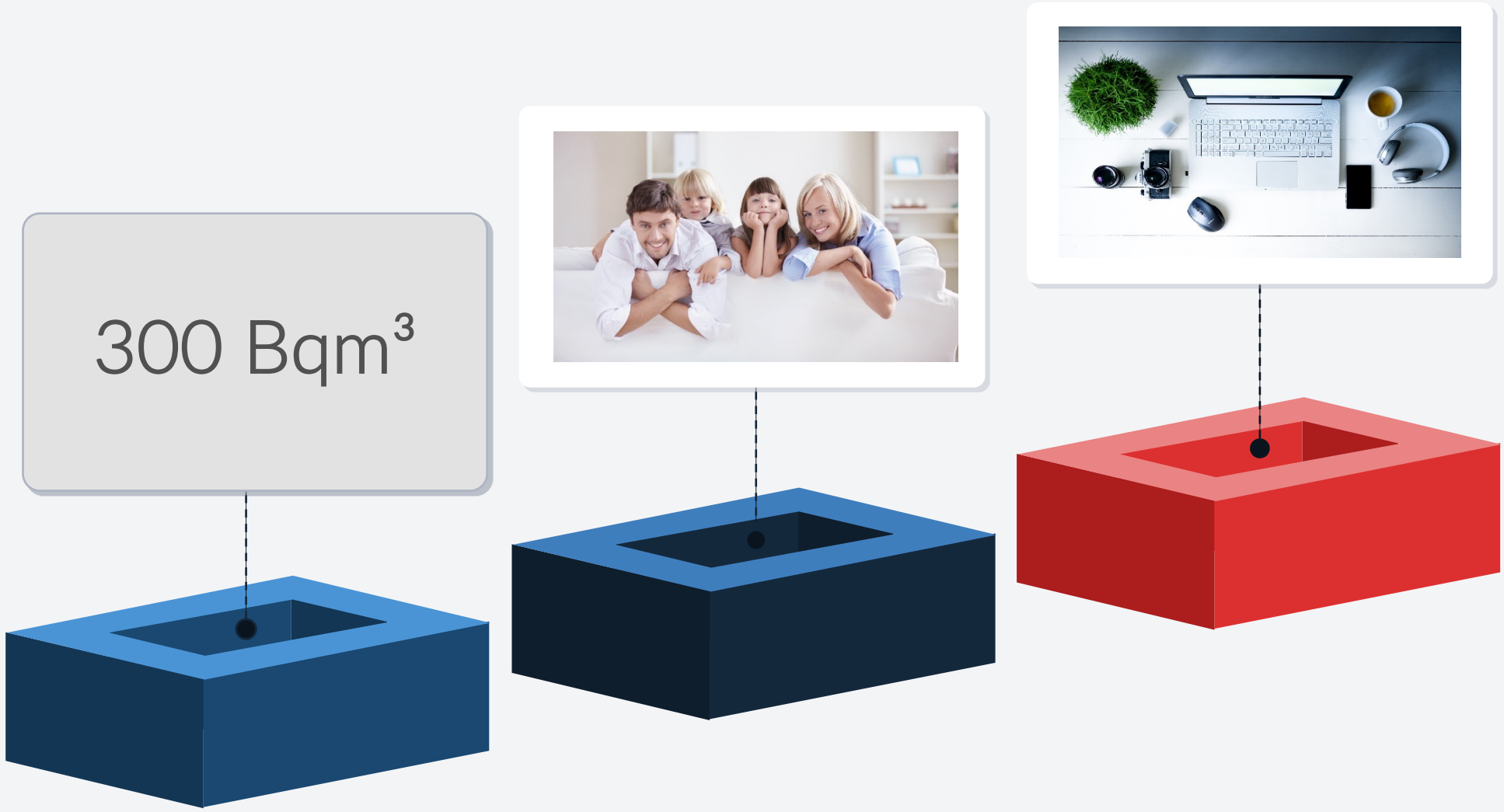
of 5 December 2013

laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom

The new directive

Euratom Basic Safety Standards

Better protection for public and workplaces



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- **EU Directive** 59/2013: 300 Bq m^{-3}
- **Strong institutions** – supervision – regulatory control: workplaces, rental apartments, public buildings
- Authorities need reliable and **accredited** measurement results: decisions that involve mitigations

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MEASUREMENTS ⟷ MITIGATIONS

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Radon and big buildings

Challenges

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- Rn monitoring several places at the same time
- Workplaces: Rn levels change over 24 h periods
- Workplaces: independent results, trustable values, confidentiality
- IAQ issues and parameters

SPIRIT – Digital IoT Radon Sensor

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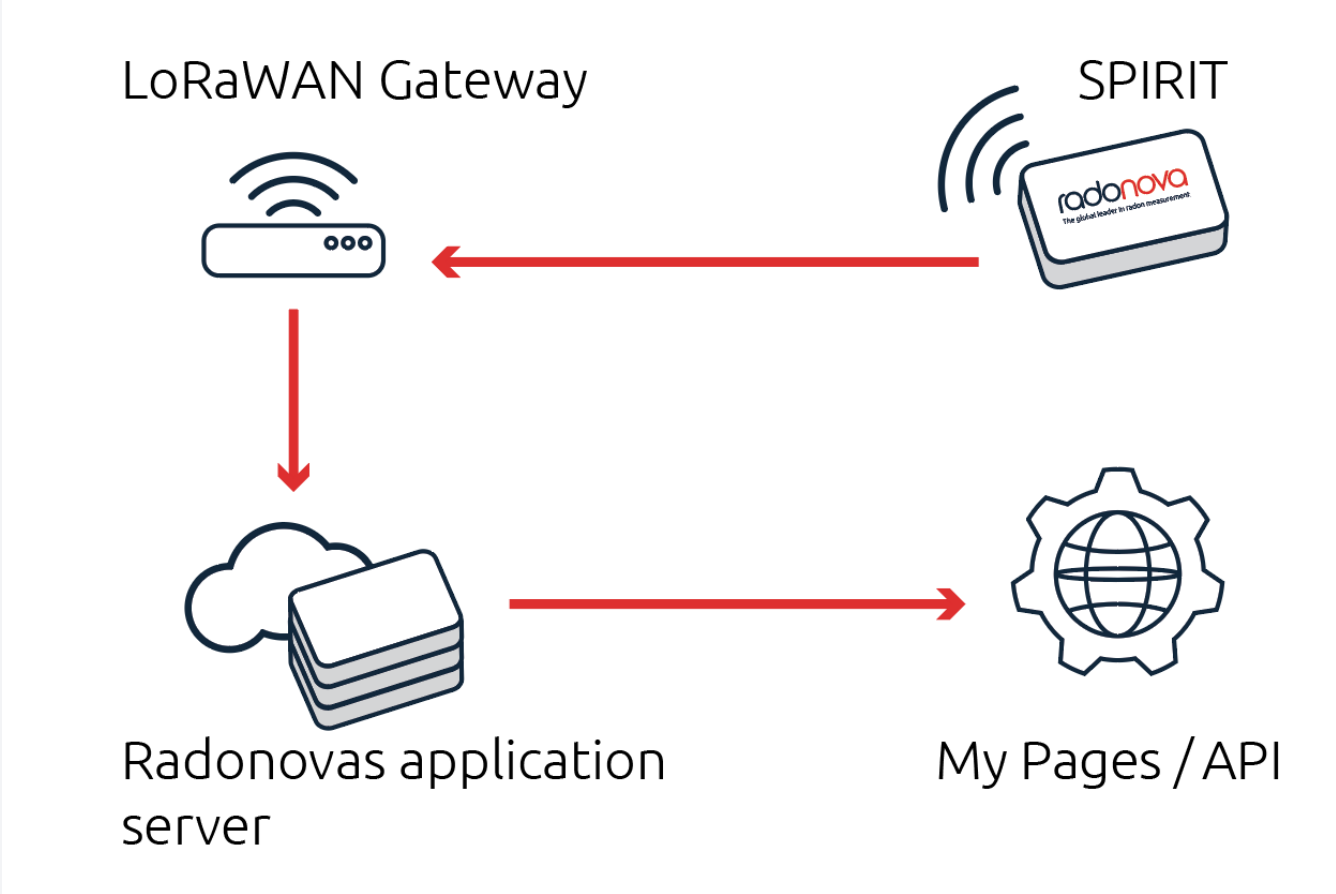
Network infrastructure



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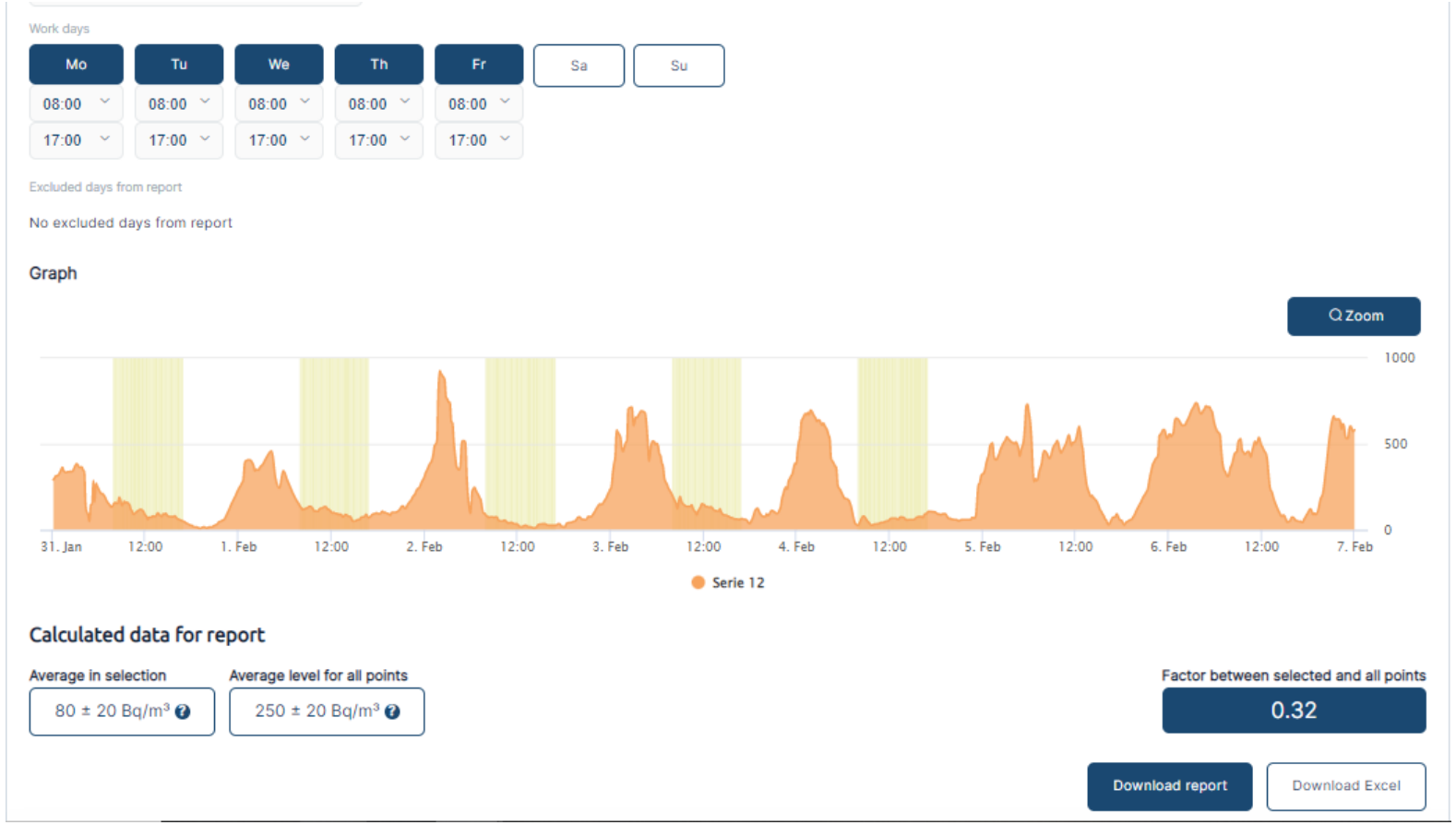
A Device for many applications

Fast response!

- Makes it possible to see variations throughout the day



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Network - LoraWAN

- The radon device uses the network LoRaWAN to send its sensor data. The LoRaWAN gateway can either be part of a larger antenna network, which is building rapidly in Europe, or a portabel “router-sized” gateway that can be used in more remote areas with unreliable network reception..

- The default report interval is 10 minutes for the device.

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Technical specifications

Measurement principe	Semiconductor detector with alpha spectroscopy
Measurement range	0 – 100.000 Bq/m3
Measurement uncertainty	<15 % after 6h @ 200Bq/m3
Sensitivity	8 counts per hours @200Bq/m3
Connectivity	Wireless data transfer LoRaWAN
Temperature range	-10ºC – 60ºC
Humidity range	0-95%
Power connection	5V Micro USB or 10-28V AC/DC
Battery time	>60 days
Weight	500g

Proposals

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- Remote quality control using a centralized sytem
- Remote verifications of calibration parameters
- Instant notifications to the users

Goal

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TO REDUCE THE NUMBER OF LUNG CANCER CASES ATTRIBUTABLE TO RADON EXPOSURE

Thank you for your attention

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