



**Nesos Group**  
INTELLIGENT PROPERTY MANAGEMENT

# LoRAD PRO – Radon Monitor

## Use cases

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## Document overview

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## Confidentiality Statement.

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## Overview

A wireless radon monitoring system for large-scale indoor air quality management across multiple buildings and facilities.

## Problem Statement

Radon is a naturally occurring radioactive gas that can accumulate in buildings and poses serious health risks, being the second leading cause of lung cancer after smoking. Traditional radon monitoring relies on passive detectors that require manual collection and laboratory analysis, or expensive wired monitoring systems that are impractical for widespread deployment.

# Solution: LoRaWAN-Enabled Radon Sensor Network

## Key Components

- **Radon sensors** with LoRaWAN connectivity
- **LoRaWAN gateways** for data collection
- **Cloud-based monitoring platform** for data analysis and alerts
- **Mobile/web dashboard** for facility managers

## Technical Specifications

- **Measurement range:** 0-3700 Bq/m<sup>3</sup> (0-99.9 pCi/L)
- **Transmission range:** Up to 15km in rural areas, 2-5km in urban environments
- **Data payload:** Radon level
- **Reporting frequency:** Configurable from 10 Minutes to daily

## Target Use Cases

### 1. Educational Institutions

- Monitor radon levels across multiple school buildings
- Ensure compliance with health regulations
- Automated alerts when levels exceed EPA action thresholds 148 Bq/m<sup>3</sup> (4 pCi/L)

### 2. Healthcare Facilities

- Continuous monitoring in hospitals and clinics
- Protect vulnerable patients and staff
- Demonstrate environmental safety compliance

### 3. Commercial Real Estate

- Monitor office buildings, hotels, and retail spaces
- Provide data for tenant safety assurance
- Support green building certifications

### 4. Government Buildings

- Federal/state facility monitoring
- Workplace safety compliance

- Long-term exposure tracking for employee health

## Benefits

### Cost Efficiency

- Low installation costs
- Minimal maintenance
- Scalable across hundreds of locations

### Real-time Monitoring

- Immediate alerts for dangerous radon levels
- Trend analysis and seasonal variation tracking
- Automated compliance reporting

### Wide Coverage

- Single gateway can cover entire campus or multiple buildings
- Penetrates through walls and floors effectively
- Suitable for remote or hard-to-reach locations

## Implementation Examples

A university deploys 20 radon sensors across 15 buildings using 3 LoRaWAN gateways. The system provides 24/7 monitoring, sends automated alerts to facilities management when radon levels exceed safe thresholds, and generates monthly compliance reports for health and safety officials. The total deployment cost is 60% lower than traditional wired systems while providing superior coverage and data granularity.

This use case leverages LoRaWAN's strengths of long range, low power consumption, and cost-effective wide-area coverage to address a critical public health monitoring need.



## Residential & Social



**Home Use:** Radon sensors continuously monitor gas levels in homes, particularly in basements where concentrations are highest. These devices measure radon in becquerels per cubic metre ( $\text{Bq}/\text{m}^3$ ), alerting homeowners when levels exceed the UK action level of  $200 \text{ Bq}/\text{m}^3$ . Real-time data helps determine if mitigation systems like positive pressurisation or improved ventilation are needed. Modern sensors connect to smartphone apps for remote monitoring and historical tracking, helping residents understand how activities like opening windows affect radon levels. Multi-room monitoring identifies high-concentration areas, whilst smart home integration enables automated ventilation responses when levels spike.

**Social Housing Applications:** Housing authorities deploy sensors across multiple units to ensure tenant safety and regulatory compliance. Large-scale networks enable data-driven maintenance scheduling and budget allocation for mitigation projects. Continuous monitoring provides documentation for inspections and helps identify construction characteristics contributing to elevated levels, informing future designs. In sheltered housing, sensors address vulnerabilities of residents who spend most time indoors. Wireless networks reduce installation costs compared to traditional testing. Aggregated data reveals neighbourhood patterns, supporting targeted public health interventions. Seasonal monitoring helps managers prepare for winter months when

reduced ventilation causes levels to rise, enabling preventive measures like heating adjustments or tenant notifications about proper ventilation practices.

## Regulatory



**Regulatory Framework:** Radon sensors help organisations meet various regulatory requirements, including Health and Safety Executive (HSE) guidelines that recommend action when levels exceed 200 Bq/m<sup>3</sup>, local authority regulations that may mandate testing in certain buildings, and workplace safety standards under the Health and Safety at Work Act. Many councils require periodic testing in schools, nurseries, and public buildings, whilst some areas have specific requirements for property transactions and rental properties in radon-affected areas.

**Compliance Benefits:** Continuous monitoring sensors provide documented evidence of radon levels over time, creating an audit trail that demonstrates due diligence to regulatory authorities. Unlike short-term test kits that provide snapshots, sensors offer ongoing compliance verification and can immediately alert facility managers when levels approach or exceed regulatory thresholds. This real-time capability enables prompt corrective action before breaches occur.

**Documentation and Reporting:** Sensors automatically log data that can be easily



compiled into compliance reports, reducing administrative burden and human error. Many devices integrate with cloud platforms that generate regulatory-compliant reports showing historical trends, peak exposures, and remediation effectiveness. This continuous documentation helps organisations demonstrate ongoing compliance rather than just point-in-time testing, which is particularly valuable during inspections or legal proceedings.

The proactive monitoring approach shifts organisations from reactive compliance to preventive management, reducing liability risks whilst ensuring safer environments for occupants.

## Commercial Buildings



**Commercial Building Requirements:** Radon sensors help commercial property owners meet duty of care obligations under health and safety legislation, particularly in offices, retail spaces, and hospitality venues in radon-affected areas. Buildings with basement levels, ground floor premises, or those on certain geological formations require monitoring to protect employees, customers, and tenants. Commercial landlords use sensors to demonstrate compliance with workplace safety regulations and maintain property values in radon-prone regions.

**Operational Benefits:** Continuous monitoring systems integrate with building management platforms to automatically adjust ventilation when radon levels rise,

maintaining safe environments without manual intervention. Sensors provide real-time data for informed decisions about space usage, particularly for below-ground areas like storage facilities, car parks, and retail units. Multi-zone monitoring tracks levels across different areas, ensuring consistent safety standards throughout premises.

**Business Continuity:** Commercial-grade sensors offer predictive maintenance, alerting managers before levels reach action thresholds, preventing business disruptions from emergency remediation. Cloud-based monitoring provides detailed reporting for insurance, tenant communications, and regulatory inspections. Data helps owners budget for remediation and demonstrate proactive safety management to tenants, potentially reducing liability risks and maintaining competitive advantage in the commercial property market.

## Industrial & Specialised



**Advanced Monitoring Capabilities:** Industrial-grade sensors feature explosion-proof housings for hazardous environments, integration with building management systems for automated ventilation control, and data logging meeting stringent regulatory requirements. Systems include remote monitoring for tracking multiple sites from central locations, with immediate alerts for threshold breaches enabling rapid response to protect workers and maintain operational compliance.

**Industrial Applications:** Radon sensors are essential in mining, quarrying, and construction where workers encounter elevated levels in underground or confined spaces. Manufacturing facilities on radon-prone geology require continuous monitoring to ensure worker safety under Control of Substances Hazardous to Health (COSHH) regulations. Nuclear facilities and research establishments use sophisticated detection systems to distinguish between natural background radiation and operational sources, ensuring accurate environmental monitoring.

**Specialised Environments:** Underground facilities including tunnels, car parks, and storage areas benefit from networked sensor systems monitoring multiple zones simultaneously. Museums, archives, and heritage buildings use sensors to protect occupants and valuable collections, as radon contributes to material deterioration. Healthcare facilities, particularly those with basement areas or built on radon-affected ground, require continuous monitoring to protect patients and staff who may be more vulnerable to radiation exposure.