

Impact and Exploitation of MetroRADON



V. Gruber, on behalf of MetroRADON consortium

Workpackage „Creating Impact“

The aim...

The aim of this work package is to ensure significant impact of the project through appropriate dissemination and uptake of the results and outputs, and exchange of knowledge and feedback between external bodies and the partners. The external bodies include national authorities, policy makers, regulators, industry, standardisation bodies and technical committees such as CEN, CENELEC, ISO, IEC, EURAMET TC-IR, BIPM CCRI(II) and international bodies and associations such as BIPM, ICRM, ICRU, IAEA, WHO, IRPA, ICRP, ERA, COIRA.

The need for this project has been largely motivated by the requirements of the EU-BSS which aims to protect the public by reducing their exposure to radon. This project will foster quality assurance of certain technical procedures which facilitate the achievement of the aims of the EU-BSS.

Knowledge transfer is particularly important for new developments and results whose impacts on different levels of the “supply chain” that leads to the overall aim of radon control, namely the reduction of exposure to radon and subsequently of the health risk, can be expected to be particularly relevant.

MetroRADON Consortium

17 partners from 12 countries



no.	Participant Type	Short Name	Organisation legal full name	Country
1	Internal Funded Partner	BEV-PTP	Physikalisch-Technischer Pruefdienst des Bundesamt fuer Eich- und Vermessungswesen	Austria
2	Internal Funded Partner	BFKH	Budapest Főváros Kormányhivatala	Hungary
3	Internal Funded Partner	CEA	Commissariat à l'énergie atomique et aux énergies alternatives	France
4	Internal Funded Partner	CMI	Cesky Metrologický Institut	Czech Republic
5	Internal Funded Partner	IFIN-HH	Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara "Horia Hulubei"	Romania
6	Internal Funded Partner	PTB	Physikalisch-Technische Bundesanstalt	Germany
7	Internal Funded Partner	STUK	Sateilyturvakeskus	Finland
8	Internal Funded Partner	VINS	Institut Za Nuklearne Nauke Vinca	Serbia
9	External Funded Partner	AGES	Oesterreichische Agentur fuer Gesundheit und Ernaehrungssicherheit GmbH	Austria
10	External Funded Partner	BfS	Bundesamt fuer Strahlenschutz	Germany
11	External Funded Partner	CLOR	Centralne Laboratorium Ochrony Radiologicznej	Poland
12	External Funded Partner	IRSN	Institut de Radioprotection et de Surete Nucleaire	France
13	External Funded Partner	JRC	JRC - Joint Research Centre - European Commission	European Commission
14	External Funded Partner	SUBG	Sofiiski Universitet Sveti Kliment Ohridski	Bulgaria
15	External Funded Partner	SUJCHBO	Státní ústav jaderné, chemické a biologické ochrany, v.v.i.	Czech Republic
16	External Funded Partner	UC	Universidad De Cantabria	Spain
17	Unfunded Partner	METAS	Eidgenössisches Institut für Metrologie METAS	Switzerland



MetroRADON Consortium

9 official collaborators (unfunded)

- DiMEILA Centro Ricerche INAIL, Italy
- University of Babes-Bolyai, Romania
- University Coimbra, Portugal
- University of Novi Sad, Serbia
- Istituto Superiore di Sanita (ISS), Italy
- Slovak Metrology Institute, Slovakia
- Radonova, Sweden
- LIFE-Respire project
- EURADOS



Metro
RADON



....and many more who gave input to the project!

The MetroRADON consortium

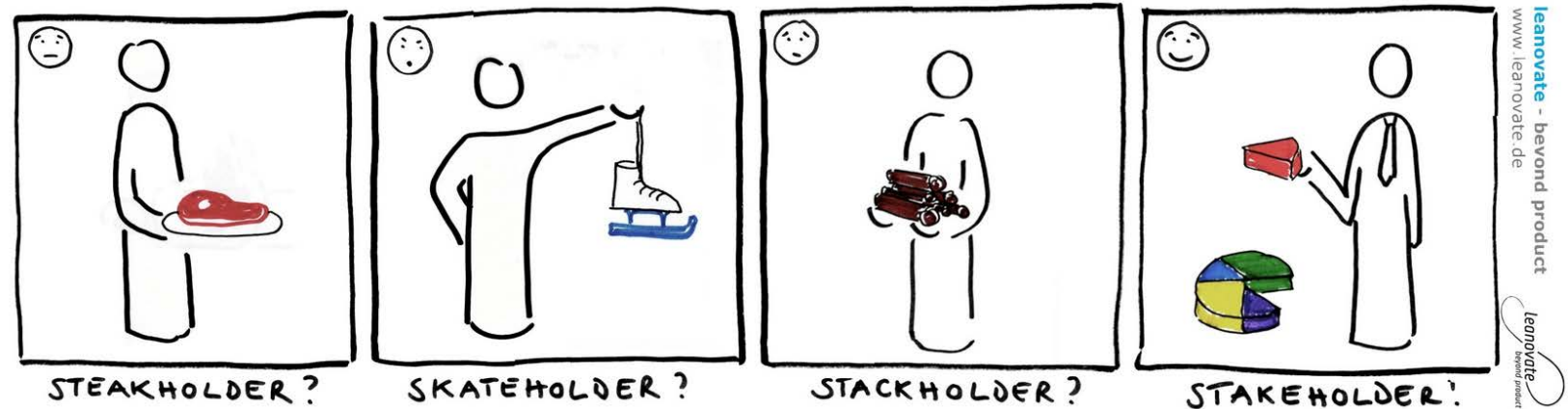
Project meetings – around Europe in all seasons



Who is interested in the project and results?

Our relevant stakeholders....

- Project Partners and Collaborateurs
- National Authorities (decision makers)
- Metrology Institutes
- Standard bodies and committees
- International bodies and organisations
- Industry
- Research Institutes, Universities, Researchers
- Related projects
- Interested Individuals



How can we reach our stakeholders?

Stakeholder involvement plan





1st June 2017 – 31st May 2020



JRP EMPIR 16ENV10: MetroRadon

Metrology for Radon monitoring

Stakeholder Involvement

- Plan and Status

Version/date: September 2019

WP Number: 6

WP description: Creating Impact

Activity Numbers: A.6.1.6

Activity description: Stakeholder Involvement Plan

Lead Participant: AGES

Other Participants: all JRP-partners

3. RELEVANT STAKEHOLDERS.....

3.1.1. Project Partners and Collaborateurs.....

3.1.2. National Authorities (decision makers).....

3.1.3. Metrology Institutes.....

3.1.4. Standard bodies and committees.....

3.1.5. International and national bodies and organisations....

3.1.6. Industry

3.1.7. Research Institutes, Universities and Researchers

3.1.8. Related projects

3.1.9. Interested Individuals/Public

5. APPROPRIATE CHANNELS FOR EACH RELEVANT STAKEHOLDER GROUP...

	3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.1.6	3.1.7	3.1.8	3.1.9
4.1.1	X	X	X	X	X	X	X	X	X
4.1.2	X								
4.1.3	X	X	X	X	X	X	X	X	X
4.1.4	X	(X)	(X)		(X)	X			
4.1.5	X		X		X		X	X	X
4.2.1	X	X	(X)		X	X			
4.2.2	X	X	X	X	X	X	X	X	
4.3.1	X			X			X		
4.3.2	X					X	X		
4.3.3	X	X	X		X	X	X	X	
4.3.4	X								
4.3.5	X								
4.4.1	X	X	X	X	X	X	X	X	X
4.4.2	X	X	X		X	X	X		
4.4.3	X	X	X		X	X	X	X	X
4.5.1	X								X

4. INFORMATION CHANNELS.....

4.1 INFORMATION VIA WEB

4.1.1. Webpage with open access

4.1.2. Webpage with restricted access

4.1.3. Newsletter

4.1.4. Discussion Board

4.1.5. Research Gate

4.2 CO-OPERATIONS AND GROUPS.....

4.2.1. Industry Interest Group

4.2.2. Other Stakeholder Groups

4.2.3. Co-operation with relevant organisations, working groups and projects

4.3 CONFERENCES, WORKSHOPS AND TRAINING.....

4.3.1. Participation in scientific workshops and conferences

4.3.2. Comparison exercises

4.3.3. Project workshop and training

4.3.4. Technical visits

4.4 PUBLICATIONS.....

4.4.1. Scientific publications

4.4.2. Best practice guidelines.....

4.4.3. Other publications

4.5 OTHER EVENTS.....

4.5.1. Public events.....

Knowledge transfer

Webpage – www.metroradon.eu



MetroRADON

Metrology for radon monitoring



Overview of project, objectives

Partners

Workpackages WP

Upcoming activities

Documents

- Newsletter, Reports, Presentations, Papers,...

Documents

This is the document section of the MetroRADON website where project outputs are shared.

Newsletters & Status Reports

- [February 2020 newsletter](#)
- [Status Report February 2020](#)
- [July 2019 newsletter](#)
- [Status Report July 2019](#)
- [January 2019 newsletter](#)
- [Status Report January 2019](#)
- [July 2018 newsletter](#)
- [Status Report July 2018](#)
- [December 2017 newsletter](#)

MetroRADON Workshops & Activities

- [Industry Interest Group \(IIG\) Meeting, 18 June 2019, Brunswick, Germany](#)
- [Transport of Radon and Thoron in Polymers, 21-22 March 2019, Sofia, Bulgaria:](#)
 - [Study of the partition coefficient and the diffusion length of radon in polymers at different temperatures: Experimental approach and results](#), S. Gregoriev (SUBG) et al.
 - [A better understanding of the morphology and the structure of the plastics versus the temperature conducive to correct radon measurements and to advanced Radon monitors](#), Luigi Tommasino and Dobromir Pressyanov (SUBG)
 - [Production of mixed radioactive gas atmosphere and proposition of setup to test ²²²Rn and ²²⁰Rn separation by polymer foils](#), Benoit Sabot (CEA)
 - [Remark on the potential influence of the way of polymer production on their radon absorption properties](#), Krasimir Mitev (SUBG)

Reports & Journal Publications

- Maringer FJ., Wiedner H. and Cardellini F., 2020. An innovative quick method for traceable measurement of radon-222 in drinking water. Applied Radiation and Isotopes 155, 108907. <https://doi.org/10.5281/zenodo.3555047>

Knowledge transfer

Newsletter

- 2 newsletter/year
- Highlight newsletter (4-5 pages), Status report with detailed work report and results of all workpackages (10-15 pages)
- Status: 5 newsletters and status reports; next: May 2020
- Sent to stakeholders (national authorities, researchers, industry, registered interested individuals, international organisations): ~ 240 recipients
- & JRC-list, WHO-radon-list, ERA-list
- Available at MetroRADON webpage (Documents)
- Registration at website!

Sorry for cross-posting!

www.metroradon.eu



5th NEWSLETTER

Executive Summary

The 3-year Research Project MetroRADON (Metrology for Radon Monitoring), funded within the European Metrology Programme for Innovation and Research (EMPIR) will come to its end in May 2020.

The purpose of the project is to develop reliable techniques and methodologies to enable SI traceable radon activity concentration measurements. More information can be found on the [MetroRADON website](#).

The results gained within the project need to be shared and discussed with the stakeholders. Results were already presented at several conferences all over Europe and published in reports and peer reviewed papers. More dissemination activities will follow in the next months. Two workshops and a training course will take place to inform the relevant stakeholders to present the MetroRADON results – we hope you will join us!

The final phase of the project has started and all results including the final report will be shared with you at the end of the project. We will inform you in the last Newsletter in May this year.

This newsletter highlights some recent actions from the project, lists some of the dissemination activities and announces the upcoming MetroRADON events. Details of the project tasks and results are discussed in the “[Status Report](#)” that can also be found on the [website](#). All the mentioned material is available on the [Document section](#) of the [MetroRADON website](#) and directly linked in this newsletter.

MetroRADON collaborators

[DiMEIA Centro Ricerche INAIL](#), Italy

[EURADOS](#), international

[Istituto Superiore di Sanità](#), Italy

[LIFE-Respire-Consortium](#), international

[Radonova](#), Sweden

[University of Babes-Bolyai](#), Romania

[Universidade de Coimbra](#), Portugal

[University of Novi Sad](#), Serbia

Partnership

BEV-PTB: Physikalisch-Technischer Prüfdienst des Bundesamts für Eich- und Vermessungswesen, Austria (coordinator)

BFKH: Budapest Főváros Kormányhivatala, Hungary

CEA: Commissariat à l'énergie atomique et aux énergies alternatives, France

CMI: Český Metrologický Institut, Czech Republic

IFIN-HH: Institutul National de Cercetare-Dezvoltare pentru Fizica si Inginerie Nucleara "Horia Hulubei", Romania

PTB: Physikalisch-Technische Bundesanstalt, Germany

STUK: Sateilyturvakeskus, Finland

VINS: Institut Za Nuklearne Nauke Vinca, Serbia

AGES: Österreichische Agentur für Gesundheit und Ernährungssicherheit, Austria

BfS: Bundesamt für Strahlenschutz, Germany

CLOR: Centrale Laboratorium Ochrony Radiologicznej, Poland

IRSN: Institut de Radioprotection et de Sureté Nucléaire, France

JRC: Joint Research Centre - European Commission, Europe

SÚJCHBO: Státní ústav jaderné, chemické a biologické ochrany, v.v.i., Czech Republic

SUBG: Sofijski Universitet Sveti Kliment Ohridski, Bulgaria

UC: Universidad de Cantabria, Spain

METAS: Eidgenössisches Institut für Metrologie, Switzerland

Contact

Franz Josef Maringer, Michael Stietka,

JRP coordinator

Bundesamt für Eich- und Vermessungswesen

Physikalisch-Technischer Prüfdienst

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The EMPIR initiative is cofunded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States



Knowledge transfer

Research Gate



Project

MetroRADON - Metrology for Radon Monitoring (EMPIR 16ENV10)

F. J. Maringer · Philippe Cassette · Nathalie Michielsens · [Show all 41 collaborators](#)

- Goal: 1. Development of novel procedures for the traceable calibration of radon (^{222}Rn) measurement instruments at low activity concentrations (100 Bq/m³ to 300 Bq/m³) with relative uncertainties $\leq 5\%$ ($k=1$)
2. Influence of thoron (^{220}Rn) and its progeny on radon end-user measurements and radon calibrations
3. Comparison and harmonization of radon measurement procedures in Europe
4. Study methodologies for the identification of radon priority areas and relationship between soil Rn exhalation and indoor Rn concentrations
5. Validation of traceability of European radon calibration facilities

Methods: Geostatistical Analysis, Alpha-particle Spectrometry, radionuclide metrology, Radon & Thoron measurement

Date: 1 June 2017 - 31 May 2020

Lab: [Mihail-Razvan Ioan's Lab](#)

Updates [4 new](#) 16

Recommendations [10 new](#) 10

Followers [22 new](#) 88

[Reads](#) [383 new](#) 1191

Qualitative overview of indoor radon surveys in Europe

[Article](#) Aug 2019

Gordana Pantelic · Igor Čeliković · Milos Zivanovic · [...] · Valeria Gruber

[View](#)

An innovative quick method for traceable measurement of radon 222 in drinking water

[Article](#) Sep 2019

F. J. Maringer · Hannah Wiedner · Francesco Cardellini

[View](#)

Knowledge transfer

Presentation at conferences & workshops & meetings

- At least 10 conference presentations
- Status: > 40 presentations/posters at European and international conferences in different fields (metrology, environment, radiation protection, radiation applications, geostatistics, geoscience, etc. – AARST, IRPA, ICRM,...)
- Most of the presentations available at the MetroRADON webpage (Documents)!

www.metroradon.eu



Knowledge transfer

Publications

- ☞ At least 10 peer reviewed papers
- ☞ Status: 7 published, several submitted/in preparation
- ☞ MetroRADON peer reviewed papers – open access!!!
- ☞ Several activity reports available
- ☞ 6 Deliverables reports – at the end of the project
- ☞ All publications available at the MetroRADON webpage (Documents)!

www.metroradon.eu

<https://www.euramet.org/repository/research-publications-repository-link/>

Reports & Journal Publications

- Maringer FJ., Wiedner H. and Cardellini F., 2020. An innovative quick method for traceable measurement of radon-222 in drinking water. Applied Radiation and Isotopes 155, 108907. <https://doi.org/10.5281/zenodo.3555047>
- Sabot, B., Rodrigues, M. and Pierre, S., 2020. Experimental facility for the production of reference atmosphere of radioactive gases (Rn, Xe, Kr, and H isotopes). Applied Radiation and Isotopes 155, 108934. <https://doi.org/10.1016/j.apradiso.2019.108934>
- Bossew, P., 2019. Radon priority areas and radon extremes – Initial statistical considerations. Radiation Environment and Medicine 8(2), 94-104. http://crss.hirosaki-u.ac.jp/wp-content/files_mf/1568795052Web_REMVol828_PeterBossew.pdf
- Georgiev, S., Mitev, K., Dutsov, C., Boshkova, T., Dimitrova, I., 2019. Partition Coefficients and Diffusion Lengths of ²²²Rn in Some Polymers at Different Temperatures. International Journal of Environmental Research and Public Health 16(22), 4523. <https://doi.org/10.3390/ijerph16224523>
- Pressyanov, D., Santiago Quindos Poncela, L., Georgiev, S., Dimitrova, I., Mitev, K., Sainz, C., Fuente, I., Rabago, D., 2019. Testing and calibration of CDs as radon detectors at highly variable radon concentrations and temperatures. International Journal of Environmental Research and Public Health 16(17), 3038. <https://doi.org/10.3390/ijerph16173038>
- Pantelić, G., Čeliković, I., Živanović, M., Vukanac, I., Nikolić, JK., Cinelli, G., Gruber, V., 2019. Qualitative overview of indoor radon surveys in Europe. Journal of Environmental Radioactivity 204, p. 163-174. <https://doi.org/10.1016/j.jenvrad.2019.04.010>
- [Intercomparison of indoor radon and geogenic radon measurements under field conditions](#), Daniel Rabago et al. (UC)
- [Literature review of indoor radon surveys in Europe – JRC Technical Report](#), Gordana Pantelic (VINS), et al.
 - PANTELIĆ G, ČELIKOVIĆ I, ŽIVANOVIĆ M, VUKANAC I, NIKOLIĆ JK, CINELLI G, GRUBER V, Literature review of Indoor radon surveys in Europe, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-97643-8 (online), doi:10.2760/977726 (online), JRC114370
- [Radon Priority Areas – Definition, Estimation and Uncertainty](#), Peter Bossew
 - Bossew, P., Radon Priority Areas – Definition, Estimation and Uncertainty, Nuclear Technology and Radiation Protection 33, 3 (2018), p. 286-292, <https://doi.org/10.2298/NTRP180515011B>
- [Review of potential techniques and materials to reduce the influence of thoron on radon measurements and calibrations](#), Olli Holmgren (STUK), et al.



Knowledge transfer

Industry Interest Group



- ☞ ~ 60 companies invited -> **27 members**
- ☞ Keep industry informed on developments in the project and obtain feedback
- ☞ Networking possibility among industry
 - Discussion board IIG
 - Industry Interest Group meeting – Braunschweig, June, 2019



IIG Meeting, 18 June 2019
PTB, Brunswick, Bothe-Bau, Room 311

AGENDA

WHEN	WHAT	WHO
9:30 – 10:00	Welcome + Introduction of participants	Dr. Stefan Neumaier
10:00 – 10:30	Presentation of MetroRadon	Dr. Michael Stietka, Dr. Valeria Gruber
10:30 – 11:00	Radon: Quantities and Units	Dr. Annette Röttger
11:00 – 11:30	Coffee break	

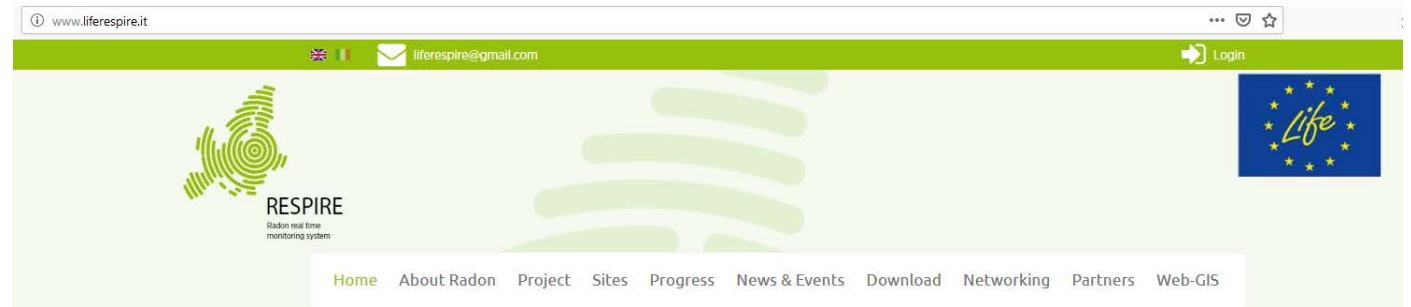
A screenshot of the MetroRADON website. The top navigation bar includes links for Home, News, Upcoming activities, Overview-objectives, Partners, Work packages, Documents, and Contact us. Below this is a secondary bar with Privacy policy / data protection declaration and Forum IIG (highlighted with a yellow circle). The main content area is titled "IIG" and shows a forum overview with two topics. The first topic is "What to do if the EURATOM BSS has not been implemented?" with 1 voice and 1 post, started by Jose Luis Gutierrez Villanueva. The second topic is "Welcome to the metroRADON forum of the IIG" with 1 voice and 1 post, started by Admin. On the right side, there is a sidebar with the MetroRADON logo and a section titled "MetroRADON Upcoming Events" listing two workshops: "Harmonisation of radon measurement methodologies and radon priority areas" (2020-02-25 to 2020-02-26) and "New procedures for radon monitoring" (2020-05-12).

Knowledge transfer

Other activities



- Presentations at **national meetings** with authorities, research institutes, national radiation protection associations, etc.
- Presentations at **standard bodies** meetings
- Presentations at Contact with international bodies about project (ERA, WHO, IAEA, HERCA,...)
- Co-operation with **Life-Respire project** (Radon real time monitoring system and proactive indoor remediation)
- Co-operation with **EURADOS**
 - EURADOS-WG-3 - subgroup „Radon“



Some Highlights...

...for MetroRADON impact



☞ Patent submitted!

- „ *Compensating Module For Sensors For Measuring Of Radioactive Noble Gases* (Bulg. Pat. Appl. Reg. Nr. 12897, priority 19.03.2019, inventor: D. Pressyanov, assignee: SUBG)

☞ EC-JRC technical report

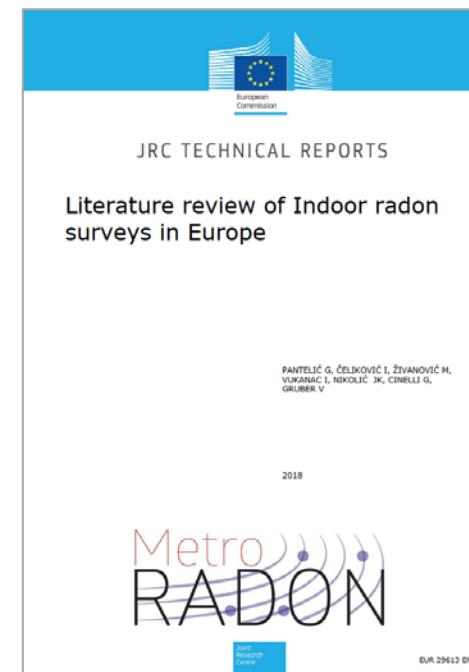
- Literature review of Indoor radon surveys in Europe, EUR 29613 EN

☞ Comparison exercises

- Comparison of existing radon gas primary standards according to CCRI(II) rules (registered at EURAMET under the number 1475 and at BIPM as EURAMET.RI(II)-S8Rn-222)

☞ Contribution to 12th EURADOS winter school

☞ ...



NATIONAL CENTRE
FOR RADIATION PROTECTION
IN HEALTH CARE



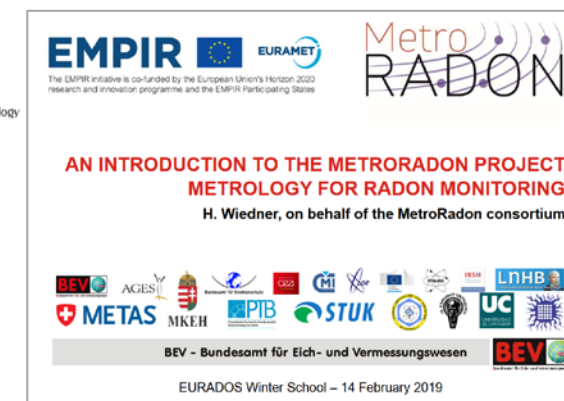
Lodz University of Technology

First Announcement

EURADOS Annual Meeting 2019

AM2019

Łódź, Poland, 11th to 14th February 2019



Workshops and Training



MetroRADON workshops and training for stakeholders

- ☞ Industry Interest Group meeting, Braunschweig, Germany, *18 June 2019 (PTB)*
- ☞ Transport of Radon and Thoron in Polymers, Sofia, Bulgaria, *21-22 March 2019, (SUBG)*
- ☞ Workshop „Harmonisation of radon measurement methodologies and radon priority areas“ - results of WP2/WP3/WP4; part of European Radon Week 2020 (for national authorities, scientific sector, industry): Vienna, *25.-28. February 2020, (AGES, BEV)*
- ☞ Short technical visits among partners

Upcoming:

- ☞ „Workshop on new procedures for radon monitoring“ - results of WP1/WP2/WP5 (industry, authorities, scientific sector): *12. May 2020, Berlin (PTB)*
- ☞ Training seminar „New procedures, guidelines and methodologies for radon instrument calibration and measurements“ (end users): *13. May 2020, Berlin (UC)*

contact: susanne.eger@ptb.de

Save the date! Registration is open!

Uptake and Exploitation

Planned activities...

- ☞ **Network** of European calibration laboratories for radon concentration in air measurements
- ☞ Contact with international bodies (e.g. JRC, IAEA, WHO, ERA) to facilitate the creation of a **best practice guideline** for **radon mapping**
- ☞ **Guideline** which summarises the constituents of the chain „from primary standards to radon maps“ and the links between them - for a **sound metrology for radon calibrations at low levels** (target audience: radon calibration laboratories and end-users)
- ☞more ideas and input welcome for **sustainable maintenance and uptake** of MetroRADON results!



Group Discussion - MetroRADON Results

Impact, Exploitation, Open Topics, Questions, Possible future research

- ☞ How can MetroRADON results impact my future work (e.g. implementation of EU-BSS in my country)?
- ☞ How should MetroRADON results best be maintained after the end of the project to be most effective/best available (e.g. data availability, publications, joint international guidelines etc.)
- ☞ What topics remained open?
- ☞ Possible future research/tasks, based on MetroRADON results/data?
- ☞ Any other MetroRADON topic you want to discuss....
- ☞ Any other (radon) topic you want to discuss....
- ☞ **Please discuss in groups and summarise your ideas on a poster/flip chart!**



Metro RADON

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AGES

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