

# RICOMET 2023

## 9<sup>th</sup> International Conference on Social Sciences and Humanities in Ionising Radiation Research

Dessel, Belgium on 30 August – 1 September 2023





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Ulrike Kulka and Warren John (RadoNorm)  
Tanja Perko (RadoNorm & SHARE vice-president)

**Venue**

Tabloo  
Gravenstraat 3  
2480 Dessel  
Belgium

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# RICOMET 2023

## Programme

<b>Monday 28/8/2023</b>	<b>PRE-RICOMET</b>
12:00 Meeting point: hotel Corbie & hotel Huron	Transport from Mol to Tabloo
12:30 – 13:30 Bistroo	Lunch
13:30 – 17:30 Room: Alfa & Beta	<b>ECOSENS Annual meeting</b> (restricted to project partners)
17:30	Transport from Tabloo to Mol
<b>Tuesday 29/8/2023</b>	<b>PRE-RICOMET</b>
9:00 Meeting point: hotel Corbie & hotel Huron	Transport from Mol to Tabloo
9:30 – 12:30 Room: Proton	<b>2050 HERE &amp; NOW - A scenario workshop to confront disruptive climate change events and citizen energy choices</b>
12:30 – 13:30	Lunch
13:30 – 17:30 Room: Proton & Neutron & Hybrid	<b>Scientific Event: Powering the Future Responsibly: Assessing the Sustainability of Nuclear Energy</b>  The focus of the Scientific Event will be the ECOSENS sustainability assessment methodology integrating a societal perspective on Europe's future energy system that includes advanced and innovative technologies including nuclear. The influence of the stakeholder input gathered at the <a href="#">ECOSENS workshops in March 2023</a> will be consolidated. Results from the morning <b>2050 Scenario workshop</b> will be shared. The event will be hybrid, and will welcome not only RICOMET conference participants, but also a wider audience interested in social, economic and environmental issues of future energy.





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<b>13:30 – 14:30</b> Room: Proton & Neutron & Hybrid	Introduction: <ul style="list-style-type: none"> <li>• Overview of ECOSENS – Daniela Diaconu (RATEN), project coordinator</li> <li>• Feedback from the morning’s 2050 Scenario workshop – Marc Poumadère (Symlog)</li> <li>• The March 2023 methodological workshop and stakeholder insights – Claire Mays (Symlog)</li> <li>• Methodological progress and uptake of insights for the ECOSENS sustainability assessment – Marin Constantin (RATEN)</li> </ul>
14:30 – 15:30 Room: Proton & Neutron & Hybrid	Panel discussion: Assessing the Sustainability of Nuclear Energy Moderation by Gaston Meskens (SCK.CEN) with invited panellists from organised civil society, industry and NGOs.
15:30 -16:00	REFRESHMENT BREAK
16:00 – 16:55 Room: Proton & Neutron & Hybrid	Workshop: Group work on Energy Demand Drivers Moderation by Aylin Erden (SYMLOG) and Marin Constantin (RATEN): Participants will check and debate the societal and technological assumptions used for the ECOSENS 2050 energy demand scenario.
16:55 – 17:00	Closing remarks: wrap up by Daniela Diaconu (RATEN), project coordinator
17:05	Transport from Tabloo to Mol

Tuesday 29/8/2023	<b>PRE-RICOMET</b>
16:00 – 18:00	<p><b>Workshop over de ontmanteling van nucleaire installaties</b> De workshop zal in het Nederlands worden gehouden en deelname is beperkt tot lokale gemeenschappen.</p>
Room: Alfa & Beta	<p>De workshop wordt georganiseerd door de Groep van Europese Gemeenten met Nucleaire Installaties (GMF) en sociale wetenschappers van SCK CEN.</p> <p><i>Welkomstwoord door de burgemeesters van Dessel (dhr. Kris van Dijck) en Mol (dhr. Wim Caeyers)</i></p>
	<p>De (toekomstige) ontmanteling van kerncentrales staat op de agenda in zowel België als Nederland, terwijl beide landen momenteel ook de mogelijkheid van nieuwe kerninstallaties onderzoeken. In België werd er bijvoorbeeld recent beslist om vanuit de federale overheid te investeren in onderzoek naar Small Modular Reactors (SMR's), terwijl de Nederlandse regering van plan is om twee nieuwe kerncentrales te bouwen. Lokale gemeenschappen binnen en over nationale grenzen heen kunnen worden beïnvloed door deze activiteiten. Daarom nodigen we bewoners van lokale gemeenschappen uit voor een workshop die specifiek gericht is op het verkennen van vragen, zorgen en aandachtspunten die zij mogelijk hebben met betrekking tot de ontmanteling van nucleaire installaties en de hernieuwde nationale interesse in nucleaire faciliteiten.</p> <p>Vorig jaar organiseerde RICOMET een vergelijkbare workshop die zich uitsluitend richtte op ontmanteling, met een breder publiek bestaande uit vertegenwoordigers uit de nucleaire industrie, academici, lokale vertegenwoordigers, en anderen.</p>
Room: Alfa & Beta	<p><b>Workshop on decommissioning of nuclear installations – the workshop will be in Dutch and is limited to local residents only</b> Organised by Group of European Municipalities with Nuclear Facilities (GMF) and social science researchers from SCK CEN <i>Welcome by the mayor of Dessel, Mr. Kris van Dijck and the mayor of Mol, Mr. Wim Caeyers</i></p>
	<p>The (future) decommissioning of nuclear power plants is on the agenda in both Belgium and the Netherlands, while at the same time, both countries are also exploring the potential development of new nuclear facilities. In Belgium, this exploration is exemplified by the recent federal investment in research on Small Modular Reactors (SMRs), while the Dutch government has the intention to build two new nuclear power plants. Local communities both within and across national boundaries could be affected by these activities. For this reason, we would like to invite residents of local communities for a workshop dedicated to explore the questions, concerns, and attention points local communities might have regarding the decommissioning of nuclear installations, and the seemingly re-emerging national interest in new facilities.</p>

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	Last year, RICOMET organised a similar workshop focused only on decommissioning with a broader audience representing nuclear industry, academics, local representatives, etc.		
18:00 – 19:00 Terrace Bistroo	<b>NETWERKDRINK /DRINK</b>		
<b>RICOMET 2023</b>			
Room Gamma is available for individual meetings and networking sessions to connect with fellow participants and engage in meaningful discussions.			
<b>Wednesday, 30.August, 2023 (Events hosted by the ECOSENS, PIANOFORTE and RADONOM projects)</b>			
9:00 Meeting point: hotel Corbie & hotel Huron	Bus transfer from Mol to Tabloo	15'	
<b>9:30 – 11:00</b> Room: Neutron	<b>Event 1: Integrating the social dimension into sustainability assessments of nuclear energy</b> Chairs: C. Turcanu & G. Meskens (SCK CEN)		
9:30 – 10:25	<i>Keynote: Key principles to achieve a sustainable energy transition/transformation</i> , B. Abelshausen (Vrije Universiteit Brussel, Belgium)	10'	
	<i>Emergent consequences of narrating futures in energy transitions: the case of nuclear energy</i> , M. Durdovic (Institute of Sociology of the Czech Academy of Sciences, Czech Republic)	7'	
	<i>The influence of the Ukraine war on nuclear energy framing in Belgium: theoretical background</i> , P. Thijssen & A. Luypaert (University of Antwerp, Belgium), T. Perko, (SCK CEN, Belgium)	7'	
	<i>From morality to nuclear energy: how generic moral frames increase our understanding of nuclear energy policy frame</i> , A. Luypaert & P. Thijssen (University of Antwerp, Belgium), T. Perko, (SCK CEN, Belgium)	10'	
	<i>Understanding political institutional support for completing the Mochovce nuclear power plant</i> , P. Mihók (Univerzita Mateja Bela v Banskej Bystrici, Slovakia)	7'	
	<i>A system of provision approach for the assessment of a nuclear power plant programme</i> , B. Mignacca & G. Dei & G. Locatelli & P. Trucco & M. Ricotti (University of Cassino and Southern Lazio, Italy)	10'	
	<b>POSTER PITCH: Climate change and energy security considerations as determinants of attitudes towards nuclear energy. Results of a systematic literature review</b> , M. Durdovic (Institute of Sociology of the Czech Academy of Sciences, Czech Republic) , C. Turcanu (SCK CEN, Belgium), R. Sala (CIEMAT, Spain), R. Geysmans (SCK CEN, Belgium), S. Lopez-Asensio & L. Goncalves Oliveira (CIEMAT, Spain)	2'	

	POSTER PITCH: <i>Energy governance and the social dimension of sustainability</i> , G.Meskens & C. Turcanu (SCK CEN, Belgium), C. Mays (SYMLOG, France)	2'	
10:25 – 11:00 Room: Neutron	<b>Discussion: In your view, what social considerations are currently missing or incomplete in sustainability assessments for energy technologies and how can we address these issues?</b> Moderator: G. Meskens (SCK CEN) (presenters and participants)	35'	
11:00 – 11:30	REFRESHMENT BREAK		
<b>11:30 – 13:00</b>	<p><b>Event 2: Sustainability game</b> M. Martell (MERIENCE, Spain) Room: Proton &amp; Neutron</p> <p>The 2030 Sustainable Development Goals Game is a multiplayer, in-person, card-based game that simulates taking the “real world” into the year 2030. A thought provoking game to explore what the world could be like in 2030 and the mindset and actions required to achieve the Sustainable Development Goals.</p>	<p><b>Event 4: Enhancing Stakeholder Engagement in nuclear waste disposal: An interactive activity exploring Tabloo, at community centre (local Tabloo guides from Dessel &amp; Mol)</b> Location: Tabloo exhibition 1st floor</p> <p>A radioactive waste repository will soon be built near Tabloo. One of the partnership tasks is to keep its memory alive for 300 years. Come and discover with your own eyes how they are already doing that today. Follow in the footsteps of scientists and be guided through the world of radioactivity as a result of stakeholder engagement process.</p>	
13:00 – 14:15 Bistro	LUNCH BREAK		
<b>14:15 – 15:45</b> Room: Neutron	<b>Event 3: From uranium mining to decommissioning and waste disposal: research on the nuclear fuel cycle</b> Chair: F. Abraham (University of Exeter)		
14:15- 15:15	<i>Strategization of stakeholder interaction in nuclear waste disposal in the Czech Republic</i> , M. Durdovic, Institute of Sociology of the Czech Academy of Sciences, Czech Republic	7'	
	<i>The Missing Decision. Nuclear Decommissioning and the Issue of the Waste Repository in Late Twentieth-Century Italy, 1976-2001</i> , M. Elli (Department of Historical Studies - State University of Milan, Italy)	7'	

	<i>Putting sociotechnical integration into practice: STIRring in advanced nuclear reactor technology research and innovation</i> , J. Kenens, R. Geysmans, C. Turcanu, (SCK CEN, Belgium)	10'	
	<i>Uncontrolled but Intentional: Addressing the Conundrum of Uranium Waste Disposal</i> , S. Sugawara, H. Yasuda (Hiroshima University), T. Saito, (Japan Atomic Energy Agency), H. Fumoto (Japan Inspection Co., Ltd.)	7'	
	<i>Zooming in and zooming out: public views on the extension of the lifetime of Belgian nuclear power plants Doel 1 and 2 until 2025</i> , C. Turcanu (SCK CEN, Belgium), B. Abelshausen (Vrije Universiteit Brussel, VUB), I. Catteeuw, (Codecrea, Belgium); R. Geysmans, (Belgian Nuclear Research Centre, SCK CEN)	7'	
	<i>Exploring the socio-technical boundary conditions of nuclear technology and innovation: the case of spent fuel partitioning and transmutation</i> , R. Geysmans (SCK CEN, Belgium), M. Silvikko de Villafranca (Aalto University, Finland) J. Kenens, (SCK CEN, Belgium)	7'	
	POSTER PITCH: UK Nuclear Heritage: A values-based approach to a modern industrial landscape. M. Potter, University of York, UK	2'	
	POSTER PITCH: <i>40 years of research in the HADES Underground Research Laboratory: exploring and defining paths towards geological disposal</i> , R. Geysmans (SCK CEN, Belgium), M. Silvikko de Villafranca, (Aalto University, Finland); G. Meskens, (SCK CEN and Ghent University, Belgium)	2'	
15:15 – 15:45	<b>Testimonial: Could you share the most remarkable observation, personal experience or anecdote regarding stakeholder engagement in research and innovation related to any aspect of the nuclear fuel cycle?</b> (presenters and participants)	30'	
15:45 – 16:15	BREAK		
<b>16:15 – 18:00</b>	<b>Event 4: Enhancing Stakeholder Engagement in nuclear waste disposal: An interactive activity exploring Tabloo, at community centre</b> (Local Tabloo guides from Dessel & Mol) Location: Tabloo exhibition 1st floor	<b>Event 2: Sustainability game</b> M. Martell (MERIENGE, Spain) Room: Proton & Neutron  The 2030 Sustainable Development Goals Game is a multiplayer, in-person, card-based game that simulates taking the “real world” into the year 2030.	


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	A radioactive waste repository will soon be built near Tabloo. One of the partnership tasks is to keep its memory alive for 300 years. Come and discover with your own eyes how they are already doing that today. Follow in the footsteps of scientists and be guided through the world of radioactivity as a result of stakeholder engagement process.	A thought provoking game to explore what the world could be like in 2030 and the mindset and actions required to achieve the Sustainable Development Goals.		
18:00	Enjoyable walk to dinner (1.5 km) – optional transport will be ensured			
<b>18:30</b> Location: Nuclea sport club, Bouretang 2000, Mol	<b>RICOMET CONFERENCE “Nuclea” BBQ</b> The dinner is sponsored by SCK CEN			
21:30	Transfer to Mol			






<b>RICOMET 2023 ((Events hosted by the RADONOM, EURAMED ROCC-N-ROLL, PIANOFORTE &amp; ECOSENS projects)</b>				
Room Gamma is available for individual meetings and networking sessions to connect with fellow participants and engage in meaningful discussions.				
<b>Thursday, 31.August, 2023</b>				
9:00 Meeting point: hotel Corbie & hotel Huron	Bus transfer from Mol to Tabloo			
<b>9:30 – 11:00</b>	<b>Event 5: The human factor in reducing the radiation risk of medical imaging: The role of risk communication and anxiety management strategies</b> Moderator: S. Molyneux-Hodgson (U Exeter) Room: Proton		<b>Event 6: Managing NORM in geothermal installations (Workshop with invited representatives of authorities, experts and industry. The discussion will be real-time visualised by an artist)</b>  Moderators: Tanja Perko & Robbe Geysmans (SCK CEN) Room: Gamma	


9:30 – 10:45	<i>Collecting scientific evidence for Radiation Risk communication, R. Gaspar (Lusófona University, HEI-Lab: Digital Human-Environment Interaction Lab, Portugal)</i>	15'	<p>9:30-9:35 Introduction</p> <p>9:35-10:00 Topic 1: Expectations and experiences regarding <b>radiation protection during operation</b> <i>Introduction by Wouter Schroeyers (UHasselt) and group discussion</i></p> <p>10:00-10:25 Topic 2: Expectations and experiences regarding <b>NORM management when handling waste</b> from geothermal industry <i>Introduction by Linde Pollet (UHasselt and JRC) and group discussion</i></p> <p>10:25-10:50 Topic 3: Expectations and experiences regarding <b>public communication and engagement</b> <i>Introduction by Tanja Perko (SCK CEN and UAntwerp) and group discussion</i></p> <p>10:50– 11:00 Wrap-up of discussion based on capitation by visual artist</p>
	<i>Radiation Imaging: Psychophysiological factors and Strategies for Patient's coping improving. L. Vieira, A. F. Pires, A. Grilo (H&amp;TRC, Health and Technology Research Center, ESTeSL/IPL, Portugal)</i>	15'	
	<i>Communicating, understanding and professional development in medical radiological protection: a role for the visual arts, J. Malone (Trinity College Dublin, Ireland)</i>	15'	
	<i>Myocardial Perfusion Scintigraphy: Impact of Patient Anxiety on Image Quality, C. Carvalho, M. Almeida-Silva et al. (H&amp;TRC, Health and Technology Research Center, ESTeSL/IPL, Portugal)</i>	15'	
	<i>Radiation and Society, I. Paiva (Instituto Superior Técnico, IST, Lisbon, Portugal)</i>	15'	
10:45 – 11:00	<b>Discussion: How can SSH contribute to the research topics prioritised from EURAMED?</b>		
11:00 – 11:20	REFRESHMENT BREAK		

11:20 – 13:15	<b>Event 7: Societal aspects of Radon and NORM (Scientific session with visual facilitation)</b> Room: Proton	<b>Continuation of Event 6: Managing NORM in geothermal installations (Workshop with invited representatives of authorities, experts and industry.)</b> Moderator: Robbe Geysmans, SCK CEN Room: Gamma
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11:20 – 11:50	<b>CITIZEN SCIENCE IN RADON &amp; NORM</b> Chair: Meritxell Martell (MERIENCE, Spain) Room: Proton			11:20-11:50 Group discussion on needs for future research regarding radiological risks perception on protection behavior associated with geothermal industry
	<i>RadoNorm Citizen Science Network in Radon Testing and Mitigation.</i> M. Akosua (SCK CEN), M. Martell, (Merience SCP, Spain), D. Aksamit, G. Peralta, A. Markiewicz, Z. Podgórska, K. Wołoszczuk, (AHSRadon Hunt, Poland), N. Canha, M. Felizardo, M. Almeida, J. Lage, C. Antunes, M. Malta, H. Fonseca (RadAR, Portugal), F. Bianchini, L. Grassi, S. Sbrulli (OCRA, Italy), A. Ďurecová, F. Ďurec, R. Rabenseifer, M. Krajčík, M. Ponický (RadonGPS, Slovakia), L. Quindos, F. Sanz, F. Romero (RADOHOW, Spain); K. König, D. Kocman, J. Vaupotič, J. Board, N. Žagar (RadoNorm-SLO, Slovenia), T. Perko (SCK CEN, Belgium)	10'		
	<i>POSTER PITCH: Portugal, citizen science, high schools, radon measurement, local communities, radon mitigation.</i> C. Antunes (Agência Portuguesa do Ambiente, APA, Portugal), N. Canha, M. Felizardo, J. Lage, S. Marta Almeida, M. Reis (Instituto Superior Técnico, Universidade de Lisboa, Portugal), M. Malta, H. Fonseca – (Agência Portuguesa do Ambiente, APA, Portugal)	2'		
	<i>POSTER PITCH: Exploring the potential of citizen science for radon research.</i> Y. Tomkiv, R. L. Anjum, D. H. Oughton, (NMBU, Norway)	2'		
	<b>Reflection: How to make citizen science initiatives sustainable over time?</b> (presenters and participants)	20'		





11:50 – 12:35 Room: Neutron	<b>SSH related to NORM</b> Chair: Wouter Schroeyers (Hasselt University, Belgium) and Hans Van Marcke (MONA)		
	<i>The role of news media for asset identification.</i> F. Panzarella (SCK CEN & KU Leuven, Belgium), V. Cappuyns (KU Leuven, Belgium), C. Turcanu (SCK CEN, Belgium), B. Abelshausen (VUB, Belgium)	10'	
	<i>Concrete produced with NORM-contained by-products: The perception of stakeholders within three EU countries.</i> N. Love (SCK CEN & Hasselt University, Belgium), R. Geysmans (SCKCEN, Belgium), S. Leroi-Werelds (Hasselt University, Belgium), N. Železnik (EIMV, Slovenia), I. Fojtíková (National Radiation Protection Institute, Czech Republic), T. Perko (SCKCEN and University of Antwerp, Belgium), W. Schroeyers (Hasselt University, Belgium), R. Malina (Hasselt University, Belgium)	10'	
	<i>A multidisciplinary approach to radiation risks from geothermal installations.</i> L. Pollet (EC-JRC, Geel & Hasselt University, Belgium), T. Perko (Belgian Nuclear Research Centre SCK CEN, Belgium), S. Schreurs (Hasselt University, Belgium), M. Hult (EC-JRC, Belgium), R. Geysmans (SCK CEN, Belgium), W. Schroeyers (Hasselt University, Belgium)	10'	
	<i>POSTER PITCH: RadoNorm Early Career Researchers Council – Goals and Activities.</i> A. Degenhardt (Federal Office for Radiation Protection, BfS, Germany), M. Muric (SCK CEN, Belgium), J. Abuhamed, (Tampere University, Finland), W. John (BfS, Germany)	2'	
12:35 – 13:25 Room: Neutron	<b>SSH related to RADON</b> Chair: Boris Dehandschutter (FANC, Belgium & European Radon Association)		
	<i>Evidence-based guidance on survey methodology in risk research: data cleaning.</i> M. Muric (SCK CEN & UA, Belgium), P. Thijssen (University Antwerp), T. Perko (SCK CEN & UA, Belgium), C. Turcanu (SCK CEN, Belgium)	10'	
	<i>Open-ended interviews on the barriers and facilitators to radon management in homes in France. Results and perspectives.</i> C. Schieber, S. Andresz (CEPN, France)	7'	
	<i>Facing the Facts: An Experimental Study to Test the Risk Convergence Model in the Context of Radon Communication.</i> S. Apers (University of Antwerp, Belgium & SCK CEN), H. Vandebosch (University of Antwerp, Belgium), T. Perko (SCK CEN, Belgium)	10'	


	<i>Exploring micro and macro effects of smoking on European radon mitigation intention.</i> F. Van den Eynde, Peter Thijssen (Faculty of Social Sciences, University of Antwerp)	10'	
	POSTER PITCH: <i>Radon spa controversy in the selected member states of the European Union.</i> P. Mihók (Univerzita Mateja Bela v Banskej Bystrici, Slovakia)	2'	
	POSTER PITCH: <i>Communication and perception of radon in Radon Spas in Austria and Germany.</i> K. Himmelbauer (AGES, Austria), C. Poelzl-Viol (BfS, Germany), K. Kerndl (AGES, Austria), R. Geysmans (SCK CEN, Belgium), T. Perko (SCK CEN, Belgium)	2'	
	POSTER PITCH: <i>A Qualitative study into contractor views on the Irish and UK radon mitigation industry.</i> D. Hevey & G. Bradley (TCD, Ireland), T. Perko (SCK CEN & UA)		
	<b>Reflection:</b> <b>How can theory from SSH contribute to better understanding of human behavior related to Radon and NORM?</b> (presenters)	10'	
13:25 – 14:15 Bistro	LUNCH BREAK  <i>Meeting of the RadoNorm citizen science team and CS projects (Internal RadoNorm meeting)</i>		

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<p><b>14:15 – 15:15</b></p>	<p><b>Event 8: Emergency management game: The VentiRay game</b>            J. Kenens &amp; A. Nagy (SCK CEN, Belgium)            Room: Gamma</p> <p>This game translates radiation protection principles into an engaging board game. In the game, you go up against the VentiRay dragon, who, once awakened, endangers the forest animals. Let's play and learn more about radiation protection and protective actions in case of radiological emergency.</p>	<p><b>Event 9: Showcase: Serious game on radioactive waste management (demonstration)</b>            N. Zeleznik (EIMV, Slovenia)            Room: Proton</p> <p>The Pathway Evaluation Process (PEP) is a serious game on governance of radioactive waste management (RWM) that has been initially developed within the SITEX-II EU project. The PEP methodology has the ambition to create the conditions of a fair dialogue on RWM among various pluralistic societal components, providing them with equitable opportunities to contribute to the framing of the purpose and content of the exchanges (on the same footing).</p>
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			This event will provide insights on the objectives, the mechanisms, and the different uses of the PEP.
15:15 – 15-30	BREAK		

<b>15:30 – 17:00</b> Room: Neutron	<b>Event 10: Safety, Security and Emergency preparedness &amp; response</b> Chair: Joan Camps, NERIS R&D committee		
	<i>VentiRay: A case Study for Serious Gaming in Radiation Protection.</i> A. Nagy, J. Kenens (SCK CEN, Belgium)	10'	
	<i>SaveEcoBot: Empowering Transparency in Radiation Safety.</i> P. Tkachenko (SaveDnipro, NGO, Ukraine)	7'	
	<i>The construction of radiation risk perception: a disassembling exercise built on Actor-Network Theory and Quantum Physics.</i> S. Van Balen, E. Shwageraus, N. Read (University of Cambridge, UK)	10'	
	<i>Crisis Communication on Social Media – Lessons learned from Covid-19.</i> M. Gruß (BfS, Germany)	7'	
	<i>Nuclear power plant's personnel in war – crucial and defenseless: The case of Ukrainian Zaporizhzhia NPP in 2022-2023.</i> S. Mirnyi, Chornobyl University, Ukraine	7'	
	POSTER PITCH: <i>“Too Strict or Too Lax”? IAEA and the Evolution of Nuclear Safety Standards.</i> K. Patil (Fried-rich-Alexander University of Erlangen_Nuremberg)	2'	
	POSTER PITCH: <i>Tools to facilitate a structured stakeholder discussion on the maturity of evidence for safety of nuclear facilities.</i> A. Ikonen (EnviroCase, Ltd. & University of Eastern Finland)	2'	
	<b>Forum: How Emergency Preparedness and Response adapt to societal changes?</b> (presenters and all participants)		
<b>17:00 – 17:15</b>	<b>Kjell Anderson award to Prof. Dr. Ortwin Renn</b>		
17:15	Transfer from Tabloo to Mol for those that are not attending the SHARE GA		



17:30 – 19:00 Room: Proton	<b>SHARE General Assembly and elections of the Executive Committee</b> (Hybrid: Tabloo & on-line) Registration for on-line participation is required at <a href="#">Meeting Registration - Zoom</a>		
19:30	<b>SHARE networking dinner (members of SHARE)</b>		
Friday, 1. September, 2023 (Events hosted by the PIANOFORTE project)			
9:00	Bus transfer from Mol to Tabloo		15'
9:30 – 11:00 Room: Neutron & Proton	<b>Event 11:</b> <b>Bridging SSH and Natural Science Perspectives in research and innovation: Contributions, experiences, challenges and lessons learned from SSH in different projects</b> Chair: Seifallah BEN HADJ HASSINE (EC) and Yevgeniya Tomkiv (SHARE)		
	<b>PIANOFORTE:</b> F. Vanhavere (PIANOFORTE) & C. Turcanu (SHARE)		5'
	<b>Rocc-n-Roll:</b> C. Hoeschen (rocc-n-roll) & S. Molyneux-Hodgson (SHARE)		5'
	<b>MYRRHA:</b> G. Manfredi (MYRRHA) & R. Geysmans (SHARE)		5'
	<b>HARPERS:</b> E. Jacobs (HARPERS) & M. Martell (SHARE)		5'
	<b>RadoNorm:</b> U. Kulka (RadoNorm) & T. Perko (SHARE)		5'
	<b>EURAD:</b> L. Théodon (ANDRA, EURAD co-ordinator) & N. Zeleznik (SHARE)		5'
	<b>Round table discussion</b> 1. How do different projects approach the selection of research priorities, and how does the field of Social Sciences and Humanities (SSH) contribute to shaping these priorities? 2. In what ways does SSH contribute to research efforts focused on the selected priorities, and what unique perspectives and methodologies does it bring to the table? 3. What are some effective strategies and best practices for fostering multidisciplinary collaboration in research, particularly in the context of RP projects?		60'
11:00 	<b>SHARE Awards ceremony</b> <b>SHARE Platform will award the most outstanding early career researcher presentations under three categories: Methodological approach; Societal impact; Development of theoretical framework</b>		
11:10 – 11:30	BREAK		
11:30 – 12:30	<b>Event 12: WORKSHOP Updating the SHARE strategic research agenda and prioritisation of research topics.</b>		60'

Room: Proton	SHARE SRA <a href="https://www.ssh-share.eu/wp-content/uploads/2020/10/Revision-SSH-SRA-After-consultationAugust2020-October-2020-FINAL.pdf">https://www.ssh-share.eu/wp-content/uploads/2020/10/Revision-SSH-SRA-After-consultationAugust2020-October-2020-FINAL.pdf</a>		
12:30 – 13:00 Room: Neutron	Event 13: Closing session	30'	
11:30 – 13:30	LUNCH BOX (takeaway)		
13:05	Transport to Mol train station (and carpooling to the airport)		

## Useful information: Ricomet.eu

### Organisers

RICOMET 2023 organising committee members include:

<p><b>Tanja Perko</b> SCK CEN, Belgium</p>	<p><b>Yevgeniya Tomkiv</b> NMBU/ CERAD, Norway</p>	<p><b>Meritxell Martell</b> Merience, Spain</p>	<p><b>Sonja Ruts</b> SCK CEN</p>
<p> Contact RICOMET Organisers</p>		<p> RICOMET Twitter</p>	

### SHARE Awards:

SHARE Platform will award **the most outstanding early career researcher** presentations under below three categories: Methodological approach; Societal impact; Development of theoretical framework. Each of the three recipients will receive a 200 euro prize



## Event 1: Integrating the social dimension into sustainability assessments of nuclear energy

The session Integrating the social dimension into sustainability assessments of nuclear energy session is mainly dedicated to the ECOSENS project presentations. ECOSENS aims to create a neutral space where specialists in social sciences (including economics, sociology, Science and Technology Studies, among others) and humanities and in nuclear energy research and policy will meet, exchange views and collaborate with civil society and other relevant stakeholders in order to:

- Provide a societal perspective on the development and use of existing and new nuclear technologies, in the context of major societal challenges: climate crisis, sustainable development and energy security, by opening up the technoscientific issues to the social, political, cultural and ethical context, in order to guide policies in the nuclear field.
- Provide an assessment of nuclear energy sustainability considering the entire life cycle of the current nuclear technologies, possible evolutions of the energy markets and nuclear technologies in the transition toward climate neutrality, and the societal perspective in order to reveal and evaluate the possible roles of nuclear power in the future;
- Provide a radically new economic model, based on the System of Provision (SoP), for the assessment of nuclear energy, overcoming the key weaknesses of existing economic models, providing a suite of indicators relevant not just for the investors (e.g. equity holders) but for a broad variety of stakeholders (e.g. consumers, governments, suppliers).



## Keynote : Key principles to achieve a sustainable energy transition/transformation

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### Abstract

The move towards sustainability has urged societal change in all aspects ranging from changing individual behavioural patterns to academic disciplinary restructuring. The energy sector is a clear example of this wherein individual citizens or households transition towards greener energy production or reduce their energy production, and academic disciplinary boundaries are broken to establish transdisciplinary research and learning labs. A fundamental questioning of these changes and whether they lead to sustainability is however often overlooked or ignored. Whether a change is incremental, transitional, or transformative is however essential to ensure that changing behaviours, insights, knowledge, and technologies lead to sustainability. To understand whether the endpoint of changes in the energy sector are sustainable, it needs to be understood that the worldview in which these changes are framed, and the meaning given to a sustainable energy sector as an end-goal are aligned. One way to achieve this is through stakeholder engagement wherein these worldviews and meanings can be included from the onset of decision-making process from which these changes result. Four principles of stakeholder engagement (or transdisciplinarity) are essential to achieve this alignment: willingness, desirability, pragmatism, and capitals. Empirical evidence from other fields of study, such as environmental management, show the potential for alignment when these principles are adhered to in decision making processes steered towards sustainability. It is thus hypothesised that by introducing these four principles in the energy sector an energy transition towards sustainability is attainable.

## Emergent consequences of narrating futures in energy transitions: the case of nuclear energy

M. Durdovic

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### **Abstract**

The presentation propounds a general theoretical argument about narrating futures and applies it to the particular case of nuclear energy. It goes beyond the perspective of social constructionism and analyzes the temporal relationship between narratives, as employed in social interactions, and the reality of structural conditions in societies.

The first part combines the morphogenetic approach of Margaret Archer and the narrative hermeneutics of Paul Ricoeur to conceptualize emergent consequences, clarifying the role of future-oriented narrative activity in generating these consequences and responding to them.

The second part relates this theoretical framework to three modern energy transitions – the transition to coal, the post-World War II transition to nuclear power, and the contemporary transition to renewables – and shows how emergent consequences stimulate narratives of variant futures. The interlinking of interactions, narratives, and structures offers a conceptual perspective suitable especially for research areas where consistent consideration of environmental, material, or technological structures is indispensable. The presentation is based on an article published in 2022 in the journal *Futures*.

**Acknowledgements:** This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.

## The influence of the Ukraine war on nuclear energy framing in Belgium: theoretical background

P. Thijssen<sup>1</sup>, A. Luypaert<sup>1</sup>, T. Perko<sup>2,1</sup>

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### Abstract

While in another presentation we show the link between morality and nuclear policy frames (see Luypaert et al.), here we explore if certain combinations of these frames are more impactful than other ones, in terms of reception and acceptance (Zaller, 1992). Research has after all shown the role of morality in the acceptance of new technology and energy policies (Roeser, 2017; Taebi et al., 2012; Vandermoere et al., 2010). Moreover, different groups prefer different morals (Haidt & Graham, 2007), which might affect the acceptance of policies combined with certain frames differentially (Bain & Bongiorno, 2020). In terms of political parties' impact on public opinion on nuclear policy, however, research has primarily focused on issue ownership and policy defending (Latré et al., 2019; Müller & Thurner, 2017), whereas the impact of using specific moral frames is unknown.

We address this gap using tweets of Flemish politicians communicating on nuclear energy before and during the Ukraine-conflict. We use machine learning to automatically identify moral and policy frames in each tweet. To measure impact in terms of reception, we look at the number of retweets, for acceptance we look at their tone. By examining the (re)tweeter's profile, we differentiate the impact within different political groups.

Acknowledgements: This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.

## From morality to nuclear energy: how generic moral frames increase our understanding of nuclear energy policy frame

A. Luypaert<sup>1</sup>, P. Thijssen<sup>1</sup>, T. Perko<sup>2,1</sup>

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<sup>2</sup>SCK CEN, Belgium

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### Abstract

Moral frames focus on the moral reasoning behind why things should be dealt with in a certain way (Haidt & Graham, 2007). We thus see these frames on social and traditional media when politicians defend certain nuclear policy options. This is not surprising as research has shown that morals play an important role in public attitudes toward science and technology (Bain & Bongiorno, 2020; Vandermoere et al., 2010) and has addressed the importance of including morality in nuclear energy discussions (Roeser, 2017; Taebi et al., 2012). However, to our knowledge, no one has attempted to connect specific moral and nuclear energy frames. In this presentation, we thus test the inter-relations between four generic moral frames and four nuclear policy frames. We use survey data in which Flemish local politicians were asked to order four general and four energy policies according to preference. Each policy linked to a predefined moral and energy frame, respectively. Besides providing insight into how morality and nuclear policy frames are connected, our research also gives insight into why some policy frames are best combined with particular morality frames, and not with others, to potentially improve the reception and acceptance of nuclear policy communication (Zaller, 1992)..

Acknowledgements: This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.

## Understanding political institutional support for completing the Mochovce nuclear power plant

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### **Abstract**

This presentation overviews that part of a political institutional support for completing the Mochovce nuclear power plant (NPP) in Slovakia which was aimed at an elimination of opportunities for non-governmental organisations (NGOs) to attempt to integrate the social dimension into environmental/sustainability assessments in this project's permit procedures. It identifies how the Slovak government supported this project, and evaluates the democratic legitimacy of that support. The analysis draws on and summarises a large data set and other information, gathered from a wide range of official and academic sources, press agencies and NGOs. The results show that the Slovak authorities applied significant institutional political pressure to promote the project, and supported its completion by circumventing the legal rights of NGOs to transparency and participation in project permit procedures. The results also explain the context and rationale of measures used to limit the contributions from the Mochovce NPP operation to the Nuclear Decommissioning Fund, and also used to shift part of nuclear decommissioning costs from industry and government onto consumers of non-nuclear generated electricity. In the conclusion the key results are reviewed in the context of institutional recreancy and the theory and practise of regulatory capture.

Acknowledgements: This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.

## A system of provision approach for the assessment of a nuclear power plant programme

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### Abstract

Programmes are the central element to bring together policies and consumption behaviours to address grand challenges. This paper discusses how the System of Provision (SoP) approach, i.e. a holistic and comprehensive framework linking policy interventions and consumption behaviours, can be an ideal theoretical framework for sensemaking how policies promote programmes, thereby shaping consumption patterns and affecting grand challenges. In order to investigate how policymakers can leverage the SoP approach, this paper presents a narrative review of the literature about the SoP approach. In particular, this paper first unveils how policymakers can leverage the SoP approach in their decision-making processes to promote programmes. Second, it presents how projects can shape consumption behaviours and vice versa. Last, it focuses on the case of nuclear power plant programmes, discussing how the SoP approach can move forward the understanding and discussion around nuclear power plants. This modelling approach contends that electricity consumption is integrally connected to how services (i.e. electricity generation) are provided. Agents in the chain of provisioning, including consumers and producers, as well as the state, have complex and competing priorities with contested outcomes. These vertical chains of provision intersect with cross-cutting structures and cultures, and thereby each SoP is highly context-specific.

Acknowledgements: This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.

## **POSTER PITCH: Climate change and energy security considerations as determinants of attitudes towards nuclear energy. Results of a systematic literature review**

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### **Abstract**

We will present the results of a systematic literature review conducted from autumn 2022 to spring 2023. The review is part of the ECOSENS project investigating views and risk perceptions, benefits, and potentials of current and new (e.g., small modular or generation IV reactors) nuclear technologies in the context of major societal challenges. Following the PRISMA protocol, the review used Scopus and Web of Science databases to identify 95 scholarly articles in English published from 2011 to 2022 that deal with the study of public attitudes towards nuclear energy in the context of climate change and energy security. On the one hand, the quantitative bibliometric analysis revealed the temporal and geographical distribution of articles and yielded insights into the network of researchers working on the topic. On the other hand, the qualitative thematic analysis focused on understanding how, to what extent, and with which results climate change and energy security have been addressed in research on public attitudes towards nuclear energy. Besides providing input for the ECOSENS project, the discussion of review findings is conducive to identifying needful avenues of research responding to a dramatically changed energy security situation after the Russian invasion of Ukraine in 2022.

**Acknowledgements:** This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.

## POSTER PITCH: Energy governance and the social dimension of sustainability

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### Abstract

What energy future do we desire? What energy future is possible? 'The Future We Want' was the title of the outcome document of the United Nations Conference on Sustainable Development in Rio de Janeiro in 2012. The conference marked the 20th anniversary of the historic Conference on Environment and Development, known as 'The Earth Summit', held in the same city in 1992. That event laid the ground work on which sustainable development thinking still builds today. Since then, 'sustainability' has been widely applied as an overall quality criterion to assess human practices with potentially ecological and social harmful consequences. Also in the context of energy governance, sustainability is used to evaluate 'energy technologies', 'energy systems', 'energy policies' and 'energy production and consumption patterns'. In doing this, the 'three pillar approach', 'integrating' economic, environmental and social sustainability, remains popular up to the present day. However, while the common idea is that economic and ecological aspects of technologies, systems, policies or patterns can be evaluated through calculation and empirical observation, 'social sustainability' remains a vague criterion open to interpretation. In addition, knowing that also economic and ecological aspects have social dimensions, the usefulness of the three pillar approach becomes questionable in itself.

Building on this rationale, the presentation will reflect on the discussions on the concept of 'social sustainability' in the context of energy governance as they were held during the international workshop 'The art and science of imagining energy futures' on 29 and 30 March 2023 in Brussels. This workshop was organised as part of the ECOSENS project ('Economic and Social Considerations for the Future of Nuclear Energy in Society') with the aim to provide inspiration and guidance for formal sustainability assessment methods in the context of energy governance. One general idea that came out of the workshop was that, in order to provide the concept of social sustainability with an evaluative potential, the social would rather need to refer to the participative character of sustainability assessment itself, instead of (only) to the social impact of energy governance in the first place.

Acknowledgements: This research was conducted within the ECOSENS project – Economic and Social Considerations for the Future of Nuclear Energy in Society, funded from the Euratom Research and Training programme, a complementary funding programme to Horizon Europe, under grant agreement No 101060920.



## **Event 2: Sustainability game**

How will our world be in 2030? How can we as individuals and/or organisations contribute to sustainability and to the Sustainable Development Goals (SDGs)?

The 2030 SDGs Game is a multiplayer, in-person, card-based game that simulates taking the “real world” into the year 2030. This thought-provoking game-based workshop brings sustainability to life and highlights the importance of balancing the three pillars of People, Planet and Prosperity.

2030 SDGs Game workshops can be held in corporate, governmental, educational and community settings. The players discover why the SDGs are important for the world, what possibilities arise by looking at the world through the SDGs and how we can relate to the SDGs ourselves. The game is linked to the players’ own reality, raising awareness of the interdependencies and consequences of our actions.

Dr. Meritxell Martell, a certified facilitator, will lead us in initiating a discussion about our potential contributions to a sustainable world, both at the individual and organizational levels. As an engaging icebreaker, the game is likely to influence all RICOMET events, creating a seamless connection throughout strategic sessions, team-building activities, stakeholder engagement meetings, and network events. This game has the potential to leave a lasting impact, forever altering our perspectives on the world.

Acknowledgement: This game is supported by the Strategic environmental consultancy MERIENCE.

## **Event 3: From uranium mining to decommissioning and waste disposal : research on the nuclear fuel cycle**

This session offers a comprehensive exploration of societal aspects of the nuclear fuel cycle, covering topics from uranium mining to decommissioning and waste disposal. The presentations within this session shed light on the intricate interplay between technological advancements, socio-political considerations, stakeholder engagement, and public perceptions. By delving into historical contexts, strategic approaches, and practical applications, the session provides a rich understanding of the challenges and opportunities inherent in managing the complete lifecycle of nuclear technology. Attendees can expect to gain insights into the complexities of waste repository issues, the role of sociotechnical integration in innovation, public viewpoints on nuclear power plant extensions, and the socio-technical dimensions of nuclear technology and innovation. Additionally, the session explores values-based perspectives on nuclear heritage, and offers reflections on four decades of research towards geological disposal. This comprehensive session is a valuable platform for participants to engage with the diverse facets of nuclear fuel cycle research.

## Strategization of stakeholder interaction in nuclear waste disposal in the Czech Republic

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### **Abstract**

The case study focuses on the temporal dynamics of stakeholder interaction to provide a sociological analysis of the deep geological repository siting process in the Czech Republic. By introducing the concept of strategization, it clarifies the shift in interaction after the state authorities backed out of a dialogue with local communities at pre-selected sites in 2016 but continued to push ahead with their siting mission. The study triangulates complementary data sources (interviews, focus groups, content analysis, and participant observation) to capture the qualitative dimension of stakeholder interaction. Insights concerning the effects of strategization derived from the Czech case contribute to critically examining the participative turn in nuclear waste management. Two mismatching strategies emerged in response to the failed dialogue: an avoidance strategy by state institutions and an influence strategy by local communities. The resulting mutual distrust and heightened level of contestation among the opposing stakeholder groups jeopardize the implementation of the EU nuclear waste policy. The question for researchers and policy makers is whether the Czech case might augur a broader trend.

## The Missing Decision. Nuclear Decommissioning and the Issue of the Waste Repository in Late Twentieth-Century Italy, 1976-2001

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### Abstract

This study – which is based on the methodology of archive-base historiography - focuses on the awkward elaboration of an Italian 'roadmap' to deal with nuclear waste and, notably, the crucial role of a national repository. Drawing on a number of unpublished archival sources, but crucially on uncatalogued original documents of ENEA – then the Italian nuclear authority – my work investigates the specific contribution of experts and scientists, and their relationship with political decision-makers. Preliminary conclusions:

- In the 1970s, the basic assumption was that nuclear waste would be reprocessed in a single national facility. By 1976, however, as a result of both US concerns for proliferation-sensitive technologies and the ever-decreasing perspective for nuclear power in Italy, an open-cycle approach was adopted.
- The issue of devising a national repository got more urgent in 1983 with the moratorium on sea dumping.
- By 1984 ENEA had prepared definite proposals on the repository issue, but it received no acknowledgment of any kind by the Ministry of Industry in spite of repeated urgings.
- The issue was resurrected in mid 1990s: after 2001 political elections, failures were attributed to bad organisation and defective legislation. The siting decision, though considered most urgent, was not taken and it is still missing.

## Putting sociotechnical integration into practice: STIRring in advanced nuclear reactor technology research and innovation

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### **Abstract**

As attention to the interconnections between science, innovation, and society grows, the question of how to implement and achieve sociotechnical integration becomes ever more salient. Sociotechnical integration approaches seek to foreground and manage challenges that may arise from the integration of and collaboration between stakeholders, knowledge, practices, and sites. Yet their application in highly technical and technology-driven contexts, such as advanced nuclear reactor technology research and innovation, remains scarce. This presentation discusses an ongoing investigation on sociotechnical integration conducted within the context of the Advanced Nuclear Safety Evaluation of Liquid Metal Using Systems (ANSELMUS) project. By applying different methodologies, including Socio-Technical Integration Research (STIR), social scientists at the Belgian Nuclear Research Centre aim to assess the potential agency of experts. In particular, this research examines whether and how experts can make societal considerations an integral part of their daily work and how a reflexive attitude regarding societal and ethical aspects of their work can be encouraged. The presentation discusses preliminary results from this investigation and outlines challenges and opportunities for sociotechnical integration in nuclear research and development.

## Uncontrolled but Intentional: Addressing the Conundrum of Uranium Waste Disposal

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### Abstract

Uranium waste disposal face specific challenges due to its long half-life and the generation of new radionuclides including Ra-226 and Rn-222. This study examines recent discussion of uranium waste disposal in Japan through the lens of science and technology studies.

In the 'isolation and containment' strategy of radioactive waste disposal, the migrations of radionuclides outside the disposal system are regarded as 'unintentional' but possible consequences. Meanwhile, 'intentional' discharge from nuclear facilities in operation can be allowed as long as its process is continuously controlled.

Looking closely at regulatory discourses on uranium waste disposal in Japan, however, the long-term disperse of uranium due to natural features seems to be expected as one of the designed functions of disposal system. In other words, an assumption that uncontrolled but intentional migration of uranium outside the disposal system will reduce radiation exposure in the distant future is seemingly taken into consideration in the long-term safety evaluation.

Reflecting these analyses, the author discusses an intricate relationship between human intention and natural features in radioactive waste disposal from the perspective of actor-network theory.

## Zooming in and zooming out: public views on the extension of the lifetime of Belgian nuclear power plants Doel 1 and 2 until 2025

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### Abstract

Following the ruling of European Union's Court of Justice, and the decision of Belgium's Constitutional Court, an ex post environmental impact assessment (EIA) and a public consultation were conducted in 2021 on the extension of the operational lifetime of Doel 1 & 2 nuclear power plants until 2025, by commission of the Belgian Federal Public Service Economy. Natural or legal persons within a 1,000 km radius of Doel were offered the opportunity to participate in a public consultation on the EIA (<https://economie.fgov.be/sites/default/files/Files/Energy/doel-1-doel-2-rapport-consultations.pdf>).

This contribution reports on the thematic analysis of the 7668 reactions received from respondents indicating Belgian residence and providing comments related to the EIA for the delayed closure of Doel 1 & 2 through an open field. For this purpose, we used qualitative and quantitative data analysis based on open coding approach. To increase the reliability of the coding process, each response was coded by two independent coders proficient in the language of the response. Inter-coder reliability was larger than 0.8 for all main codes.

Main themes emerging from the responses included: i) reactions concerning the EIA report (e.g. clarity, objectivity, missing elements); ii) positive or negative effects of the extension of operational lifetime for Doel 1&2, or nuclear energy in general, (e.g. radiological and non-radiological environmental effects; human health, biodiversity; energy security); and iii) the broader decision-making process concerning energy policy in Belgium.

Examples of the specific viewpoints related to these themes are given, as well connections between themes. In conclusion it is argued that methodological reflections are needed.

Disclaimer: Data underlying this study have been obtained through a public consultation commissioned by the Belgian Federal Public Service Economy. The views and conclusions presented in contribution are solely those of the authors.

## Exploring the socio-technical boundary conditions of nuclear technology and innovation: the case of spent fuel partitioning and transmutation

R. Geysmans<sup>1</sup>, J. Kenens<sup>1</sup>, M. Silvikko de Villafranca<sup>2</sup>

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### Abstract

For decades already, the intertwinements of technology and society are a topic of study and discussion. Yet, a disconnection often persists between techno-scientific projects and the societal challenges they emerge from and contribute to. In the context of an ongoing interdisciplinary project on spent nuclear fuel management at the Belgian Nuclear Research Centre, we sought to unearth, connect and make explicit the various socio-technical intertwinements of spent fuel management that connect the techno-scientific work with socio-technical questions regarding present and future nuclear fuel cycles. For this reason, we conceptualized the notion of socio-technical boundary conditions and mobilized it in desktop research, interviews (n=12), a workshop and a focus group with nuclear stakeholders. We define socio-technical boundary conditions as situational opportunities and constraints that set boundaries for technological development, and that connect to past, current and future practices, needs, desires, and values. In this presentation, we zoom in on partitioning and transmutation, as one potential spent fuel management option, to demonstrate the use of sociotechnical boundary conditions as a conceptual tool. In this way, we aim to highlight that identifying and engaging with socio-technical boundaries can be an important step to enable societal reflection and debate on (nuclear) innovation.

Disclaimer: Research reported on in this contribution has been conducted with the support of the Belgian Energy Transition Fund.

## POSTER PITCH: UK Nuclear Heritage: A values-based approach to a modern industrial landscape

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### **Abstract**

The ongoing decommissioning of the nuclear estate has highlighted the potential loss of nuclear assets due to a lack of existing heritage protection. The UK nuclear industry played an important role in national and international politics, providing a symbol of hope and modernity in the post-war years. Recently, aging infrastructure and technological developments have required the closure of sites and prompted consideration of their heritage significance. This poster will present the early stages of a PhD project aiming to build a framework to determine heritage significance across the UK nuclear estate and consider how heritage value may be protected against the necessary, but substantial changes to the fabric of sites and buildings required due to radiation contamination. A values-based approach will be used to distinguish between different aspects of importance and consider the varying, and sometimes conflicting, attitudes towards the nuclear heritage; archival material, interviews and site visits are anticipated as the primary research methods. Current findings are focused on post-war ideas of the integration of industry into rural locations and the architectural features thought to harmonise designs with the landscape.



## POSTER PITCH: 40 years of research in the HADES Underground Research Laboratory: exploring and defining paths towards geological disposal

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### Abstract

Since the early 1980s, the HADES Underground Research Laboratory (URL) in Mol, Belgium, has been conducting research on the feasibility of geological disposal. Similar to other URLs around the world, HADES provides a 'realistic environment' to study radioactive waste management techniques and materials, with the expectation that insights can be translated to performances and timescales of an actual repository. In this way, URLs offer a tool to make a seemingly distant future comprehensible today. In this presentation, we reflect on how scientific knowledge produced in/through HADES not only describes possible futures, but also contributes to enacting these futures. Building on the field of Science and Technology Studies (STS), emphasis is put on how knowledge production is characterized by the interplay of heterogeneous –and sometimes rather trivial- elements and actors, interlinked through a range of explicit and implicit decisions. We argue that tracing these elements and decisions, making them explicit and reflecting upon them is of key importance, as knowledge production is performative. It makes some things possible and imaginable – and others not. Furthermore, this presentation will focus on what 'making the future' could entail from an ethical perspective, with a particular focus on deliberation and intergenerational justice.

#### **Event 4: Enhancing Stakeholder Engagement in nuclear waste disposal: An interactive activity exploring Tabloo, at community centre**

A radioactive waste repository will soon be built near Tabloo. One of the partnership tasks is to keep its memory alive for 300 years. Come and discover with your own eyes how they are already doing that today. Follow in the footsteps of scientists and be guided through the world of radioactivity as a result of stakeholder engagement process.

## Event 5: The human factor in reducing the radiation risk of medical imaging: The role of risk communication and anxiety management strategies

This event marks the successful conclusion of the 3-year EURAMED rocc-n-roll project, a significant milestone in radiation protection research and development. Representatives of the project, joined by their stakeholders, are joining us at RICOMET to present their accomplishments in the realm of societal aspects. This collaborative effort provides a platform for in-depth discussions on their achievements and offers a glimpse into the future path. Notably, a cornerstone of the project's success is the formulation of a strategic research agenda (SRA) in the domain of medical applications of ionizing radiation and related radiation protection. This SRA has been meticulously shaped through extensive stakeholder consultations, including engagement with the social science and humanities community. Alongside, a coherent roadmap and an interlink document have been meticulously crafted, weaving together viewpoints and identifying synergies from the domains of radiation protection, health research, and digitization. This trio of documents collectively delivers influential guidance to the European Commission and stakeholders, thereby influencing the trajectory of future research endeavors.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 899995. Collecting scientific evidence for Radiation Risk communication

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### Abstract

Research from behavioural sciences such as psychology, has shown that for people to make informed decisions to implement behaviours that protect themselves and others from harm, they need to have the adequate Capabilities, Opportunities and Motivation to do so (COM-B model; e.g. West & Michie, 2020). Risk communication activities can be targeted to enhance capabilities (e.g. through access to information concerning risks and protective actions) and motivations (e.g. increasing personal relevance of the information shared). By doing so, we are increasing people's awareness of the risks associated with exposure to radiation in medical imaging and increasing the probability that people make informed decisions to protect themselves and others they care.

However, to achieve such aims, scientific evidence should be collected, to enable customized communication to the target audience's needs and motivations, knowledge gaps and potentially biased beliefs and other aspects considered priority targets. Moreover, such evidence collection should allow to test communication's effectiveness in achieving the pre-determined goals. Therefore, this presentation will focus on examples of evidence collection approaches and methods, as for example the mental models approach to risk communications, to enable best practices in Radiation Risk communication.

## Radiation Imaging: Psychophysiological factors and Strategies for Patient's coping improving

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### Abstract

**Purpose:** To identify the factors that trigger anxiety or psychological distress in patients undergoing imaging examinations involving ionizing radiation.

To provide coping strategies that help patients to better manage imaging examinations.

**Methods:** To achieve the objectives we conducted a literature review which allowed us to identify the main factors that trigger anxiety and stress in patients who undergo imaging examinations that use ionizing radiation, as well as, the most used coping strategies in these imaging procedures.

**Results:** The main factors contributing to anxiety and stress among patients undergoing this particular type of examination include: a) preparation and procedure of the exam they are going to perform, b) equipment and patient positioning, c) examination results and subsequent clinical decisions, and d) utilization of ionizing radiation.

Various coping strategies can be used to reduce these anxiety factors, such as relaxation strategies (relaxation videos, mindfulness, and listening to music) and/or educational strategies (educational videos and effective communication).

**Conclusion:** Knowing the main factors that emotionally affect patients who undergo imaging examinations with ionizing radiation, it will be possible to adapt guidelines with more appropriate coping strategies and consequently increase the satisfaction and well-being of patients and improve the quality of the results obtained.

**Acknowledgements:** The authors would like to acknowledge the support from FCT/MCTES, granted to H&TRC through UIDB/05608/2020 and UIDP/05608/2020, and also the funding from IDI&CA - IPL, to project IPL/2022/CPMeAQI\_ESTeSL

## Communicating, understanding and professional development in medical radiological protection: a role for the visual arts

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### **Abstract**

The visual arts are rooted in the life of the wider community and while they may lack radiation protection (RP) reference, they can be influential, can illustrate, communicate, inform, inspire, challenge, heal, give pleasure, help put one's professional and personal life in perspective and enrich the experience of being a practitioner/researcher in RP.

Several works from well established, mainly modern, artists will be presented. All inform and challenge our behaviour. They also help address: similarities of method between science and the arts; contexts for uncertainty; the value of a sense of wonder; borders between disciplines; and the value of a reflective, quiet, still approach.

How we feel (or don't feel) about our disciplines, how we approach them, how we internalise and communicate them. How we celebrate them in silence. All of these can find able allies in the arts. They are freely available to those willing to take a risk on them and approach them with sensibility and an openness. The impact of art on radiation professionals, and medicine is endorsed by many great scientists including Einstein and is visible in under explored institutional collections at the IAEA in Vienna and WHO in Geneva.

## Myocardial Perfusion Scintigraphy: Impact of Patient Anxiety on Image Quality

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### Abstract

**Aim:** The goal of this study is to assess the impact of patient anxiety on the quality of myocardial perfusion scintigraphy (MPS) images.

**Methods:** The study included a non-probabilistic sample of 63 patients with clinical indication for MPS in a Lisbon region Nuclear Medicine department who agreed to participate. We have only included subjects undergoing a one-day rest-stress protocol, between November 2022 and March 2023. All patients received information according to the department's usual communication protocol and psychological and physiological parameters were collected. The Spielberger State-Trait Anxiety Inventory (STAI-Y1) and the Visual Analogue Scale (VAS) were used for psychological parameters. Heart rate, blood oxygen, and blood pressure were measured regarding physiological parameters.

Psychological and physiological measurements were taken at five different time points during the study: T1 (when the patient arrived at the service), T2 (before the rest images were acquired), T3 (after the rest images were acquired), T4 (before the stress images were acquired), and T5 (after the stress images were acquired but before the patient left the service). The measurements for the cortisol variable were only taken at T1, T2, and T3.

**Results:** The results of the anxiety assessment showed the following:

- i) Statistically significant differences were found in anxiety levels (STAI-Y1) before and after MPS. Anxiety levels were lower at the final time point (T5).
- ii) Physiological parameters showed differences in values at different time points, except at T4 and T5 in blood pressure.
- iii) Cortisol levels decreased at all three-time points assessed, with the lowest value observed at T3. Regarding the relationship between anxiety and the quality of MPS images, we found that certain physiological variables (such as reduced oxygen in the blood, increased blood pressure, and an increased number of respiratory cycles) were associated with patient movement during cardiac studies, which in turn led to increased image noise.

**Conclusion:** In the present sample, anxiety levels at the various moments of the MPS seem to be related to the increase in patient movement during image acquisition and the consequent increase in image noise.

**Acknowledgements:** H&TRC authors gratefully acknowledge the FCT/MCTES national support through the UIDB/05608/2020 and UIDP/05608/2020. All the authors also acknowledge Instituto Politécnico de Lisboa for funding the project CPMaAQI (IPL/2022/CPMaAQI\_ESTeSL) under its IDI&CA Program.

## Radiation and Society

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### **Abstract**

The discovery of radioactivity and the application of radiation in health, industry, education, and research areas, has changed our Society in many ways. The birth of radiological protection, the different risk perceptions, and the efforts to increase communication of radiological risks were just two aspects of the natural steps into a more educated and knowledgeable Society. A summarized description of developments concerning radiation and Society will be described.

## **Event 6: Managing NORM in geothermal installations (Workshop with invited representatives of authorities, experts and industry)**

Explore the multifaceted challenges of managing Naturally Occurring Radioactive Materials (NORM) in geothermal installations through an interactive and dynamic workshop. This session brings together a distinguished group of invited authorities, industry experts, and representatives for a collaborative exploration of NORM management strategies. Guided by moderators with extensive expertise, this workshop is not just a conversation—it's an innovative experience.

This workshop is an exclusive gathering of invited representatives from authorities, industry, and experts. By uniting minds from diverse backgrounds, the workshop will create a vibrant platform for multi-perspective insights, discussions, and collaborative problem-solving.

### **Real-Time Visualization by an Artist**

In a unique twist, the discussions during the workshop will be brought to life in real-time by a talented visual artist. This dynamic visualization promises to capture the essence of the discourse, transforming complex concepts into engaging visuals that resonate and leave a lasting impact.

The workshop will delve into three pivotal aspects:

- **Radiation Protection During Operation:** Exploring the expectations and experiences surrounding radiation protection measures during the operation of geothermal installations.
- **NORM Management in Waste Handling:** Investigating the expectations and experiences linked to NORM management when handling waste originating from the geothermal industry.
- **Public Communication and Engagement:** Analyzing expectations and experiences concerning public communication and engagement related to geothermal installations.

To conclude the workshop, a captivating wrap-up will be facilitated by the visual artist. This innovative reflection will encapsulate the essence of the discussions, weaving together insights, ideas, and perspectives into an artistic representation that resonates with participants.

### **Group Discussion: Future Research Needs**

Additionally, the session will feature a group discussion focused on identifying needs for future research. Specifically, the discourse will revolve around radiological risk perception and protection behavior associated with the geothermal industry. This collaborative conversation aims to shape the direction of future research endeavors in this critical domain.

**Acknowledgements:** The project RadoNorm has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009. The discussion on radiation protection research needs has received funding from the European Union's "EURATOM" research and innovation program under the 101061037 grant agreement.



## **Event 7: Societal aspects of Radon and NORM (Scientific session with visual facilitation)**

Discover a rich landscape of research findings in the realm of societal aspects surrounding Radon and Naturally Occurring Radioactive Materials (NORM) in this insightful session. At the heart of this session lies the culmination of diligent efforts from WP6 of the RadoNorm project. Through a collection of presentations and poster pitches, we will unveil research results that delve into the intricate interplay between these radiological elements and the societies they impact. From exploring public perceptions to uncovering the challenges of communication and methodologies, this session offers a comprehensive exploration of the societal dimensions that intersect with Radon and NORM.

Acknowledgements: The project RadoNorm has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## RadoNorm Citizen Science Network in Radon Testing and Mitigation

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In recent times, the role of citizen science in enhancing radiation protection practices has become increasingly significant, with the RadoNorm project at the forefront of this transformative movement. RadoNorm acts as a citizen science incubator, facilitating the development of multiple projects in radon priority areas. It fosters a collaborative network of citizen science initiatives across European countries, revolutionizing radon awareness, testing, and mitigation strategies. The primary objective is to enable citizens and radon experts to collaborate on projects aimed at increasing radon measurement and mitigation actions. To achieve this goal, an open call for citizen science initiatives was launched, inviting interested parties such as local communities, schools, NGOs, universities, and social civil groups to apply for funding to conduct radon-related projects. Nineteen projects were submitted and evaluated based on four criteria: overall concept, implementation, impact, and team expertise. Eventually, six projects were selected for funding, including AHSRadon Hunt in Poland, RadAR in Portugal, OCRA in Italy, RadonGPS in Slovakia, RADOHOW in Spain, and RadoNorm-SLO in Slovenia. These projects will focus on indoor radon measurements, with one project also exploring radon concentrations in tap water and water sold for drinking in spa resorts. Measurements will be conducted in various settings, including schools, dwellings, offices, caves, spas, water treatment facilities, and underground mines, utilising both passive and active detectors. Furthermore, the citizen scientists will not only address mitigation techniques but also assess their efficacy in reducing radiation exposure. These citizen science projects in the field of radon aim to provide valuable advice on mitigation strategies in situations where high concentrations of radon are measured, ensuring effective measures are implemented to minimize potential health risks. This approach will not only contribute to the advancement of scientific research, but also will generate a host of additional impacts that reach beyond traditional scientific boundaries. These impacts span a diverse range of areas, including education, society, policy, and more. Even though all six projects involve residents of local communities, three focus on engaging High School Students as the key citizen scientists. Citizen scientists will until May 2024 contribute to scientific publications, datasets, project reports, and dissemination materials such as leaflets and videos. The presentation for the RICOMET conference will provide an overview, not only showcasing the citizen science projects, but also engaging in a discussion about the challenges encountered when establishing citizen science initiatives within the field of radiation protection.

**Acknowledgements:** This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009. We extend our heartfelt gratitude to all members of the citizen science teams AHSRadon Hunt in Poland, RadAR in Portugal, OCRA in Italy, RadonGPS in Slovakia, RADOHOW in Spain, and RadoNorm-SLO in Slovenia for their invaluable

contributions. Additionally, we would like to express our sincere appreciation to all citizen scientists who are dedicating their time and effort towards advancing our understanding of radiation protection from radon.

## POSTER PITCH: Portugal, citizen science, high schools, radon measurement, local

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### Abstract

RadAR aims to engage 60 high school students from 3 schools in Portugal, to empower them to create and implement a local communication strategy that encourages the local community to measure their dwellings and to take action to reduce indoor radon exposure in case of high concentration levels. To achieve these aims, RaDAR will: 1) gather information of radon concentration in 300 dwellings in a poorly characterised Portuguese district; 2) develop dissemination materials about radon management, including a video created by students; and 3) produce a document with guidelines on how to implement a local communication strategy, to be used and/or adapted to other municipalities.

The project will kick-start in September 2023 with meetings with the students of the selected class (9th grade or higher) in 3 high schools (2 in Portalegre and 1 in Ponte de Sor) to present the project. Student citizen scientists will:

- have the freedom to define strategies to communicate to both scholar and local communities, in order to maximise their participation in a radon survey;
- create and disseminate information about radon;
- engage the population to participate in a radon survey, through measuring radon levels in their dwellings and participating in RadAR events including answering a questionnaire to assess their knowledge on radon;
- evaluate the results from the survey and communicate their assessment to the communities;
- create communication tools about radon remediation strategies.

RadAR intends to provide step by step and “real time” information about the project and its phases to all citizen science participants and interested audience in order to promote their interest and engagement. It will utilise targeted messaging to local groups and local NGOs via social networks through a dedicated RadAR webpage that will be integrated in the Portuguese Environment Agency (APA) website.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## POSTER PITCH: Exploring the potential of citizen science for radon research

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### **Abstract**

Norway is one of the countries in the world with the highest concentrations of radon in the indoor air, however, only 21% of the population report to have tested radon in their homes. As the part of the EU-project RadoNorm, citizen science pilot projects were organized in Norway and four other countries with the focus on exploring the potential of this approach to increase rates of radon measurement and remediation. Norwegian pilot project took the 'extreme citizen science' approach, which meant that the participants were involved in defining the project themselves and to choose to what extent they would like to be involved. The project was successful in involving over 100 people in various roles. Citizen scientists participated in the initial workshop on barriers and solutions for remediation, launched a measurement campaign, co-developed a radon remediation guide, and co-organised an open information meeting. This talk will present the results of the Norwegian pilot project and reflect on the potential and challenges of citizen science approaches in the field of radon.

## The role of news media for asset identification

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### Abstract

This study assesses news media coverage for identifying assets relevant to the historical radioactive contamination and the remediation activities of the Winterbeek (Belgium).

The Community Capitals Framework (CCF) is employed as a framing theory for the thematic analysis of news articles to identify what community capitals are mentioned with regard to the Winterbeek valley and how are these capitals discussed in relation to site remediation.

News articles were selected through a keyword search on Nexis Uni and coded on Nvivo.

The Winterbeek provides a useful case study for analyzing news outside the context of emergency and disaster communication and for shedding light on the nexus between community resources, stakeholder engagement and communication in the presence of low doses of ionizing radiation. Such an analysis is useful for stakeholder mapping and provides a solid base from which a multi-stakeholder discussion could start in order to inform (ongoing and future) decision-making for sustainable site remediation projects.

Results show, among others, that financial, built, political and natural capitals are more likely to be identified in news media compared to social, human and cultural capitals. Therefore, media analysis should be complemented with other data collection methods for a comprehensive identification of assets.

## Concrete produced with NORM-contained by-products: The perception of stakeholders within three EU countries

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### Abstract

This exploratory comparative study aims to understand the concrete industry and end-users' perspective regarding the usage of alternative cementitious binders made with NORM-contained by-products. There are certain industrial by-products, generated for example during aluminium or copper production, with enhanced levels of radioactivity. Due to the lack of potential usage for these by products, they have been piling up in landfills, creating potential environmental and health hazards. Various studies have investigated the technical and environmental potential of using these materials as a sustainable alternative to traditional cement in concrete production, thus potentially helping to reduce the 7% of anthropogenic greenhouse gas emissions the concrete and cement industries currently are responsible for. However, due to the radiological aspects of some of these materials, they might be associated with a higher perceived risk by different stakeholders. Using semi-structured interviews with end-users and concrete industry representatives in three EU countries (Belgium, Czech Republic and Slovenia), this study provides a first in-depth understanding of stakeholders' perspectives on the potential use of NORM (Naturally Occurring Radioactive Materials) containing by-products in building material. A thematic and comparative analysis of the data identifies stakeholders' concerns, thresholds and benefits regarding the usage of these NORM-contained by-products. These findings will be useful in decisions made in coming years by policymakers, industry, and scientists who try to contribute to decarbonising the cement and concrete industry.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## A multidisciplinary approach to radiation risks from geothermal installations

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### Abstract

A particular issue in geothermal industry is that pumped up water contains minerals and other impurities, which can accumulate in several places in the geothermal installation, depending on the type and location of the infrastructure. This can allow for higher concentrations of naturally occurring radionuclides (NORs) and other impurities, such as heavy metals, to build up. The radioactivity of the accumulated scales and deposits is generally under exemption level. However, when these materials are not handled and/or disposed properly, they can still be harmful for humans or the environment. In order to understand the related risks and ensuing radiation protection behaviour, this study presents a multidisciplinary approach to address both technical and societal aspects related to the geothermal industry.

In a first part of the study, the composition of deposits, found during maintenance, was characterized by using gamma-ray spectrometry and XRF. The geothermal installation is a doublet located in a sandstone formation in The Netherlands. In a second part of the study, risk perceptions and behaviours of geothermal industry stakeholders was explored, both from within industry, but also encompassing researchers and risk managers. Data was gathered using a convenient sample of semi-structured interviews in selected geothermal installations in Belgium and the Netherlands, from January up to August 2023, and analysed using thematic analysis. This study thus contributes to a better understanding of a domain which has remained little researched in the past, providing more knowledge about radiation and its potential environmental and health risks in an expanding industry.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.



## POSTER PITCH: RadoNorm Early Career Researchers Council – Goals and Activities

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### **Abstract**

Introduction: One of the targets of RadoNorm Project is to create a multidisciplinary knowledge base and to reduce scientific, technical and societal uncertainties in all steps of the radiation risk management cycle for radon and NORM exposure situations. This is achieved by integrating education and training into research and development work of the project. Motivation: Currently, the project has 37 Ph.D. and Post-doctoral candidates from different backgrounds working in 5 scientific work packages (WP). In September 2023 an Early Career Researchers Council (ECRC) was established in order to facilitate closer contact and networking between junior researchers who are the basis of future European Union experts in the field of radiation research. Ongoing work: The ECRC is organized monthly as online meetings in which the junior investigators of each WP have the opportunity to share their work within the frame of the project. The ECRC also organized a training course on transdisciplinary communication in radon and NORM. The goal was to promote interaction among participants of different fields related to radon and NORM in order to bring up different views and experiences within the project. Next steps: The council will organize activities to train and to facilitate collaboration among the members.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## Evidence-based guidance on survey methodology in risk research: data cleaning

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### Abstract

Within the field of radiation protection, we often rely on surveys to quantify and understand human attitudes, and behaviours. Moreover, in this type of surveys, we are often confronted with non-response and biased response. To ensure high quality data, it is essential that survey-based research approaches are developed, reviewed, and updated in line with existing evidence, and new scientific and technological developments. In practice, however, there is need for improved guidance on good practice, since the current is not always based on state of the art empirical evidence. Prime examples are the built-in quality control features of survey companies, which were developed to inspect and remove straight-liners, and other responses that are deemed invalid. The criteria by which respondents are excluded are not standardized across companies, and little scrutinized by researchers. Are the excluded respondents truly biasing the results, or are we generating new biases by systematically excluding them, and if we are; what criteria should we apply instead? These were the guiding questions of our methodological study. Using data from survey on public attitudes, norms, and behaviors related to indoor radon radiation, conducted in 9+ European Countries (BG, CZ, FI, GR, DE, IE, RO, SL, ES) we evaluate, through structural equation methodology, the impact of quality control measures of 6 different market research companies on (the validity of) data, with a focus on response bias. Based on these findings, we provide methodological guidance for socio-technical research design and data-cleaning.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## Open-ended interviews on the barriers and facilitators to radon management in homes in France. Results and perspectives

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### **Abstract**

This presentation will report on the results and perspectives of a qualitative study performed within the framework of the Work Package dedicated to societal aspects of radon management of the European project RadoNorm. The purpose of the study was to investigate the barriers and facilitators to radon management in homes, from the perspectives of two types of stakeholders: a) local public administrations who engaged radon management actions in their territory, and b) inhabitants who participated to a radon measurement campaign. A specific recruitment method was applied for each group and allowed to recruit N=6 local public administrations and N=7 inhabitants. Open-ended interviews have then been conducted and a thematic analysis was applied to the two sets of interviews' data to identify themes and sub-themes for the barriers and facilitators, such as: a) for local public administrations: initial motive; development of health and prevention promoting services; advocacy; cooperation of organizations; social mobilization and development of individual skills and b) for inhabitants: source of information; cognitive mediating process and coping modes. Lessons learned from these analyses will be presented in a way to provide advices to local public administrations and inhabitants to improve radon management actions.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## Facing the Facts: An Experimental Study to Test the Risk Convergence Model in the Context of Radon Communication

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### Abstract

The present experimental study investigates the impact of narratives and statistical texts on behavioral intention in the context of radon communication, based on the risk convergence model and construal level theory. The study aimed to explore the effects of psychological distance in determining the impact of communication strategies on behavioral intention. The study used a between-subjects design and randomly assigned participants to one of three conditions: a narrative text, a statistical text, or a control condition. The results indicate that the narratives compared to the control condition did increase behavioral intention through a decreased psychological distance and increased risk perception. When comparing narratives to statistical texts, there was no mediation based on the risk convergence model, but transportation mediated the effect of narratives on behavioral intention. Narratives had a direct effect on the intention to seek information and recommend important others to test for radon. Overall, the findings suggest that narratives are a more effective communication strategy for increasing behavioral intention in the context of radon communication and that transportation may play an important role in the effectiveness of narrative-based communication. These results have implications for public health communication campaigns that aim to encourage behavior change related to radon exposure.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## Exploring micro and macro effects of smoking on European radon mitigation intention

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### Abstract

Radon is considered an important cause of lung cancer development and poses a multiplicative risk when combined with tobacco smoking. Previous research indicates the imbalance in targeting vulnerable groups during radon remediation programs. The campaigns' failure to effectively engage smokers is emphasizing a need for more inclusive strategies. In addition, a broader perspective reveals a common tendency among smokers to underestimate their overall health risks. This particular attitude corresponds with the subject of this current research, outlining the underappreciation of risks associated with radon exposure. This approach contributes to the existing literature by analysing the relationship between smoking behaviour and the intention to test or mitigate indoor radon levels. In addition, the research examines potential variations in the frequency and perception of smoking across different European countries and its effect on the intention to test and mitigate. The study contributes to the existing literature by exploring how sociodemographic factors may influence information processing and risk perception of tobacco smokers.

In the scope of this research, a quantitative analysis is deduced based on structural equation modelling. Concretely, the statistical software MPLUS is used to examine a dataset containing 12.349 individuals from 10 European countries. The dataset was collected within the European RadoNorm project, funded by EURATOM Horizon 2020 (Perko et. al, 2020). The preliminary results suggest a variation in the behaviour of smoking and non-smoking individuals. The imbalance is further analyzed by comparing European data on national smoking behaviour. Overall, the results seem to indicate an inequality in the behavioural intention of countries where smoking is less prevalent. These initial insights highlight the interaction between smoking habits and cultural influences and reveal variations in behaviour within different social contexts. These insights might contribute to the development of public health policies.

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Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## POSTER PITCH: Radon spa controversy in the selected member states of the European Union

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### Abstract

Radon, a radioactive gas, has been presented as one of the leading causes of lung-cancer by the World Health Organisation since 2009. While public health authorities emphasize radon's health risks, there are spas across Europe which claim health benefits of radon. In some of the member states of the European Union (EU), a potential parallel presentation exists of two contradicting messages about potential health impacts of radon: (i.) radon as an active substance of cure, resp. of a pain relief in medical therapies at the radon spas and (ii.) radon as a carcinogen, resp. one of key factors in lung cancer development. This situation, sometimes referred to as a 'radon spa controversy', became one of the topics of research in the RadoNorm project. This presentation summarizes the recent results of the RadoNorm project research aimed at identifying, analysing, evaluating and summarizing relevant scientific information concerning radon spas in the EU, and the relevant legal contexts of their existence at selected EU member states.

Acknowledgement: Part of this project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## POSTER PITCH: Communication and perception of radon in Radon Spas in Austria and Germany

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### Abstract

Radon has been classified as a class 1 carcinogen by the WHO since 1988 and is one of the most important factors for lung cancer after smoking. It is therefore often presented and framed in terms of its health risks. At the same time, radon spas can be found in different EU member states. These radon spas offer therapies and treatments which claim positive health impacts. As such, a controversy can arise on the safety of exposure to radon, or framing of "radon as health risk" and "radon as healing factor". What are the consequences for communication on radon?

1) The first part that refers to this question is a radon spa question block in the German and Austrian RadoNorm survey (sub-task 6.2.4). This quantitative online survey examines in particular the awareness towards radon spas; the attitude to radon as healing factor, the knowledge about radon spas, visiting a radon spa, the risk perception of radon in radon spas and the trust in authorities regarding measures for radiation protection.

2) The second part relates to semi-structured qualitative interviews inside and in the vicinity of radon spas in Austria and Germany (sub-task 6.4.3). The interviews are conducted with employers and visitors of radon spas and with national and local stakeholders. The aim of this research activity is to identify:

- the perception of radon, as healing factor or as risk, or both?
- the dealing with radon in radon spas
- if there is a perceived conflict in health communication related to radon

The methods and results will be presented. Contrasting the results of both research activities will contribute to improvement on risk communication related to radon in radon spas and radon as an indoor air pollutant.

Acknowledgement: This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.

## **Event 8: Emergency management game: The VentiRay game**

This game translates radiation protection principles into an engaging board game. In the game, you go up against the VentiRay dragon, who, once awakened, endangers the forest animals.

Let's play and learn more about radiation protection and protective actions in case of radiological emergency.



### **Event 9: Showcase: Serious game on radioactive waste management (demonstration)**

The Pathway Evaluation Process (PEP) is a serious game on governance of radioactive waste management (RWM) that has been initially developed within the SITEX-II EU project.

The PEP methodology has the ambition to create the conditions of a fair dialogue on RWM among various pluralistic societal components, providing them with equitable opportunities to contribute to the framing of the purpose and content of the exchanges (on the same footing).

This event will provide insights on the objectives, the mechanisms, and the different uses of the PEP.

## **Event 10: Safety, Security and Emergency preparedness & response**

Explore a comprehensive spectrum of insights and advancements in the realm of safety, security, and emergency readiness within the context of nuclear emergencies. This session will feature a series of presentations that collectively touch upon various facets of this critical subject. Attendees will have the opportunity to gain valuable insights from diverse perspectives, showcasing innovations, methodologies, and real-world experiences that contribute to the enhancement of emergency preparedness and response. The session will culminate in a forum where presenters and participants alike will engage in an open dialogue, examining how emergency strategies adapt to evolving societal dynamics. Join us for an enriching exploration into the complex domain of safety and response in nuclear emergencies.

## VentiRay: A case Study for Serious Gaming in Radiation Protection

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### **Abstract**

The use of serious games in educational contexts is booming, as they offer a way to transfer knowledge in a fun setting by creating an engaging mix of education and games. Within the context of radiation protection, serious games also provide a safe and controlled environment for participants to learn about radiation safety practices without endangering themselves or others. We present a case study for teaching the base concepts in radiation protection during crisis management and emergency planning through a board game, called 'VentiRay'. By translating aspects of crisis response and management into a game setting, the VentiRay game creates a learning environment for students to reflect on decisions, opportunities and challenges that crisis managers are confronted with in the case of a nuclear accident. This presentation gives an insight into the design process of the VentiRay game and delves into practical questions, including how to balance education and fun, and how generative artificial intelligence tools can assist game design. It also touches upon broader reflections regarding science education, universal design for learning and user centric approaches. By addressing these questions and reflections, the presentation discusses the potential of serious games for radiation protection.

## SaveEcoBot: Empowering Transparency in Radiation Safety

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### **Abstract**

Ensuring population safety from radiation risks requires an open and transparent information system. But what happens when official systems fail or don't exist? And what if false information is spread globally through media disinformation? This leads to widespread anxiety, misunderstanding, and distrust of authorities.

The 1986 Chernobyl disaster, where Soviet authorities withheld information about radiation leaks, is a cautionary tale. If a similar scenario occurred today, during wartime, could the public trust the government to provide accurate radiation information?

To address these concerns, we are developing the SaveEcoBot system. It aggregates radiation data from various Ukrainian sources, establishes independent monitoring with international partners, and assists state institutions in obtaining structured data on radiation levels.

A concrete example of SaveEcoBot's benefits is its response to Russian disinformation in mid-May 2023. Propaganda falsely claimed increased radiation levels in Khmelnytskyi due to a missile strike on a weapons depot allegedly storing DU munitions. Although this was easily proven untrue, panic spread. Over 230,000 users accessed SaveEcoBot within ten days, confirming stable radiation levels in Ukraine.

Our citizen science project has given the public increased access to real-time radiation information in Ukraine. We aim to promote more transparent, EU-compliant state policies for Ukraine.

## The construction of radiation risk perception: a disassembling exercise built on Actor-Network Theory and Quantum Physics

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### **Abstract**

In the framework of WP3 of TERRITORIES project, the objective of the present study was to understand the misalignment between risk and the perception of risk has become increasingly stark with regards to ionising radiation. This is not without adverse consequences. This paper proposes a theoretical approach to investigating the phenomenon of risk perception. More specifically, it introduces a mechanistic model that describes the construction and nurturing of misperceptions. Through the language of Quantum and Particle Physics, we translate the terminology of Actor-Network Theory to ease the understanding of perception as a social concept for scientists. Using an analogy of the structure and behaviour of subatomic particles, the model visualises the actor-network duality that describes perception as a constructed collective. The model is developed as a tool to investigate how current radiological protection practices may be contributing to the existence and persistence of excess radiophobia – the excessive fear of radiation. This paper ends with a variety of approaches to test out the model empirically.

## Crisis Communication on Social Media – Lessons learned from Covid-19

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### **Abstract**

Social media played an important role in people's information behavior during the Covid-19 pandemic. Therefore, the pandemic provided a unique opportunity to observe and analyze social media crisis communication in real-time and draw conclusions for a radiological emergency.

The objective of the presentation is to analyze the requirements for effective social media crisis communication. Additionally, the communication of authorities and independent experts will be compared through best practice examples and big data analysis. Finally, conclusions and recommendations will be drawn regarding radiological emergency preparedness.

The study consists of both qualitative and quantitative research methods. The qualitative research involved guided interviews with social media users (n=30) as well as communicators and experts (n=9) in Covid-19 crisis communication. Additionally, best practice examples of social media posts (n=30) underwent a qualitative content analysis. The quantitative research involved a Twitter analysis of 35,645 tweets. The dataset was examined descriptively and then analyzed using quantitative content analysis and social network analysis.

The key findings of the study, such as the users' experience, the effect of using hashtags and mentions in tweets, and the role of sentiment, will be presented. The insights of the study will be applied to radiation protection.

## Nuclear power plant's personnel in war – crucial and defenseless: The case of Ukrainian Zaporizhzhia NPP in 2022-2023

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### Abstract

During the war in Ukraine in 2022-2023, the European biggest (six 1-GWt PWR) Zaporizhzhia NPP was occupied, after a combat, for more than a year. All IAEA 7 pillars of nuclear safety and security were demolished or severely compromised. The NPP personnel seem crucial in preventing (as of May 2023) a nuclear/radiation accident, and their best possible physical and psychological shape is the key safeguard against it.

The preliminary analysis shows that the IAEA does what it can, within its mandate, to support and sustain the ZNPP personnel, with rather limited but clearly positive effect.

On the contrary, actions of the relevant Ukrainian nuclear authorities during this crisis:

- on several crucial important occasions, violated both national and international regulations;
- have been clearly mis-prioritized (economic and misunderstood "PR-image" causes over prevailed over radiation and nuclear safety);
- lack the understanding of the dire complex situation of the ZNPP people;
- are contradictory, incoherent both in time and in their essence.

Thus, instead of sustaining and supporting the ZNPP personnel, they exacerbate their stress and exhaustion, and increase the probability of the accident.

The analysis lays grounds to suggest the means to efficiently protect nuclear facilities and their personnel in possible future military conflicts.

## POSTER PITCH: “Too Strict or Too Lax”? IAEA and the Evolution of Nuclear Safety Standards

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### **Abstract**

In “Too Strict or Too Lax”?, we critically analyse what is usually treated as a strictly techno-scientific issue—how best to protect humans from ionized radiation—and show that the making of radiation standards has been more than the social construction of a scientific fact. Tracing the establishment of the International Atomic Energy Agency in post-WWII global politics, we argue that the drafting of the agency’s Basic Safety Standards (BSS) was an ingrained techno-diplomatic endeavor entailing extensive give-and-take and consensus-building among scientific experts and the specialized agencies of the United Nations. From its first edition published in 1962 to the fourth one published in 1996, the production of BSS marked a gradual shift not only in the processes of producing standards but more importantly, the very philosophy of radiation protection. The unpacking of the process underpinning the development of BSS leads also from IAEA’s ad-hoc expert panels to a joint secretariat of specialized agencies and puts to test the professed neutrality of scientific experts in resolving high-stake radiation protection controversies. Standardization of radiation safety standards, in principle, proved to be a process of dominance, control, and eventual consensus-building through diplomatic means.



## **POSTER PITCH: Tools to facilitate a structured stakeholder discussion on the maturity of evidence for safety of nuclear facilities**

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### **Abstract**

Safety of nuclear facilities is a common concern among the public, which seems a challenge particularly for new developments including radioactive waste disposal and small modular reactors to generate for example electricity, district heat or hydrogen. Such concerns may challenge the continued operation, or decommissioning, of existing facilities as well. However, the communication tends to remain at highly technical levels. The aim of this study is to identify a range of tools to help the experts compiling radiological and environmental safety cases to systematically enhance the coherence in presenting the evidence for the safety while not overlooking the weaknesses and unavoidable remaining uncertainties either. Such tools should cover the aspects of issue framing and identification of explicit and hidden concerns, choosing evaluation criteria and translating them to proxies understandable to different audiences, reliability of the assessment (including comprehensiveness, sensitivity to assumptions, model structures and input data, strength of the knowledge basis, and complementary indications of the correctness of results), identification and evaluation of remaining quantitative and qualitative uncertainties and their meaning, and synthesis of the evidence and weaknesses in respect of the assessment context, the project stage and life cycle, and the decision-making context.

## **Event 11: Bridging SSH and Natural Science Perspectives in research and innovation: Contributions, experiences, challenges and lessons learned from SSH in different projects**

Embark on a journey of interdisciplinary collaboration as we delve into the pivotal role of Social Sciences and Humanities (SSH) in the landscape of research and innovation. This session promises a dynamic exploration of various projects, presented through the collaborative tandem of social scientists and natural scientists. Together, they will illuminate their collective contributions, experiences, challenges, and lessons learned from their unique collaboration.

Topics for Round Table Discussion:

**Shaping Research Priorities:** Unveil the intricate process of selecting research priorities across diverse projects and understand the significant role SSH plays in shaping these priorities. Through insightful discussions, participants will gain a deeper understanding of the interplay between disciplines and how SSH contributes to the broader research landscape.

**Unique Perspectives and Methodologies:** Discover the distinct value that SSH brings to the realm of research efforts, particularly those focused on the chosen priorities. Delve into the unique perspectives, methodologies, and insights that social sciences and humanities offer, enriching the multidimensional understanding of complex challenges.

**Fostering Multidisciplinary Collaboration:** Dive into effective strategies and best practices that foster seamless multidisciplinary collaboration in research, specifically within the context of research and innovation projects. Participants will gain practical insights into nurturing fruitful collaborations that harness the strengths of both social sciences and natural sciences.

This session not only showcases the tangible outcomes of collaborative endeavors but also presents a platform for candid discussions on the synergy between disciplines. Join us for an illuminating dialogue that bridges the gap between SSH and natural science perspectives, offering a panoramic view of research and innovation from a multidimensional lens.

**Acknowledgement:** The PIANOFORTE partnership has received funding from the European Union's "EURATOM" research and innovation program under the 101061037 grant agreement.

## **Event 12: WORKSHOP Updating the SHARE strategic research agenda and prioritisation of research topics**

Explore an exclusive workshop tailored for our SHARE Working Group (WG), set to take place on Friday during RICOMET. Delve into a thought-provoking agenda designed to foster impactful discussions and strategic planning related to future radiation protection research needs for the PIANOFORTE project, as well as research needs in societal aspects of ionizing radiation applications. The workshop is poised to revolve around critical topics, including the revision of the SHARE SSH Strategic Research Agenda (SRA) from diverse projects. Dive into insightful dialogues surrounding the way forward for this revision, with potential avenues for a new paper. The workshop also extends an invitation to new members, fostering a collaborative community. Attendees will witness a dynamic presentation of updated inputs, with contributors sharing their progress in areas such as HARPERS, EURAMED, RadoNorm, PIANOFORTE, NERIS roadmap, research priorities for waste, and energy. Join us for a stimulating exchange of ideas and perspectives that shape the trajectory of our WG's endeavors. Your valuable proposals and contributions are highly anticipated.

Acknowledgement: The PIANOFORTE partnership has received funding from the European Union's "EURATOM" research and innovation program under the 101061037 grant agreement.

### **Event 13: Closing session**

The closing session of the RICOMET conference offers a moment of reflection and anticipation as we draw the curtains on an enriching journey of knowledge exchange and collaboration. This session provides an opportunity to collectively appreciate the wealth of insights, discussions, and connections that have been forged throughout our time together. As we bid farewell to this chapter, we look forward to the next, eager to translate the lessons learned and ideas shared into impactful actions that shape the future. Join us as we celebrate the accomplishments of this event while embarking on a path of continued exploration, innovation, and collaboration.