



Summary of the Proceedings of International Radiology Forum 2025: Green Radiology and Sustainability in Medical Imaging

Indian Radiological and Imaging Association

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Abstract

The International Radiology Forum at the AOCR 2025 discussed the need for sustainability practices in medical imaging and “Green Radiology” for planet earth. The participating societies were invited to submit written reports detailing the current situation in their country or region. The International Radiology Forum is designed to discuss hot topics in the profession of radiology among various international societies. At the International Radiology Forum 2025, environmental impact of medical imaging was discussed and several ideas were proposed to achieve sustainability in medical imaging including training and education regarding green radiology, technology and innovation with utilization of AI, policy formulation and implementation, and the improvisation of hospital infrastructure to achieve a limited carbon footprint.

Keywords

- ▶ Artificial Intelligence
- ▶ Green Radiology
- ▶ Innovation
- ▶ Technology
- ▶ Environment

Key Presentations and Contributions

- **Reducing radiology’s carbon footprint:** Strategies for lowering emissions through optimized scanning protocols and equipment efficiency.
- **AI-powered sustainable radiology:** AI’s role in improving efficiency, minimizing redundant imaging, and automating workflows.
- **Sustainable resource use and waste management:** Innovative recycling methods for contrast media and waste reduction strategies.
- **Policy and advocacy for green radiology:** The importance of policy engagement and regulatory frameworks.
- **Energy-efficient imaging technologies:** The development of low-energy imaging protocols and sustainable hospital initiatives.

Introduction

The Indian Radiological and Imaging Association hosted the International Radiology Forum 2025 at the 23rd Asian Oceanian Congress of Radiology in Chennai, India. The forum convened leaders in medical imaging to address sustainability challenges and explore innovative solutions in radiology. Discussions centered on reducing environmental impact, optimizing energy use, and implementing AI-driven efficiency improvements. The meeting explored strategies such as carbon footprint reduction, waste management, policy advocacy, and green hospital initiatives. The following societies submitted a report and presented the point of view of their respective countries or regions: Radiological Society of North America (RSNA), Pan Arab Association of Radiological Societies (PAARS), Brazilian College of Radiology (CBR), European

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Board of Radiology, Italian Society of Medical Radiology (SIRM), European Society of Radiology (ESR), Kenya Association of Radiologists, Morocco Society of Radiology, Russian Society of Radiologists and Radiological Surgeons, and Royal College of Radiologists, United Kingdom.

The following important topics were discussed in detail during the meeting.

Environmental Impact of Medical Imaging

Medical imaging contributes to approximately 1% of global greenhouse gas (GHG) emissions, while the health care sector accounts for 4.6% of total GHG emissions. Sustainable radiology practices, including recycling, energy conservation, and eco-friendly hospital operations, were highlighted.

Digital Transformation and Green Radiology

Methods to reduce radiology's carbon footprint, including the adoption of cloud-based PACS systems, energy-efficient servers, and digital sobriety strategies, were explored. Reducing redundant imaging and optimizing digital storage emerged as key recommendations.

AI and Automation in Sustainable Imaging

AI-powered solutions were identified as crucial for enhancing workflow efficiency, reducing unnecessary scans, and lowering energy consumption. Predictive maintenance of imaging equipment and AI-driven reporting tools can minimize resource wastage and improve sustainability.

Energy Management in Radiology Departments

The integration of renewable energy sources such as solar and wind power into imaging facilities was discussed. Hospitals are optimizing power consumption through automated shutdown systems and low-energy imaging protocols.

Sustainable Use of Contrast Media and Waste Reduction

Recycling iodine-based contrast media, improving storage efficiency, and enforcing strict waste segregation were emphasized as essential measures for reducing medical waste and promoting sustainability in radiology.

Policy Advocacy and Global Standards for Green Radiology

The role of radiology societies in promoting sustainability policies was a key topic. Establishing regulatory guidelines, incentivizing eco-friendly hospital initiatives, and encouraging sustainability certifications for radiology departments were proposed.

Sustainable Hospital Infrastructure

Case studies showcased hospitals incorporating energy-efficient materials, smart technology, and sustainable building designs to optimize operations and lower environmental impact.

Proposed Solutions and Future Directions

Green Radiology Education and Training

- Integrating sustainability principles into radiology curricula.
- Expanding international fellowship programs focused on eco-friendly imaging.

Technology and Innovation

- Utilizing AI-driven workflow management tools to improve imaging efficiency.
- Encouraging digital radiology solutions to minimize paper and film waste.

Policy Implementation

- Establishing standardized sustainability guidelines for radiology.
- Advocating for funding and incentives for eco-friendly initiatives.

Infrastructure and Hospital Design

- Increasing investment in renewable energy for imaging facilities.
- Encouraging sustainable radiology department construction.

Summary Statements of Various Radiology Societies

Jeffrey Klein, RSNA Board Chair, stated that worldwide, reports show the health care sector is responsible for as much as 4.6% of total greenhouse gas emissions and that estimate increases to 8.5% for just the U.S. health care sector. Overall medical imaging is estimated to account for 1% of GHG emissions. Radiology contributes significantly to the health care carbon footprint, primarily through energy consumption and waste production. By comparison, the global aviation industry contributes around 2% of greenhouse gas emissions. *RSNA is dedicated to a healthier future that reflects our mission and values. We recognize the critical role that health care plays in environmental stewardship and are committed to implementing sustainability throughout the organization and developing leaders in the field. We will engage in and promote research, education, and collaboration with invested stakeholders to reduce the environmental impact of medical imaging and improve environmental sustainability in radiology.* Jeffrey Klein emphasized that RSNA has moved their suite of journals online only, reducing both paper waste and emissions involved in delivery. They are also exploring avenues to address equipment refurbishment and reuse. We have found that, in many countries, they receive "recycled" equipment without service contracts or training. Equipment not being maintained or used improperly adds to unnecessary medical waste. Most importantly, at the RSNA annual meeting, this past year we increased green initiatives to make our meeting even more sustainable by including more options for recycling at McCormick Place and prioritizing sustainability.

Emad Naguib, Secretary General, PAARS, stated that our aim should always be to have a sustainable, innovative, and responsible approach in our practice, and to focus on minimizing negative environmental effects of technologies and procedures used in radiology. This can be achieved by decreasing energy, water, and helium usage; proper waste management; minimizing ionizing radiation; and promoting eco-friendly radiology. PAARS established ArabSafe, which was based on the EuroSafe experience, and it was launched in March 2017.

Mauricio Zapparoli, Scientific Director, CBR, stated that CBR introduced in 2024 its Socio-Environmental Seal. This certification program features a tiered recognition system—Bronze, Silver, and Gold levels—designed to progressively guide imaging centers in adopting best practices in social responsibility, environmental sustainability, and worker safety. Drawing inspiration from global initiatives and sustainability models, and publications from leaders in the field, the program establishes criteria across key areas: environmental management, labor practices, human rights, society, infrastructure, and suppliers. The bronze level recognizes imaging centers that meet legal socioenvironmental standards, while the silver and gold levels reward facilities demonstrating increasingly comprehensive and exemplary sustainability and operational excellence. The program's development has been driven by CBR's Cultural Committee, led by CBR's Cultural Director, Dr. Linei Urban, whose guidance has been essential in promoting its adoption and outreach.

Laura Oleaga Zufiría, Scientific Director European diploma in Radiology (EDiR), stated that the Radiology Department of the Hospital Clinic in Barcelona, where she serves, has implemented a recycling program for iodine contrast media as part of its commitment to sustainability and environmental preservation. This initiative operates within advanced medical imaging facilities, including five CT rooms, four digital angiography rooms, and one PET-CT room. Recycling iodine reduces operational costs, conserves non-renewable resources, and mitigates environmental impact. As iodine is critical for diagnostic imaging, this program highlights the importance of responsible resource management to ensure sustainability while addressing economic and environmental challenges.

Nicoletta Gandolfo, President, and Andrea Giovagnoni, Past President, Italian Society of Medical and Interventional Radiology (SIRM), stated that sustainability in radiology is becoming increasingly important as health care providers and manufacturers strive to reduce their environmental impact. In 2025, SIRM plans to organize conferences, webinars, and workshops to educate radiologists with a specific program in particular for residents in cooperation with academic college of radiology, focusing on sustainable practices. A position paper resulting from an international conference promoted by SIRM, involving seven scientific societies last October in Venice, is being published. During this conference, the main radiology leaders shared the need to produce programmatic guidelines on the actions that should be taken in individual countries regarding future

sustainable radiology. The specific action supported by SIRM is staff training and awareness, collaboration with industry leaders, policy advocacy, collaboration and networking, and patient involvement.

SIRM suggested that particular attention and support should be given towards educational initiative to emphasize the role of The Role of Artificial Intelligence in Green Radiology in terms of optimising Imaging protocols, improving machine efficiency, enhancing workflow efficiency.

Andrea Rockall, President, ESR emphasized that “radiology in a warming world” needs urgent action. ESR recognizes the growing need for sustainability in radiology and is actively working on solutions to reduce environmental impact. The theme for the 2025 European Congress of Radiology (ECR) is Planet Radiology, highlighting the role of radiology in the context of planetary health. Key challenges and areas of focus, where changes can be made, include digital “sobriety” and lean ICT (information and communication technologies); optimizing digital infrastructure to minimize energy consumption; consideration of new technologies for energy savings, including AI-driven automation; and minimization of waste, including single-use plastics and contrast agents. ESR's immediate actions are the following: formation of the ESR Sustainability Subcommittee focusing on setting sustainability goals and actionable strategies, leading to a multisociety statement and call to action, to promote global sustainable radiology, launching the Green Imaging Department (Green ID) Scheme, increasing education through European School of Radiology (ESOR) courses and awareness initiatives, promotion of research and innovation to reduce waste and energy use, and collaboration with industry through European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry (COCIR) and policy collaboration with the European Union.

Gladys Mwangi, Chairperson, Kenya Association of Radiologists, stated that sustainable, innovative, and responsible approach in radiology practice is key to minimize the negative effects to the environment that can occur from the day-to-day activities in radiology. To reduce the carbon, water, and ecological footprint in Kenya, it would require a multipronged approach that involves appropriate policy direction, strengthening the implementation of guidelines and standards that influence the public and private radiology health care providers. The Kenya Digital Health Act of 2023 has established a digital health agency and legal framework that operationalizes integrated health information systems at all levels of care right from the community level (level 1) to the tertiary and specialized hospital (level 6). Currently, the digital systems in existence are mainly used for administrative purposes. Digitization of radiology departments has gained faster leverage in the private sector compared to the public facilities; however, these systems are facility specific with varying levels of interoperability. Interdepartmental and interfacility communication still requires printing of films and radiology reports for the larger part. But on the positive side; the electric power supply in Kenya is mostly renewable energy, with

approximately 90% being renewable energy and only 10% coming from petroleum products.

Najat Cherif Idrissi El Ganouni, President, Morocco Society of Radiology, stated that ecology in radiology is becoming an essential consideration as the field significantly contributes to environmental challenges, including high energy consumption, medical waste production, and contrast agent pollution. Radiology accounts for approximately 1% of GHG emissions, driven by power-intensive imaging modalities, single-use materials, and depletion of finite resources like helium. Additionally, the excretion of contrast agents into wastewater poses risks to ecosystems and water quality. Addressing these concerns requires a shift toward sustainable practices, such as optimizing contrast use, improving waste management, adopting energy-efficient technologies, and integrating AI to enhance efficiency while reducing resource consumption. Energy-saving measures, such as shutting down idle machines, utilizing low-energy MRI systems, and limiting unnecessary image storage, contribute to a reduced carbon footprint. AI applications are also leveraged to streamline imaging protocols, reducing scan times and contrast needs while maintaining diagnostic accuracy.

Valentin Sinitsyn, President, Russian Society of Radiologists and Radiological Surgeons, emphasized that to succeed in the green radiology project, it is crucial to create a team of enthusiastic radiology department staff members who are interested in ecological activities. Such a team can spark interest in the project among their colleagues, suggest ideas, and implement them effectively. Few practical suggestions to get started include the following: group of activists can print and distribute posters, stickers, and brochures throughout the department and hospital, explaining the main principles of “green radiology”; ordinary rubbish bins in the department should be replaced with special containers for separate waste collection and recycling; departments and medical centers should transition from paperwork to electronic documents (e.g., electronic patient records, examination referrals, timetables, and lists of examinations); reports and images should be sent via e-mail or networks instead of being printed; and online consultations should be encouraged to reduce the need for patients to use transportation. Energy conservation is also essential. Idle workstations and radiological equipment should be switched off at night and outside working hours, and energy-saving modes should be utilized when available. Staff should ensure that lights in unused rooms and cabinets are turned off (motion detectors can be installed to facilitate this). Air conditioning and ventilation systems should be turned off during nonworking hours.

Katharine Halliday, President, Royal College of Radiologists, in her presentation, summarized high-level aims and objectives of the United Kingdom National Health Service (NHS) plan to get to net zero and “greener NHS” by 2040. The NHS is an important player in the United Kingdom’s overall aim to achieve net zero, since it accounts for 4% of the

country’s total emissions, and is also its largest single employer. Dr. Halliday discussed a case study concerning computer energy use at one NHS hospital, illustrating how easily solutions can be found and the scale of the benefit they can have, in terms of both reducing emissions and saving money. There was a direct link between increased medical imaging and increased energy consumption. She focused on driving down noncontributory or unnecessary examinations, choosing lower carbon examinations where possible, limiting the unnecessary use of gadolinium, and exploring technological solutions to idle or put scanners on standby when not in use.

Conclusion

The International Radiology Forum 2025 emphasized the importance of sustainability in medical imaging. Through AI integration, optimized energy use, waste reduction, and policy reforms, the radiology community aims to reduce its environmental footprint. The session concluded with a commitment to global collaboration and continued innovation for a greener radiology future.

Note

This article was prepared based on presentations delivered at International Radiology Forum held during the 23rd Asian Oceanian Congress of Radiology and 77th Annual Conference of Indian Radiological and Imaging Association in Chennai Trade Centre, India on 23rd January 2025.

Prof. Umesh Krishnamurthy, Past President Indian Radiological and Imaging Association, presided the meeting, Dr. Dinesh Chinchure moderated the session, and Dr. Mohammed Shakeebuddin Kashif co-ordinated for the program and prepared the manuscript.

The presentations were given by Dr. Jeffrey Klein, RSNA Board Chair; Dr. Emad Naguib, Secretary General, PAARS; Dr. Mauricio Zapparoli, Scientific Director, Brazilian College of Radiology; Dr. Laura Oleaga Zufiría, Scientific Director European Diploma in Radiology, Prof. Andrea G. Giovagnoni, President, SIRM; Prof. Andrea Rockall, President, ESR; Dr. Gladys Mwangi, Chairperson, Kenya Association of Radiologists; Dr. Najat Cherif Idrissi El Ganouni, President, Morocco Society of Radiology; Prof. Valentin Sinitsyn, President, Russian Society of Radiologists and Radiological Surgeons; and Dr. Katharine Halliday, President, Royal College of Radiologists, United Kingdom.

Authors’ Contributions

All the collaborators read and approved the final manuscript.

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Conflict of Interest

None declared.