

Reduce, Reuse, Recycle: The Three R's of Sustainability

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Kate Hanneman, MD, MPH

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The origins of the “Go Green” and sustainability movements to reduce man-made impacts on the environment can be traced to the 1960s and '70s, which gave birth to the first celebration of Earth Day in 1970.

However, Kate Hanneman, MD, MPH, vice chair of research and deputy lead for sustainability in the Department of Medical Imaging at the University of Toronto, Ontario, Canada, admits she didn't consider sustainability relevant to her role until rather recently.

“While I was interested in sustainability personally, from an academic perspective, I didn't initially think this was in my lane as a radiologist,” says Dr Hanneman. But that changed during the pandemic, when she started reading papers about the impact of radiology on the environment. Suddenly, she says, “a light bulb went off. I realized we do have a big role to play.”

She's not alone. Many medical imaging industry and clinical stakeholders are joining their peers in transportation, manufacturing, farming, and other industries in rethinking energy use and waste disposal practices to help curb greenhouse gas (GHG) production, believed to be a leading cause of climate change.

“There's been a ton of momentum and engagement in sustainability in healthcare, especially in radiology,” says Reed Omary, MD, MS, noting that he has witnessed standing-room-only sessions at radiology conferences and read numerous academic publications on the topic. Dr Omary, who is on a climate-learning sabbatical, is the Carol D. & Henry P. Pendergrass Professor in the Department of Radiology and Radiological Sciences, and a professor of biomedical engineering at Vanderbilt

University Medical Center & School of Medicine in Nashville, Tennessee.

“The heart of the momentum is coming from medical professionals who are projecting a new energy around sustainability ... and engaging us about our own efforts,” adds Amy King, sustainability lead at Bracco Diagnostics. King notes that recent federal legislation enacting grants and tax credits for sustainability action is also advancing GHG reduction efforts in healthcare.

Reduce Energy Consumption

Globally, healthcare emits the equivalent of more than 2 gigatons of carbon dioxide each year. That amounts to between 5% and 8% of total GHG emissions in developed nations and up to 1% of emissions worldwide.¹

“Healthcare is an industry that drives one of the largest carbon footprints—more than aviation or shipping—and in hospitals, imaging accounts for a big part of this,” says Olesya Struk, senior director of sustainability and access to care at Philips.

Medical imaging equipment—especially MRI and CT scanners—consumes significant amounts of energy that generates GHGs. The estimated energy expenditure for MRI for every 1,000 U.S. citizens annually is 1648 kWh; CT energy expenditure comes in at an estimated 298 kWh per 1,000 citizens.²

In response, vendors are taking steps to reduce the carbon footprints of their technologies. Philips, for example, has added a standby mode to all its MRI and CT scanners to reduce energy consumption when they are not in use, says Struk, adding that scan duration is also optimized for energy efficiency.



Philips' new MRI scanners also now employ efficient micro-cooling technology that requires just 7 liters of liquid helium—a fraction of the 1,500 liters of helium used by conventional magnets. This has saved more than 1.9 million liters of liquid helium since 2018, says Struk.

Bracco, meanwhile, offers consulting services to help radiology teams convert from single-dose to multi-dose contrast vials, as well as to help implement weight-based contrast dosing, says King. She adds that the company now offers a contrast agent that uses only half the dose of gadolinium previously needed to obtain diagnostic-quality images, and also encourages its customers to switch from single kits to efficiency packs of its ultrasound contrast agent.

Medical imaging departments and private practices are likewise joining the sustainability fight. Considering equipment life and rising case volumes, Dr Hanneman says, it is imperative that providers power down scanners to their lowest settings when not in use. She argues that reducing energy use and waste is one of the best steps radiology departments can take to make a significant step toward sustainability.

“Energy that is not being used to contribute to patient care, generate images, or run our workstations should be preserved,” Dr Hanneman says, recommending establishment of department policies to power down machines during prolonged idle times, such as after hours. Department leaders can also inquire about their hospital's energy provider, suggests Dr Hanneman, who says that switching to renewable energy can have a big impact on emissions.

She similarly recommends using only the imaging sequences that are absolutely necessary to a procedure to reduce energy consumption.

“In general, the shorter the protocol, the less energy per patient,” Dr Hanneman says. Aligning

department policy with campaigns to reduce low-value imaging and following guidelines for managing incidental findings can further reduce unnecessary imaging, she says.

“The greenest radiology is avoiding the radiology that isn't needed,” agrees Dr Omary.

Reduce Waste

Reducing energy use isn't the only way to go green in radiology; reducing waste is another effective strategy to improve sustainability efforts. Dr Hanneman suggests that imaging practice leaders work with their vendors to expand the lifespan of existing machines. Philips, for example, takes back whole systems and/or parts for upgrading, refurbishing, reusing, or recycling.

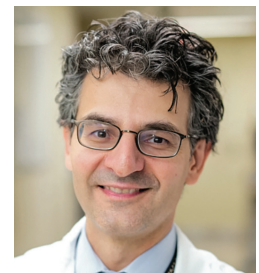
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Dr Omary says interest is growing in performing MRI scans either without gadolinium or with the absolute minimum dose required, particularly in pediatric cases. The environmental impact of gadolinium-based contrast agents in the water system is a growing problem.³ Packaging of contrast in single-use vials is also a concern.

“We have structured ourselves with well-meaning intention to be disposable radiology departments,” Dr Omary says, suggesting that by switching to multi-dose bottles, departments could save “an immense amount of money, plastic waste, and contrast agent waste.”

Beware the “Double-edged Sword”

Software that now allows imaging and image interpretation to be performed remotely can reduce the need for travel and thereby indirectly reduce



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GHG emissions. Artificial intelligence (AI) is gaining attention for its potential to improve sustainability in radiology in multiple ways, including accelerating imaging and optimizing scanners to improve patient workflows, says Dr Hanneman. However, she is quick to label AI a “doubled-edged sword.”

“The data and storage required for AI and the energy to train models and run inference is massive,” she explains, recommending that data storage providers that prioritize renewable energy sources be used to help lower AI’s impact on the environment.

Collaborate for Successful Change

Implementing the tools, technologies, and policies needed to create sustainability requires collaboration among key stakeholders. For example, department leaders can quantify energy savings and patient benefits when proposing changes to their administrators. They can also look for opportunities to collaborate with vendors while also requiring transparency about their carbon footprint and procurement principles.

“Through our collective efforts, imaging teams and industry can work together to create more of an impact on our society and less of an imprint on our environment,” says King.

Like-minded radiology professionals can also form communities—like the one growing around

Dr Omary’s “The Green Leap blog” to make healthcare sustainable.

“Climate change will affect us all ... but those who are already most vulnerable will be affected the most,” explains Dr Hanneman, who says that health equity and the sustainability of our planet are “intrinsically linked.”

In the US, 100 healthcare systems have joined a Department of Health and Human Services pledge to reduce carbon emissions by 50% before the end of the decade, and to achieve net zero emissions by 2050.¹ California-based Kaiser Permanente achieved carbon neutrality in 2020.¹

“We have many opportunities to reduce waste, which is good for the planet,” concludes Dr Omary. “By taking care of the planet, we take care of our patients and of our health systems.”

References

- 1) Brown M, Schoen JH, Gross J, Omary R, Hanneman K. Climate change and radiology: Impetus for change and a toolkit for action. *Radiology*. 2023; 307(4):e230229. <https://doi.org/10.1148/radiol.230229>
- 2) Chaban Y, Vosschenrich J, McKee H, Gunasekaran S, et al. Environmental sustainability and MRI: Challenges, opportunities, and a call for action. *JMRI*. 2024; 59(4) 1149-1167. <https://doi.org/10.1002/jmri.28994>
- 3) Dekker HM, Stroomberg GJ, Van der Molen AJ, et al. Review of strategies to reduce the contamination of the water environment by gadolinium-based contrast agents. *Insights Imaging*. 2024; 15(62). <https://doi.org/10.1186/s13244-024-01626-7>