In this Q&A, Julia Schoen, MD, discusses her background as an environmental engineer and radiology’s role in addressing environmental sustainability to improve population health.

**Promoting a Sustainable Future**

**Key Takeaways:**
- Radiologists have formed a group called Radiologists for a Sustainable Future that is dedicated to increasing radiology’s environmental sustainability.
- Hospitals account for up to 8% of carbon emissions in the U.S., and radiology departments are significant contributors to these emissions, mainly due to heavy equipment and technology usage.
- Radiologists can take meaningful steps to increase their environmental sustainability, including working with vendors to develop more energy-efficient scanners and decreasing procedural waste.

Listen to an episode of the Bulletin Podcast to hear Julia Schoen, MD, discuss sustainability in radiology.

Q. In addition to being a radiology resident at Wake Forest, you’re an environmental engineer. Can you tell me about your background and the work you’ve done in the environmental engineering space?

A. I have both a bachelor’s and master’s degree in environmental engineering. Between earning my degrees, I was trying to combine my interest in public health and civil engineering through research. The work that I did in environmental engineering mostly focused on water resources. I worked in Brazil on a project related to leptospirosis, water, and sanitation. Then I worked on a project in South Africa focused on water resource management in a lake and how management decisions affected ecosystems. It was very interesting work, but I found that people don’t necessarily value the impact our environment has on our health. As an environmental engineer, I found myself in situations where people didn’t think I was authoritative enough to make that connection. I think making the link between climate change and health is critical to addressing the climate crisis, and I wanted to learn how I could do that as a physician.

Q. What made you decide to pursue radiology, and how do you see the fields of radiology and environmental engineering overlapping?

A. The work that I was doing for my master’s was in environmental fluid mechanics. Upon starting medical school, I didn’t know that I wanted to be a radiologist. I wanted to go into infectious disease, but because of my engineering background, I was interested in technology and its use in medicine. In fact, the lab that I worked in while studying for my master’s had previously used MRI to measure flow around a coral reef. That was before I got there, but it was an example of how radiology and engineering could overlap. In medical school, I gravitated toward technology innovations and found that radiology was one of the most technology-heavy areas of medicine. So that’s how I ended up in the specialty.

Q. You’re one of the founders of the group Radiologists for a Sustainable Future. Tell me about that group. How did it get started?

A. We started Radiologists for a Sustainable Future (@Rads4SF) after Dr. Geraldine McGinty tweeted that she was interested in writing a paper on climate change in radiology. That led to the creation of the group, which has met every two to three months since its formation. The initial members were the radiologists who responded to Geraldine’s tweet, saying that we were interested in writing that paper and learning more about the topic. As we worked on the paper, we decided to keep meeting and thinking about ways that we could contribute to sustainability in radiology beyond that paper. The group has since grown, and now we have close to 60 members. We’re also now affiliated with Health Care Without Harm, an organization that works with physicians from various specialties to transform healthcare and reduce its environmental impact globally.
Case Study: Promoting a Sustainable Future

Q. Why did the group decide to keep the conversation going?
A. The people who are in the group are passionate about reducing our environmental impact. We know there are changes we can make in our individual lives to be more sustainable, and while that adds up over time, it’s limited in some ways. This group allows us to extend our sustainability efforts into our work. It gives us greater ability to make a difference and educate others to increase our collective impact. There is so much waste in healthcare, and many people are concerned about it. We want to figure out ways to improve — not only from an environmental perspective but also in terms of cost. The more we can raise awareness, the more people realize they can have an impact at work as well as at home.

Q. Why should radiologists and other healthcare professionals care about environmental sustainability and climate change?
A. Climate change and environmental issues affect public health and our patients. In some ways, environmental sustainability goes hand in hand with fulfilling our oath to do no harm because when we pollute, we cause harm. Some of the changes in human health and the burden of disease that we’re seeing may be related to climate change. On top of that, climate change is also increasing the frequency of natural disasters that disrupt healthcare services with negative consequences for radiology practices and our patients. We know that global temperatures are rising, and we know that there are steps we can take to mitigate the impact of climate change. We have a responsibility to act to improve everyone’s health because this is something that affects us all.

Q. How does climate change relate to public health and population health?
A. It relates in various ways. For example, there has been a 50% increase in heat-related mortality in older populations in the past 20 years as the climate has warmed and heat waves have become more intense and frequent. We’re also seeing impacts on population health related to air and water quality as well as natural disasters, like hurricanes and wildfires. Likewise, the amount of waste we produce has a negative impact on population health. Not only does it take energy to transport and dispose of waste, but it can also affect things like air and water quality.

In radiology, in particular, we give contrast media like gadolinium to patients. When they excrete these agents, they end up in the water supply. That’s just one example. We don’t know how our waste impacts ecosystems. When you dispose of a CT scanner, for example, what happens to it? Where does it go, and what are the environmental repercussions? Are they impacting populations near those landfills? These are important questions, and we don’t have great answers to them because the information is not readily available. Plus, when you think about these impacts, it’s likely that they disproportionately affect people with preexisting conditions and vulnerable populations. This includes people of color and people of low socioeconomic status because these populations are more likely to live next to a landfill or incinerator. Ultimately, we must consider the environmental justice piece to this problem as it pertains to population health.

Q. What role does radiology play in contributing to climate change?
A. We haven’t really studied that question, so we don’t have a great answer. But we know that hospitals are energy intensive. The healthcare sector emits up to 8% of the total carbon emissions produced in the U.S. We know that our radiology scanners are energy intensive. Any devices we use, including our scanners and procedural devices, take energy to produce and to dispose. Anywhere we can push for more sustainability, even if it’s something small, is a good thing. For example, you might have a single-use device, and you want to push for a product that is reusable or produced with less energy. You could work with a vendor and show them that if a product were made differently, it could be applied broadly across healthcare to improve sustainability.

Environmental sustainability should be taken into consideration for any supplies that we’re ordering. We should look for ways we can switch to reusable materials or decrease certain kinds of packaging or unnecessary items that we acquire. This can help decrease our carbon footprint and the downstream pollution related to disposing and incinerating medical waste. Some of this is unavoidable because there are a lot of regulations for infection control. But to reduce our environmental impact, we need to find ways we can more creatively recycle or dispose of these items.

Q. What are some other ways that radiologists could reduce their environmental impact?
A. Working with vendors to decrease the energy use of our scanners is a big one. Our scanners might have a 10-year lifespan, so if we want to decrease the energy use, we need to start early so that in 10 to 20 years when we are replacing our scanners, we have more sustainable options. We currently have scanners that have an energy-efficiency mode, but our engineers worry about that function decreasing the scanners’ overall lifespan, so we don’t use it. We need to be having conversations with vendors about what we want in
Join @Rads4SF and/or similar groups to connect with others interested in sustainability now. It's called Med Students for a Sustainable Future, and they publish a report card on medical schools regarding their climate change and sustainability curriculum. This group thinks that environmental sustainability is an important topic for comparing medical schools.

Q. Where do you foresee healthcare headed in addressing these issues?

A. It seems like there is a lot of momentum towards healthcare becoming more sustainable. Large healthcare systems like Kaiser Permanente are carbon neutral now, and they have pretty ambitious targets in terms of their sustainability. The Cleveland Clinic is another one that has ambitious targets. There is a hospital in Wisconsin that actually produces more renewable energy than it uses. You’re going to see more and more physicians who care about this issue, particularly younger physicians, because we will be more directly affected by the devastating effects climate change will bring in our lifetimes.

Q. Do you think environmental sustainability will become a recruiting tool for medical schools and for hospitals?

A. I suspect it will be something that impacts people’s evaluation of institutions. There is a medical student group focused on sustainability now. It was initially part of Health Care Without Harm, the same network that hosts R4SF, but they spun off to form their own organization with a medical student focus. It’s called Med Students for a Sustainable Future, and they publish a report card on medical schools regarding their climate change and sustainability curriculum. This group thinks that environmental sustainability is an important topic for comparing medical schools.

Q. Beyond changes within individual practices and departments, how can radiologists get involved in promoting environmental sustainability?

A. At an institutional level, some hospitals have sustainability committees that they can join. Outside of our institutions, we have physicians in our group who have been involved in local or national nongovernmental organizations. Being involved in local groups gives you the power to talk about climate change and health while supporting your community. All of these advocacy efforts are important, as is working with industry on more sustainable solutions.

Endnotes
3. Global Green and Healthy Hospitals. Cleveland Clinic: reducing or air exchange loads/2015/07/Cleveland-Clinic-USA.pdf.

Now It’s Your Turn
Follow these steps toward increased sustainability in radiology, and tell us how you did at imaging3@acr.org or on Twitter at the hashtag #Imaging3.

• Reduce energy use in your practice through actions that include powering off PACS and lights when they are not needed.
• Work with vendors to develop energy-efficient scanners and partner with hospital administrators to decrease the healthcare system’s carbon emissions.
• Join @Rads4SF and/or similar groups to connect with others interested in sustainability and advocate for environmental causes.

Share Your Story
Have a case study idea you’d like to share with the radiology community? To submit your idea please click here.
Case Study: Promoting a Sustainable Future

To Reduce Radiology’s Energy Consumption...

- Transition to renewable energy
- Institute a 24-hour operating model to reduce carbon emissions per exam
- Work with industry to improve efficiency of fluoroscopy and X-ray systems
- Regularly power down workstations
- Use AI to develop protocols

Recent Radiology Energy Studies Show...

- Over a year, one CT scanner uses as much energy as five four-person households.
- One MR scanner uses as much in a year as 26 four-person households.
- At one Swiss hospital, three CT and four MR scanners account for 4% of energy use.
- Computers and PACS left on overnight in one department produced nearly the same annual carbon dioxide emissions as four passenger cars.
- At one U.S. hospital, one CT scanner uses as much energy as 26 four-person households.

At one U.S. hospital, one CT scanner uses as much energy as 26 four-person households.

92% of patients want healthcare systems to operate more sustainably.

The U.S. healthcare system produces nearly 10% of America’s greenhouse gas emissions, and radiology departments are likely a significant contributor.


92% of patients want healthcare systems to operate more sustainably.