

The Philips logo is displayed in a white rounded rectangle in the top left corner of the image. The background of the entire image is a photograph of the interior of a Philips MRI scanner, showing the patient bed with a blue blanket and the control console on the left.

Magnetic resonance

Proactive energy management

Reducing power and resource
consumption for efficient,
cost-effective MR operations

BlueSeal

Hospitals consume nearly two-and-a-half times more energy than other commercial buildings, spending more than \$8.7 billion per year according to the EPA.¹ They are currently the second most energy-intensive building type in the U.S.² As an example, a typical 200,000-square-foot hospital with 50 beds might spend around \$680,000 or \$13,611 per bed annually on electricity and natural gas.³ This is a substantial investment.

Additionally, there is a considerable environmental impact from this high level of energy consumption. In fact, the healthcare industry is among the most carbon-intensive service sectors in the industrialized world, responsible for 4.4 to 4.6% of worldwide greenhouse gas emissions.⁴





A volatile helium market

In the case of magnetic resonance imaging, there is another challenging issue: the scarcity of helium as a resource. The healthcare industry is the world's biggest consumer of helium, accounting for around 30% of global use.⁵ The average MRI scanner requires approximately 1,700 liters of liquid helium⁶ that needs to be periodically replenished, and there are roughly 50 thousand⁷ mostly conventional, helium-cooled MRI scanners in use around the world today.

The supply of helium has been strained for years. In the U.S., the Federal Helium Reserve once stored decades' worth of helium, but today only has enough to match roughly one year of domestic demand, or a third of a year of global demand.⁸ Privatization of this supply has added uncertainty to the industry.

A new facility in eastern Russia was supposed to provide a third of the world's supply, but a fire in January of 2022 caused delays, and current political strains due to the war in Ukraine have halted U.S. plans to acquire the helium.⁹



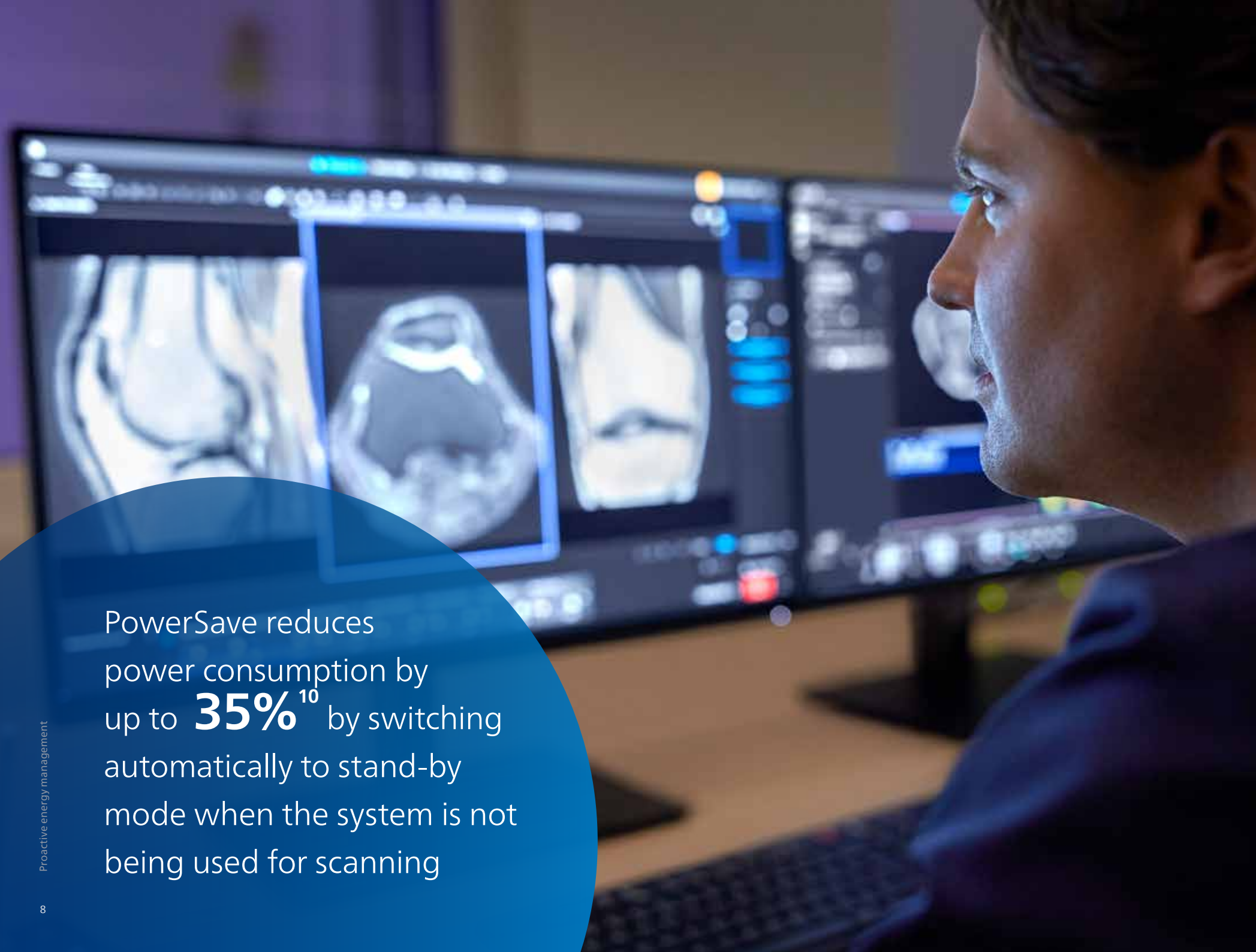
The Philips answer

In an effort to positively impact these concerns, the Philips MR Ingenia Ambition 1.5T S, MR Ingenia Ambition 1.5T X, and MR 5300 are designed to respond in three ways:

1. By reducing scanner power consumption using PowerSave technology
2. By delivering faster speed* and higher image* quality with SmartSpeed technology
3. By eliminating the dependency on helium through BlueSeal technology

Combined, these solutions help provide an effective way to save energy, reduce costs, and support global sustainability initiatives for an environmentally friendly future.





PowerSave reduces power consumption by up to **35%**¹⁰ by switching automatically to stand-by mode when the system is not being used for scanning

Power only when you need it

Philips PowerSave is our smart power management solution for MR. It is built around two design principles: lowering the level of energy consumption when the system is not in use, and lowering the level of energy consumption between scans.

The level of energy consumption between scans is driven by choices in gradient amplifier design. The regulated solid-state gradient amplifier uses energy only when the system is scanning, thereby lowering energy consumption in between the scans.

Reducing scan time reduces the time of higher energy consumption, leading to an improved and more efficient use of the technology in the saving mode. PowerSave enables our MRI systems to work effectively with both 50Hz and 60 Hz power sources.

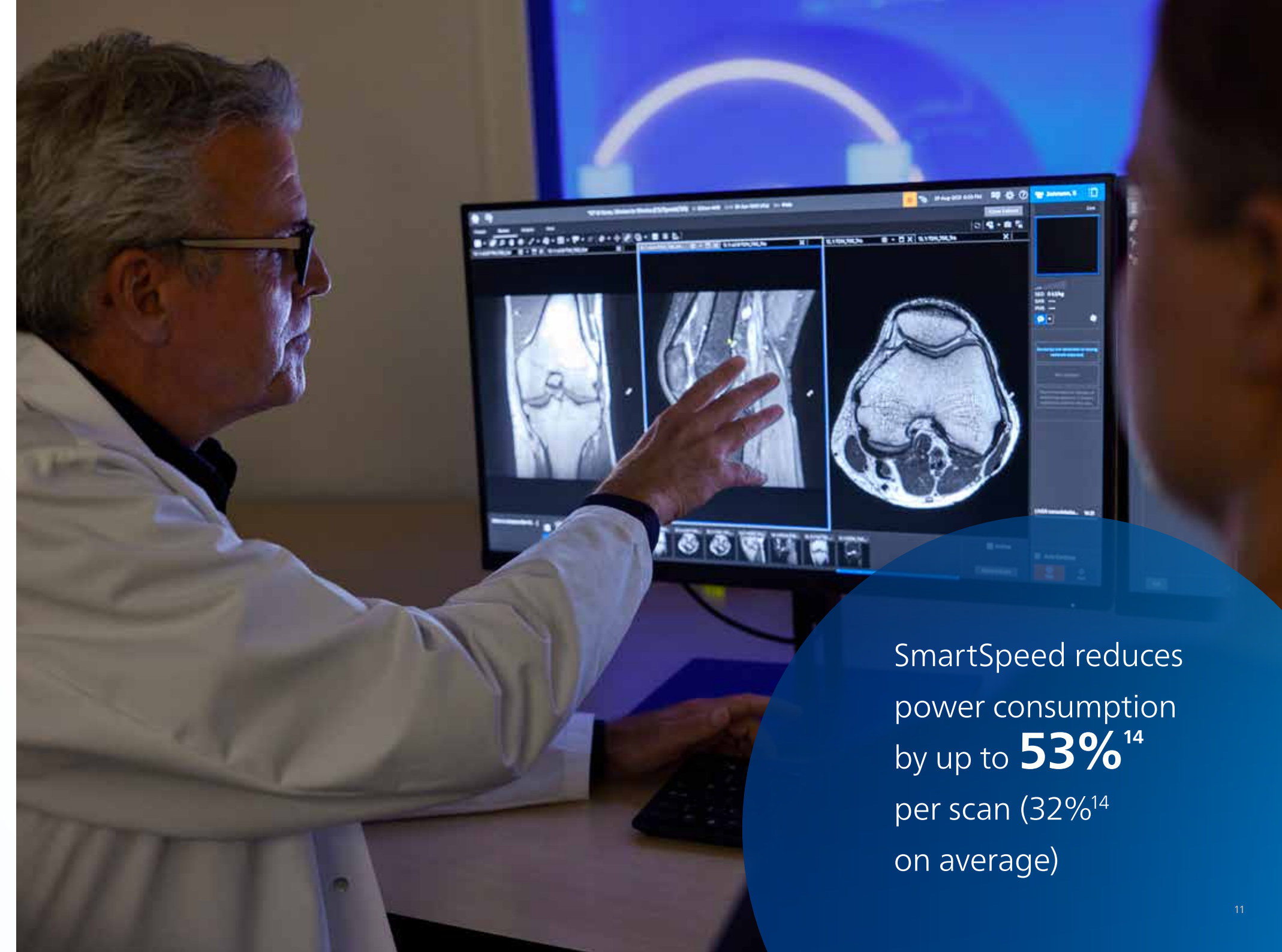
PowerSave is the result of our continued focus on improving the sustainability of our products. All Philips MRI systems adhere to the company-wide EcoDesign principle which (in part) commits to improving the efficiency of a product to reduce its energy consumption and carbon footprint.

Speed without compromise

At imaging speeds nearly three times faster than parallel imaging, Philips SmartSpeed reduces acquisition time. It can also improve workflow to support high throughput and great productivity. Reducing acquisition times means patients spend less time in the magnet, helping to reduce electricity consumption, improving shift schedules, and allowing for enhanced utilization of service hours.

SmartSpeed delivers image quality and speed without compromise via the Philips Compressed SENSE engine and award-winning AI technology¹¹. Together they form a state-of-the-art solution that can be used to speed up scan time and boost image quality significantly on all anatomical areas and contrasts in 2D and 3D sequences.

SmartSpeed increases imaging speed by up to a factor of 3¹², provides up to 65% greater resolution¹² to deliver outstanding image quality, and is compatible with 97% of clinical protocols¹³. It covers motion imaging, imaging near implants, free-breathing imaging and diffusion-weighted imaging to address the needs of a broad range of patients in various conditions.



SmartSpeed reduces power consumption by up to **53%**¹⁴ per scan (32%¹⁴ on average)

Forget about the helium

To address the growing global helium shortage, Philips proprietary BlueSeal magnet technology eliminates the need to replenish the cooling liquid. Using a highly efficient, micro-cooling technology, a negligible amount of liquid helium (<0.5% of today's volume¹⁵) is placed in the magnet during manufacturing and then fully sealed, enclosing the precious coolant for the rest of the system life.

Due to the magnet being sealed, no helium can escape¹⁶. This reduces long interruptions to MR services that can result from helium issues. Moreover, it means that the magnet does not have to be refilled with liquid helium during its lifetime, avoiding any onsite cryogenic work on the magnet.

Philips offers an entire family of 70cm bore scanners incorporating BlueSeal magnet technology – MR Ingenia Ambition 1.5T S, MR Ingenia Ambition 1.5T X, and the latest efficiency enhancing MR 5300. With these three systems, Philips is actively working to close the gap amid the helium shortage, making alternative, low-cost, low-helium technologies readily available around the globe.

Additional BlueSeal benefits

- No need for a vent pipe
- Easy siting with a 900 kg¹⁵ lighter system
- Easy discharge and re-energize capability



Classic magnet technology - ~1,500 liters of liquid helium

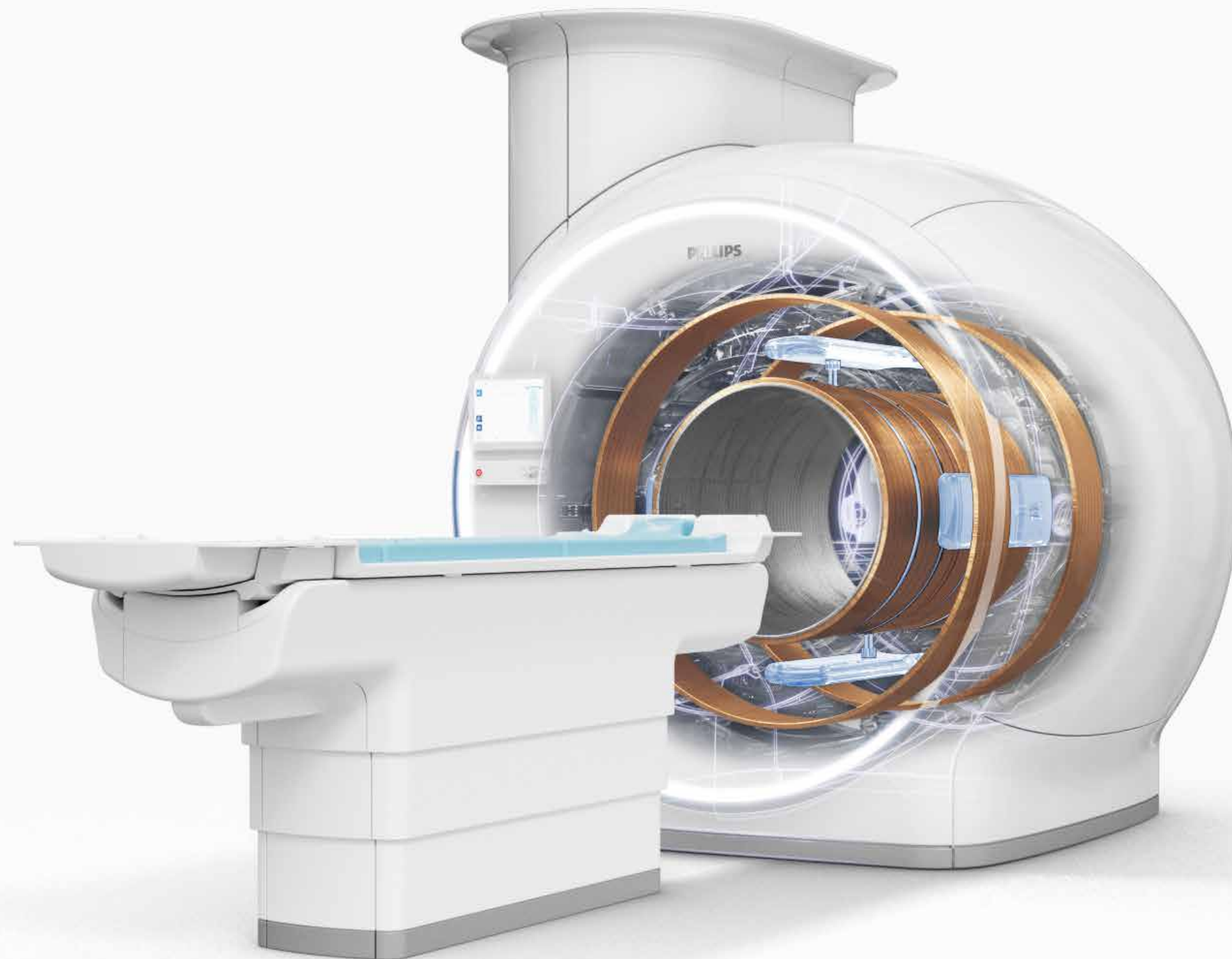


BlueSeal micro-cooling technology - ~7 liters of liquid helium

The sensible path forward

Reduced scan times, improved image quality, and efficient workflows, can all be accomplished at a reasonable cost with proactive power management solutions from Philips. Helium costs can be virtually eliminated with BlueSeal magnet technology. Philips approach to energy consumption and resource management is a key factor in the move to a more sustainable future. This in turn helps create a healthier living environment for all.

Get the most from your MR systems – work sensibly.



- 1 Sustainability Roadmap for Hospitals – A guide to achieving your sustainability goals, <http://www.sustainabilityroadmap.org/resources/#.Y5czhezMKo4>, accessed 12/09/22
- 2 Integrating Health and Energy Efficiency in Healthcare Facilities, U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, Federal Emergency Management Program, June 2021
- 3 Average Hospital Electric Bill: How to Uncover Savings, PC3 Cost Analysts / Utility / November 5, 2021 <https://www.costanalysts.com/average-hospital-electric-bill/>, accessed 12/09/22
- 4 Eckelman, Matthew J., et. al., Health care Pollution And Public Health Damage In The United States: An Update, Health Affairs > Vol. 39, No. 12: Climate & Health <https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2020.01247>, accessed 12/09/22
- 5 Distribution of helium consumption worldwide as of 2021, by end use.
- 6 Cincinnati Children's, December 11, 2019: <https://blog.cincinnatichildrens.org/radiology/what-is-a-quench-as-it-relates-to-an-mri-magnet/>
- 7 Magnetic Resonance, Chapter 21, Facts and Figures. <https://www.magnetic-resonance.org/ch/21-01.html>
- 8 Mo, Jeffery, Hunt is on for helium; rising cost has some hospitals turning to new MRI models, Healthydebate, July 4, 2022, <https://healthydebate.ca/2022/07/topic/helium-shortage/> accessed 01/12/23
- 9 Twenter, Paige, Helium shortage raises concerns around MRIs, Becker's Hospital review, October 24, 2022, <https://www.beckershospitalreview.com/supply-chain/helium-shortage-raises-concerns-around-mris.html> accessed 01/12/23
- 10 Applicable to Ambition 1.5 X. Philips stand-by versus ready-to-scan mode. Results can vary based on site conditions.
- 11 Adaptive-C-SENSE-Net technology is the winner of Fast MRI Challenge hosted by Facebook AI research and New York Langone Health
- 12 Compared to Philips SENSE
- 13 97% applicability on average, measured across a sample of sites from Philips MR installed base
- 14 Philips SmartSpeed power consumption versus Philips SENSE based scanning. Based on COCIR and in-house simulated environment. Results can vary based on site conditions applicable for Ambition and MR5300
- 15 Compared to the Ingenia 1.5T ZBO magnet.
- 16 In the rare case of the magnet becoming unsealed, the negligible amount of helium escaping would not materially affect the oxygen level within the room.



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