

A Philips MRI scanner with a patient bed inside the gantry. The gantry is illuminated with a bright blue light. Two control monitors are visible on either side of the gantry. The Philips logo is visible on the top of the gantry.

**PHILIPS**

Magnetic resonance

# Proactive energy management

Reducing power  
consumption for efficient,  
cost-effective MR operations

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.<sup>1</sup> They are currently the second most energy-intensive building type in the U.S.<sup>2</sup> 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.<sup>3</sup> 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. It is responsible for 4.4 to 4.6% of worldwide greenhouse gas emissions.<sup>4</sup>

In an effort to positively impact this energy problem, Philips approaches the situation in three ways. Our Ingenia Elition 3.0T X and MR 7700 both enjoy exceptional gradient coil efficiency, reduced power consumption by using PowerSave technology, and faster speed/higher image quality with SmartSpeed<sup>7</sup>. Combined, these technologies help to provide an effective way to save energy, reduce costs, and support global sustainability initiatives for an environmentally friendly future.





## Improved gradient efficiency

Gradient system efficiency, which is largely determined by gradient coil sensitivity, determines how much power is required to simultaneously achieve a specific gradient amplitude and slew rate. A high efficiency lowers the demands on the gradient amplifier power and also reduces the heat dissipation within the gradient coil.

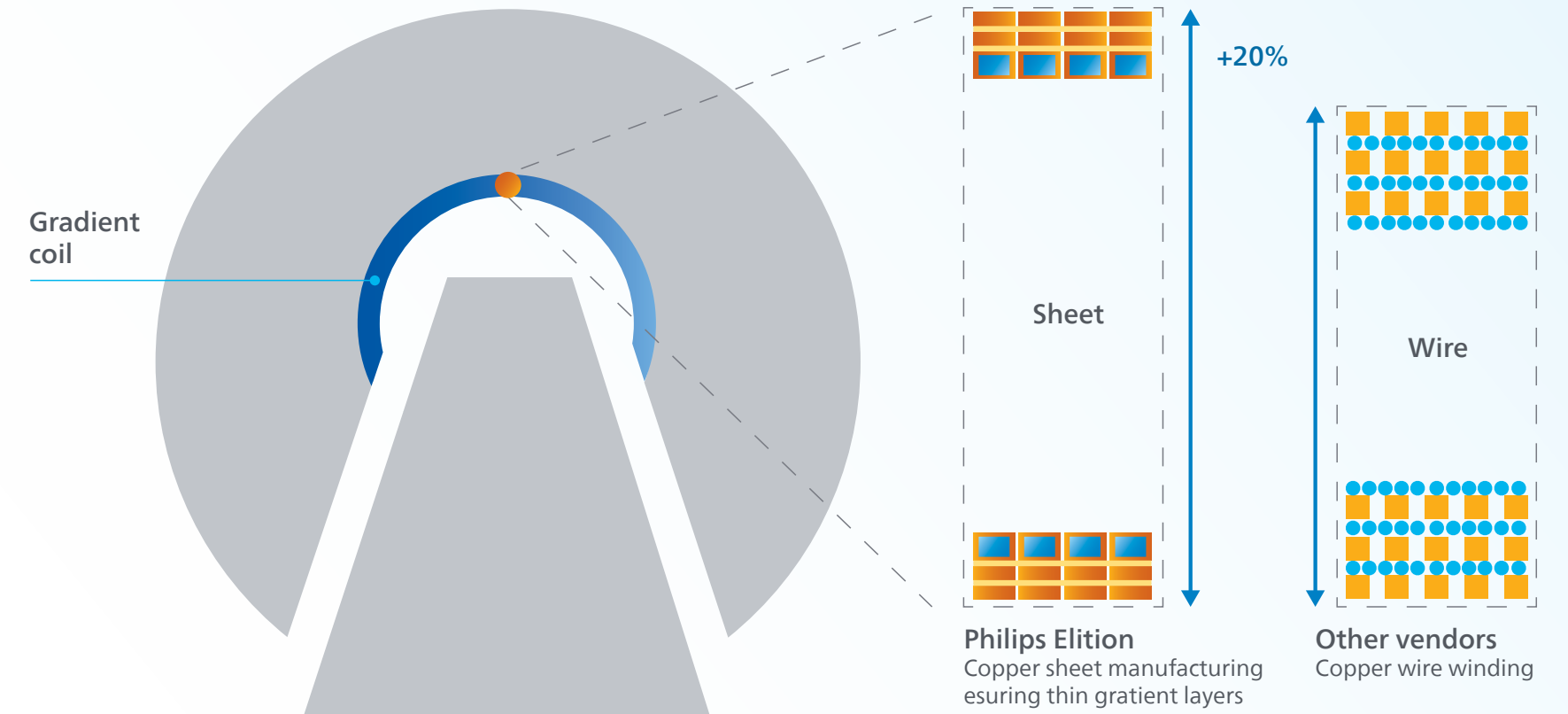
As an example, the Ingenia Elition 3.0T X configuration is around 50% more efficient, as measured against a typical industry 'Configuration B'. This then minimizes the power that the gradient amplifier needs to supply, as well as the power consumed and dissipated by the Ingenia Elition 3.0T X gradient coil.

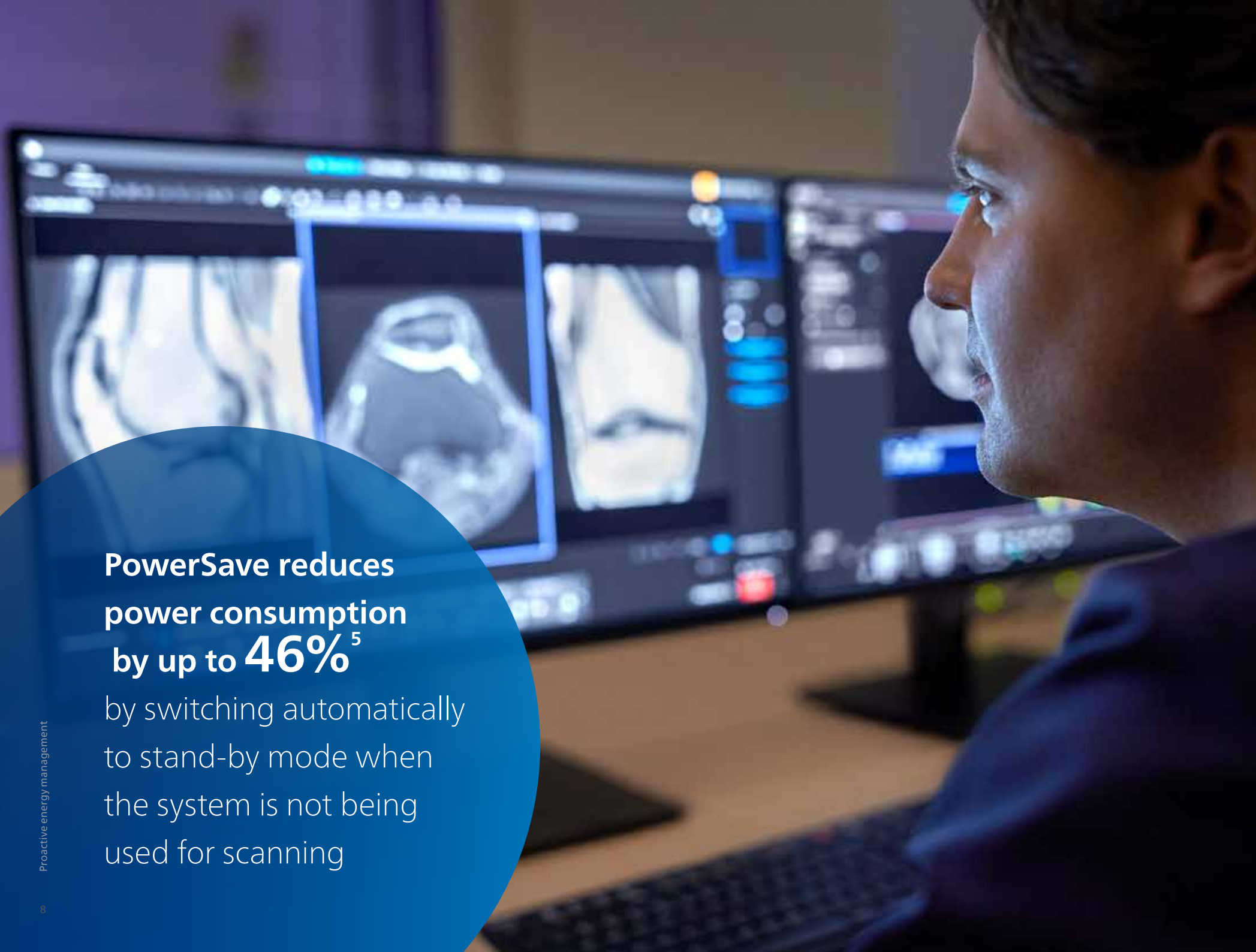
	<b>IngeniaElition X</b>	<b>Configuration B</b>
Required power per axis	1.5MVA	203MVA
Gmax	45 mT/m	45 mT/m
SRmax	220 T/m/s	200 T/m/s
gradient coil efficiency &	0.0066	0.0044

Philips 3.0T MR systems exceptional gradient system efficiency is achieved by creating high gradient coil sensitivity through the use of a large warm bore magnet and a large radial distance between the inner- and outer gradient coils.

Gradient coil sensitivity scales with the separation between inner and outer layers: the larger the distance, the higher the sensitivity. For example, increasing the distance between inner and outer layer diameters by just 2 cm can yield a ~20% increase in gradient coil power efficiency.

**Philips 3.0T gradient coil** is approximately **50%** more efficient than other 3.0T MRI's, leading to a lower power consumption when scanning





**PowerSave reduces power consumption by up to 46%<sup>5</sup>**

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.

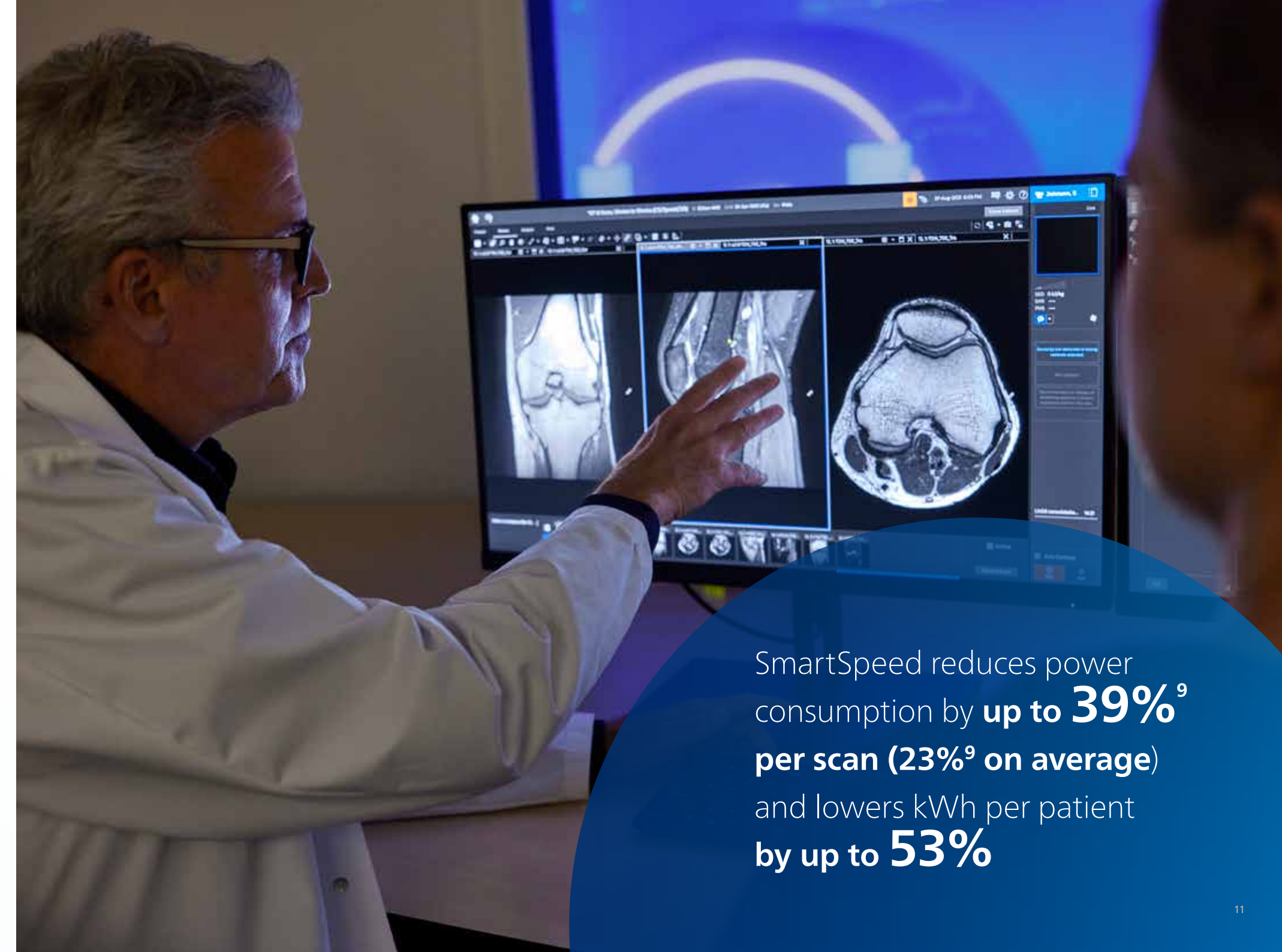
PowerSave is the result of our continued focus on improving the sustainability of our products. All Philips MRI systems adhere to the company-wide EcoDesign principle which (in part) commits to improving the efficiency of a product to reduce its energy consumption and carbon footprint.

## Speed without compromise

At imaging speeds nearly three times faster than SENSE 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 award-winning AI technology<sup>6</sup> and a state-of-the-art Compressed SENSE speed engine. Together, these technologies 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 3<sup>7</sup>, provides up to 65% greater resolution<sup>7</sup> to deliver outstanding image quality, and is compatible with 97% of clinical protocols<sup>8</sup>. 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 39%<sup>9</sup> per scan (23%<sup>9</sup> on average)** and lowers kWh per patient by **up to 53%**

# 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.

Such responsible energy consumption 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 Applicable to Elition X, Elition S and MR 7700. Philips stand-by versus ready-to-scan mode. Results can vary based on site conditions
- 6 Adaptive-C-SENSE-Net technology is the winner of Fast MRI Challenge hosted by Facebook AI research and New York Langone Health
- 7 Compared to Philips SENSE
- 8 97% applicability on average, measured across a sample of sites from Philips MR installed base
- 9 Philips SmartSpeed power consumption versus Philips SENSE based scanning. Based on COCIR and in-house simulated environment. Results can vary based on site conditions



#### How to reach us

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