PHILIPS

Case study

A sustainable cath lab: Partnership aims to future-proof healthcare

Rennes University Hospital and Philips measured the cath lab's environmental impact to find ways to reduce greenhouse gas emissions and resource use, setting a standard for other decarbonization projects in the healthcare sector.

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Executive summary

As part of a five-year clinical partnership on technology and innovation, Philips and Rennes University Hospital first focused on lowering the hospital's carbon footprint. This project aimed to quantify and reduce the overall environmental impact of the cath lab that treats strokes and aneurysms.

Based on a detailed environmental assessment, Philips and Rennes found that three strategies – energy savings, circular upgrades and refurbishment – could reduce the environmental impact. In addition to supporting Rennes to meet its strategic and technological priorities, this partnership demonstrates how healthcare institutions and industry providers can collaborate to reduce carbon emissions. Such efforts are crucial to meet the Paris Agreement's 1.5° C global warming threshold and avoid the worst impacts of climate change.

Background

With four sites and more than 1,800 beds, Rennes University Hospital is one of the top 10 hospitals in France. It is a reference center in a broad range of state-of-the-art clinical services: cardiac and vascular surgery and transplantation, as well as other specialties such as neuroradiology, rare diseases and robotics. Rennes has around 250 professionals involved in more than 1,800 research projects shared among 13 research units. Focused on sustainable healthcare, Rennes University Hospital has a comprehensive carbon action plan that promotes sustainable procurement, alternative transportation, energy-saving measures and waste reduction.

6 tons CO_2

The annual emissions of the Azurion system as used at Rennes University Hospital

>35 T CO_2

The annual carbon footprint from 15 medical consumables used in the Rennes University Hospital cath lab

20%

The potential energy savings from turning off the Azurion system between procedures at Rennes University Hospital

The challenge

Healthcare accounts for 4.4% of global CO_2 emissions, but in France, that figure is nearly double at 8%.[1] The sector is also responsible for 10% of global materials used each year, and the supply chain is responsible for 71% of the sector's CO_2 emissions.[2,3] Philips recognizes that environmental and human health go hand in hand. The threat of climate change creates a pressing need to build resilient and sustainable healthcare models.

Rennes University Hospital started its journey towards more sustainable operations more than 15 years ago and hit an important milestone in 2020 by performing a baseline carbon footprint assessment to precisely quantify its environmental impact. The assessment showed that the hospital's purchases accounted for nearly half (44%) of its total greenhouse gas emissions, followed by mobility (37%) and energy (11%).

Armed with this insight, the hospital created an action plan to look beyond the financial costs and into the environmental cost of purchasing medical equipment. This highlighted the need for a sustainable procurement strategy and to collaborate with industry stakeholders to address sustainability challenges through a systemic approach.

"Recognizing the impact of our healthcare activities and our ability to influence the ecological balance, Rennes University Hospital has been implementing an ambitious policy to reduce its environmental footprint for over 15 years," said Anne Kittler, Deputy Director General of Rennes University Hospital.

With an eye on green purchasing, in 2021, Rennes and Philips signed a five-year technology and innovation partnership to improve patient care and outcomes while contributing to a more sustainable healthcare system. In this context, the first step was to quantify the environmental impact of a recently renewed interventional neurology suite in order to identify hot spots and areas for improvement. There was a strong focus initially on the room's centerpiece, the Azurion, a biplane image-guided therapy system used in the care of stroke patients. Philips Azurion is an EcoDesigned product; it uses 10-19% less energy compared to the predecessor, and up to 90% of material weight is reused during Philips refurbishment [5,6,7]. This study sought to identify the environmental impacts specifically as it was used at Rennes University Hospital.

This partnership is an example of how Philips is well-positioned to bring innovation and in-depth experience in driving and embedding sustainability as part of day-to-day business operations and innovation, to help decarbonize the industry and deliver more care to more people.

Approach

The environmental impacts of the Azurion system were assessed through a Life Cycle Analysis (LCA), a holistic, science-based approach that considers all the phases of a product life from production to end-of-life, including the transport and use phases. More precisely, this analysis was conducted according to the Product Environmental Footprint (PEF), a LCA methodology developed by the European Commission. The 16 impact categories evaluated not only the carbon footprint but other impacts such as resource use, pollution and the impact on human health. The robustness and transparency of the method were key to the project to ensure that it could be replicable and used as a reference for the healthcare sector. To further add credibility, results were audited by an independent third party based on ISO 14040/44.

The PEF methodology had already been applied in several industries, from food to textile. But not yet in healthcare. This unique partnership allowed a review of the entire value chain: Philips gathered detailed data on procurement and system production, while Rennes University Hospital was able to precisely measure the use phase in order to see how their care practices directly impacted resources and energy use.

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Deputy Director General
of Rennes University Hospital

Interestingly, the project eventually extended beyond a product LCA. "While we were performing the analysis, we realized that there was an even bigger opportunity: we decided not just to focus on the equipment, but to also take into account other factors that may highly contribute to the overall carbon footprint of the cath lab operations, such as consumables, energy use, data storage and waste," said Mélissa Vincent, Innovation Account Manager at Philips, who also works on-site at the hospital.

[1] The Shift Project. Décarboner la Santé pour Soigner Durablement (2023).
[2] Circle Economy. The Circularity Gap Report 2020.
[3] Health Care Without Harm. Health care climate footprint report (2019).
[4] European Commission Environmental Footprint Methods.
[5] Compared to predecessor Allura Xper platform. Exact energy reduction depends on configuration.
[6] Depending on age of the system, 90% value is applicable to systems less than 3 years old.
[7] Philips. Environmental Performance Overview For Azurion image-guided therapy platform

Outcomes and results

The PEF LCA data showed that the Azurion system was responsible for approximatively 6 tons of CO_2e annually – which is nearly equivalent to the annual carbon footprint of a French citizen.

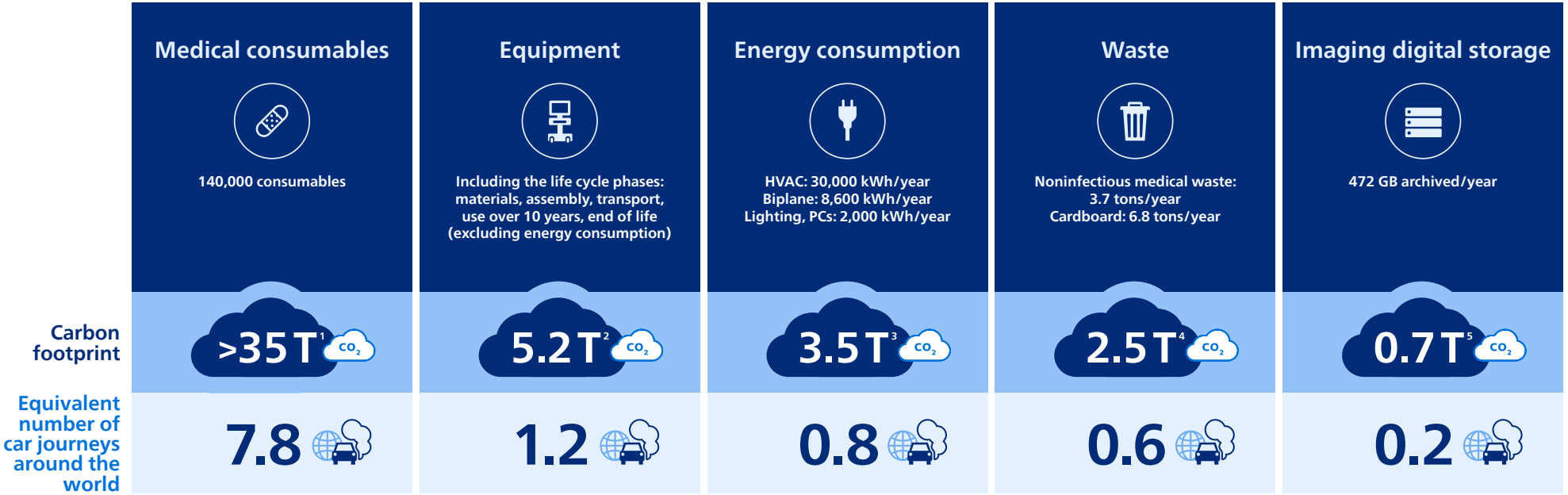
The data revealed that the raw material extraction and production phases of the Azurion are by far the most impactful for the device, as used specifically at Rennes, especially in terms of resource depletion, freshwater ecotoxicity and climate change (these phases accounted for 66% of total CO_2 emissions). This can be explained by the high environmental impact of printed circuit boards, representing 43% of the total impact alone but less than 2% of the system weight, according to this study.

The energy use related to the use phase only accounted for 13% of total emissions at Rennes. This surprisingly low result can be explained by the large share of nuclear power in the French energy mix, which generates approximately 4.5 times less CO_2 emissions compared to the average European grid. The LCA indicated that if the European or global energy mix were used, then the impact of the use phase would be similar or greater than the impact of the production phase.

To better understand how the system compared to other emission spots in the cath lab, the assessment took a more general approach to estimate the impact of consumables, waste, energy consumption (including ventilation, lightings and computers) and data storage.[8] Consumables emit the most carbon, in particular neurology devices containing rare metals like gold and platinum. The biplane itself was responsible for the second highest level of emissions, followed by the room's energy consumption, especially the ventilation system. This was followed by waste – a considerable 10 tons annually. (See infographic for more details.)

[8] Rougher estimations, not conducted according to PEF method.

Annual impact of the cath lab at Rennes University Hospital



[1] Estimated based on 15 typical consumables (representing 54% of the total amount of consumables) Data collected on weight. The main materials and location of suppliers collected from the available supplier documentation and supplemented by assumptions, if necessary. CO_2 emissions modeled from the EcoInvent database 3.9.1. Assumptions made about the composition of (micro)catheters significantly influence estimates of carbon emissions from consumables (while they generate 60% of impacts).
[2] Quantified carbon impact based on PEF LCA data.
[3] Estimated based on energy consumption measurements made on site using a power analyzer (ventilation: 3 days, biplane: 6 days, lighting and PCs: 4 days).
[4] Estimated based on weighing waste at the exit of six procedures, supplemented by an estimate of the volume of grey litter upstream of the room.
[5] Estimated based on the volume of data generated over a period of 6 months, considering a cumulative storage duration of 20 years then averaged back to 1 year.

Partnering with Philips to drive sustainable and equitable healthcare:

- Since 2020, we have been carbon neutral in our operations (scope 1 and 2).
- We have ambitious targets to decarbonize the value chain. Teaming up with suppliers and customers has a potential sevenfold impact compared with only reducing CO_2 emissions from our own operations.
- As an advocate for globally aligned green purchasing criteria, we consider sustainable procurement one of the critical strategies that care providers and governments can adopt.
- Circularity can drive a lower material footprint per patient, creating the opportunity to reduce costs, emissions and waste, while improving healthcare efficiency. By 2025, we aim to design all new product introductions in line with our EcoDesign requirements.

Next steps

Rennes University Hospital is planning to extend these learnings to other operating theaters and interventional imaging rooms, including in its new Surgical and Interventional Center, scheduled to open in 2025. The study results will help better estimate how much heavy radiology systems contribute to the hospital's carbon footprint.

The circular economy emerged as a major theme, summarized as: use less, use longer, use again. Circularity can help lower the material footprint per patient, creating the opportunity to reduce costs, emissions and waste. For example, extending the lifetime of the Azurion through software upgrades and refurbishment can decrease impact. Rennes has already adopted a strategy to maximize the system's lifetime by subscribing to a technology upgrade program on top of a regular maintenance plan. They also bought a refurbished interventional radiology suite for their new Surgical and Interventional Center.

Meanwhile, Philips continues to work on improving energy efficiency and circularity across its portfolio. By 2025, Philips aims to design all new product introductions in line with EcoDesign requirements and for 25% of sales from products, services and solutions to contribute to circularity.

At Rennes, optimizing the HVAC systems used in operating theaters is crucial for energy consumption. This was planned during the design phase of the new Surgical and Interventional Center. Therefore, it is expected that the cath lab's energy consumption will decrease once it moves to the new facility, and additional energy measurements will be taken to confirm this. Additionally, the assessment indicates that turning off the system between procedures could save about 20% of energy.

As they did with Philips, the hospital will continue to challenge its suppliers to produce greener consumables. For instance, the high volume of waste demonstrates the importance of reducing excess packaging and setting up recycling methods.

The partnership between Rennes and Philips was cited as best practice by the Ministry of Health in its sustainability roadmap.

"These efforts must, however, be carried out together at the whole industry level if we want to drive change," said Mélissa Vincent. "As a major industry player, we have the responsibility to help establish a realistic decarbonization roadmap for the healthcare sector fueled by a clear green procurement framework. Conducting the kind of in-depth assessment we did with Rennes produces the background knowledge we need to achieve this goal."

The partnership between Rennes and Philips has received national attention in France and the project was cited as best practice by the Ministry of Health in its sustainability roadmap.[9] This underlines the urgent necessity to address decarbonization and the environmental footprint of healthcare systems.

"Thanks to this project we now have more detailed data concerning the impact of our radiology equipment and can better assess their contribution to our global carbon footprint," said Anne Kittler. "Moreover, we have already tackled several topics such as improving the ventilation system, setting up best practices for energy consumption of the equipment, waste management, and more."

As a first-use case, this project could become a reference to accelerate the process of decarbonizing the healthcare sector.

[9] French Ministère de la Santé et de l'Accès aux soins. Feuille de route: Planification écologique du système de santé.

*Results from case studies are not predictive of results in other cases. Results in other cases may vary.

*The LCA results are obtained using Philips Environmental Profit & Loss (EP&L), proxy data, literature and customer obtained data including energy measurements. The LCA was performed via PEF methodology, and an external 3rd party review was performed based on ISO 14040/44.

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