

Greenspace PCTG Asturias, Spain

uponor

**Science, technology
and art come together to
create zero emissions**







➤ The first **net-zero energy office building** in the region

Greenspace PCTG in Asturias, Spain, is the first net-zero energy office building in the region and one of the few of its kind in the whole country. An impressive achievement made possible by a combination of highly efficient active energy and passive systems. Spanish architects EMASE Arquitectura worked with engineering firm SvR Ingenieros to create a sustainable, environmentally friendly design. It uses solar panels for keeping solar loads out of the building on one hand and to generate more energy than the building consumes on the other hand. In order to minimise the building's energy use, the project partners turned to Uponor and its thermally active building systems (TABS) for heating and cooling.

➤ We needed a system that was tailored to the building structure while also being energy-efficient enough to fit in with our energy calculations and hydraulic design requirements.

Ramón van Riet, SvR Ingenieros

➤ An impressive achievement by EMASE Arquitectura and SvR Ingenieros

Between the basement, the three above-ground floors and the roof, Greenspace covers a total area of 1,500 square metres. Since it was opened in July 2020 in Gijón Technology Park, it has hosted a range of start-ups and other companies with a focus on innovation and digital technology.

Designed by EMASE Arquitectura and SvR Ingenieros, this LEED gold-certified building is an example of sustainable construction that aligns with the goals of the European Circular Economy Action Plan. However, it would not have been possible to design Greenspace without Uponor's thermally active building systems (TABS) for heating and cooling. 'We needed a system that was tailored to the building structure while also being energy-efficient enough to fit in with our energy calculations and hydraulic design requirements,' says Ramón van Riet from SvR Ingenieros.

With the support of Uponor's technology, EMASE Arquitectura and SvR Ingenieros were able to determine the ideal size for the solar panels and energy distribution systems, which, together with other measures, earned the building an A energy rating.

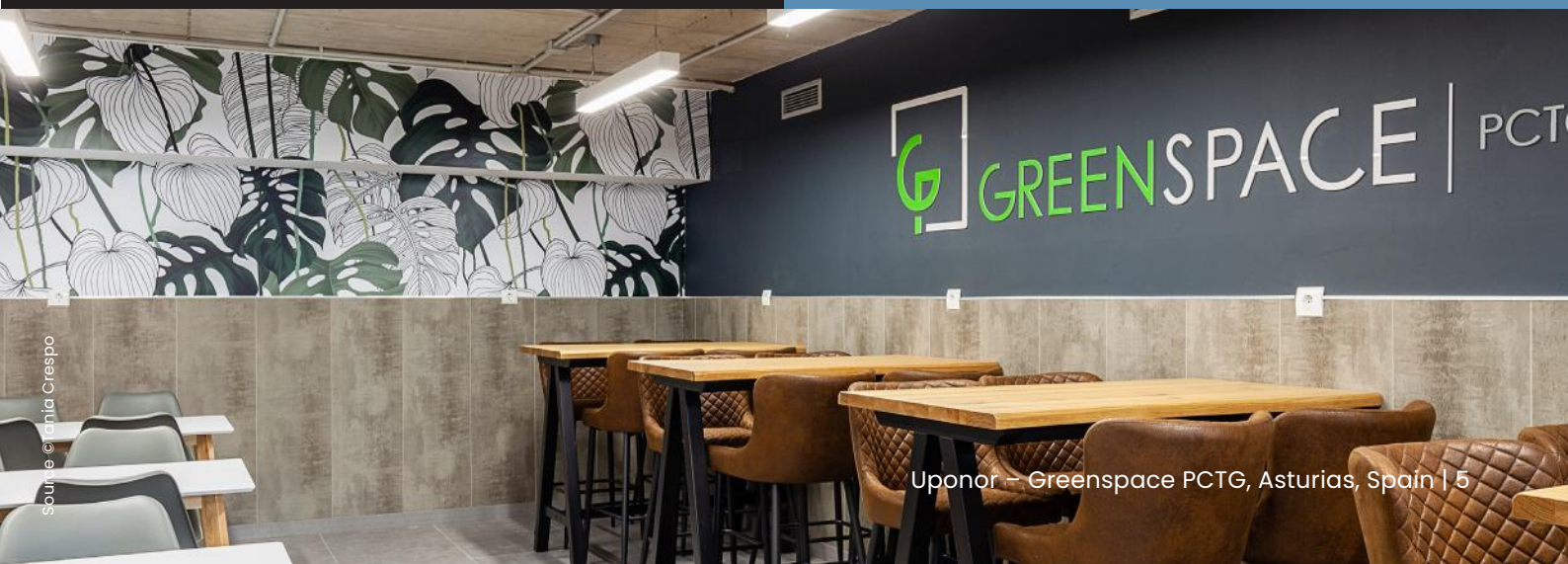




Source © Tania Crespo

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Ramón van Riet, SvR Ingenieros



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➤ Minimising energy consumption

The innovation and efficiency behind Greenspace have led to a positive energy balance. That means that building generates more energy than it uses. 'This is a net-zero building connected to a smart grid,' outlines Ramón Rodríguez from Arup. The building's positive energy balance is down to its combination of extremely efficient active and passive energy systems. '

➤ **We are continuously monitoring the indoor climate solutions, pumping, lighting and energy usage, broken down for each separate installation, as well as how much the solar panels are generating.**

Ramón van Riet, Svr Ingenieros

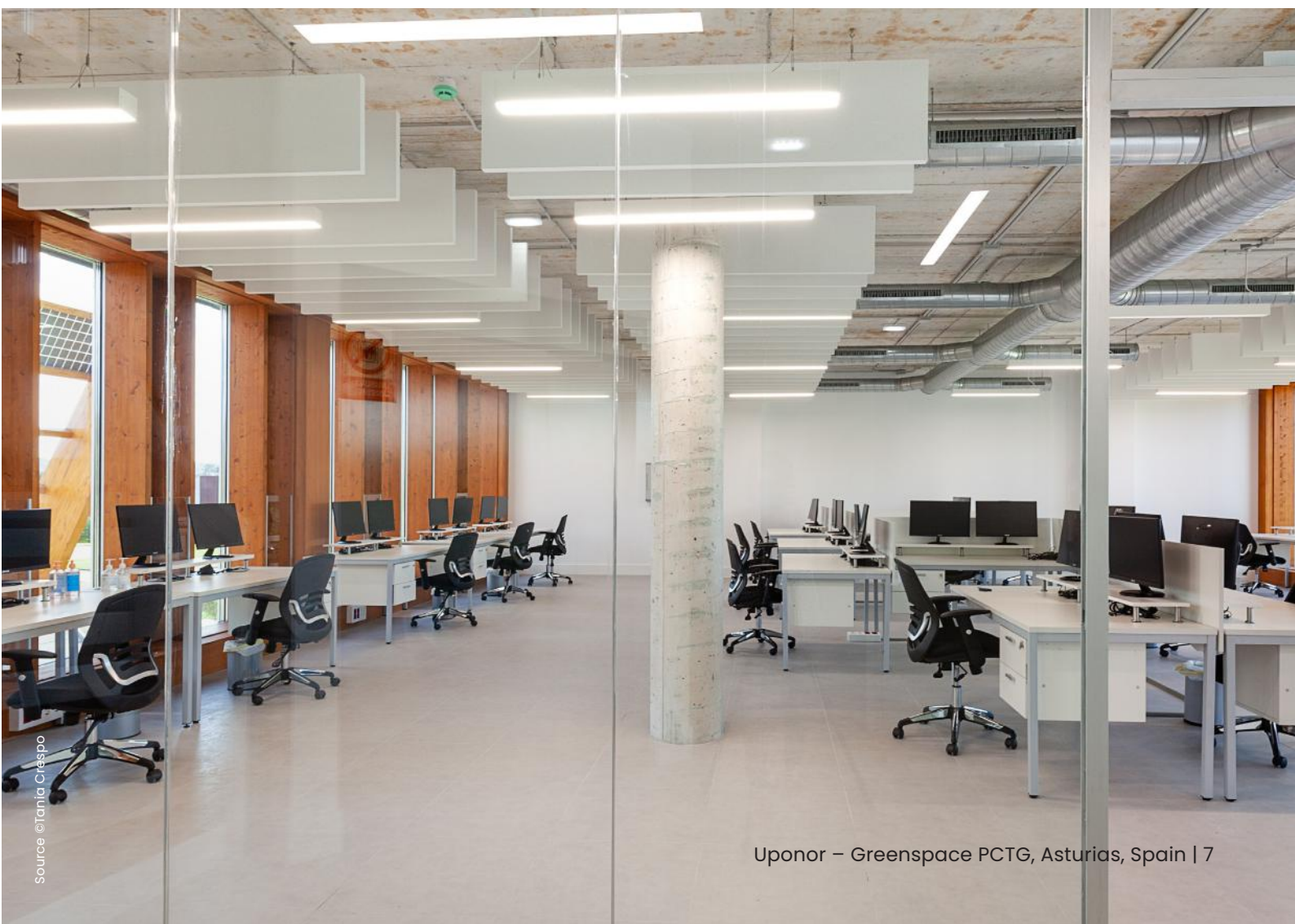


The passive systems include the building's facing direction, the insulation, the plant cover, and the natural lighting and ventilation. The active systems, on the other hand, are the solar panels, the indoor climate solutions through a thermo-active building system (TABS) and the radiant floor heating, as well as the monitoring and control of the building services,' highlights Eugenia del Río, from EMASE Arquitectura. The monitoring is another factor behind the positive energy balance. 'We are continuously monitoring the indoor climate solutions, pumping, lighting and energy usage, broken down for each separate installation, as well as how much the solar panels are generating,' adds Ramón van Riet.

As the HVAC is part of the active energy system, it needs to be one of the most energy-efficient and economical elements. Uponor provided a TABS solution, which makes use of the thermal inertia of the building's concrete structures. 'The decision to install TABS came down to the fact that the very low voltage of the power generators, together with the huge thermal inertia in the building's structures, would allow for a heating and cooling solution with minimal energy consumption,' notes José Manuel Santiago, Business Development Manager of Uponor for Spain and Portugal. In order to harness the thermal inertia, a network of pipes was built into the structure of the building, using concrete core activation to store and release both heat and cold.

These pipes carry water for the building's heating and cooling systems and provide comfortable temperatures all year round. Although they cannot be seen, the TABS can certainly be felt – they are supplied by heat pumps and keep the water at a temperature of 29°C for heating and 19°C for cooling, close to the ambient temperature. The Greenspace building uses a total of 7,500 metres of Uponor Comfort Pipe PLUS with a diameter of 20 mm and a wall thickness of 2.0 mm. These are fixed to a B500T corrugated steel meshes, measuring 6.00 m × 2.20 m. 'Uponor designed each of these modules on a bespoke basis,' notes José Manuel Santiago. 'While most of them were standard modules, we used some non-standard ones too in order to tailor it to the building structure.'

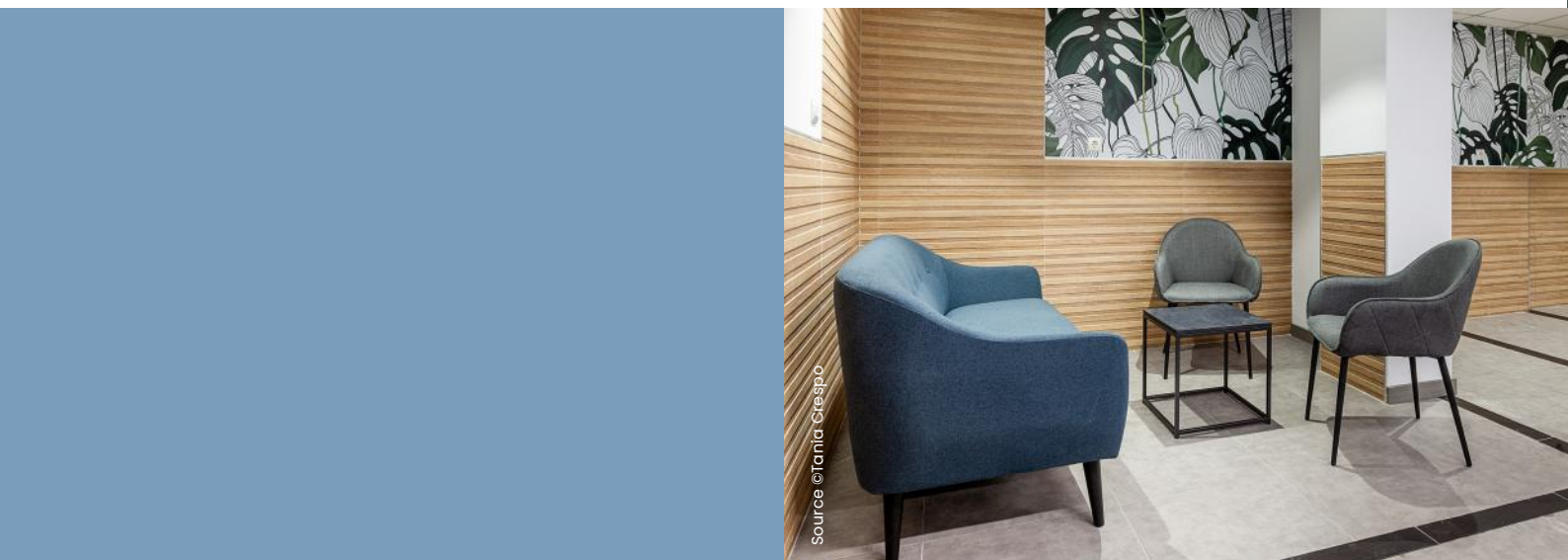
Although the TABS does not replace an air conditioning or ventilation system, it minimises the size of it. TABS is much more effective in dealing with the sensible loads whereas the air system is downsized to only cover the latent loads and fresh air supply. Moreover, as Holmer Deecke, Director International Engineering for Uponor explains, 'by being perfectly compatible with the aerothermal or geothermal heat pumps or with any other renewable energy systems, it can reduce both the building's energy consumption and its CO2 emissions significantly.'



➤ Efficiency, sustainability and design combined

Working alongside EMASE Arquitectura and SvR Ingenieros, Uponor succeeded in supporting a more efficient design process and helping to cut construction times. 'With our HEAT2 simulation software, we were able to analyse the building's static and dynamic thermal behaviour over time. This was the key to finding out the best way to use TABS within the building,' outlines José Manuel Santiago.

In order to avoid heating-up in the summer and to provide shade to each storey of the building, Greenspace has a pergola equipped with solar panels, not letting the sun radiation into the building but collecting it for energy generation. Located primarily on the south part of the roof, the solar energy system has a peak output of 60 kWp. Three sides of the building are equipped with panels. With the east and west sides picking up most sunlight during the mornings and evenings respectively and the south side, which has the pergola, being in direct sunlight throughout the day. 'All 134 solar panels on the pergola were made to measure, and we laid them out in an optimal design to provide shade indoors and generate power for the building to use. Since the building generates over 70 MWh per year, more than it uses, the excess can be fed back into the grid,' explains Eladio Rodriguez from EMASE Arquitectura, adding that 'the peak energy generated is enough to power around three million LED lights.'



In line with its goal of energy efficiency, the building's lighting system uses low-energy LED bulbs, controlled by sensors that automatically adjust the level and intensity of lighting as needed. Another part of the sustainable design is a lift, providing transport between the three floors above ground. The lift is encased in a concrete and glass cage, which displays its machinery, including an energy recovery system with batteries for storage. 'The batteries are charged by energy from the solar panels and, at full charge, they hold enough energy for the lift to go up and down 100 times without any more power being fed in,' says Ramón van Riet.



Source ©Tania Crespo

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José Manuel Santiago, Business Development Manager of Uponor for Spain and Portugal



➤ Maximum comfort

Greenspace provides a pleasant working environment, fostering creative thinking and high productivity. 'We wanted to provide maximum comfort, in keeping with a good understanding of sustainability, so that people could work as efficiently as possible,' reveals Eugenia del Río.



Project participants

- Project architects: Emase Arquitectura, Madrid
- Consultancy and LEED certification: Arup, Madrid
- Project management and LEED commissioning: SvR ingenieros, Asturias
- Promotion: GesyGes Innovación en la Edificación

Key facts

- 134 solar panels spread across three sides of the building have a peak capacity of 60 kWp, generating more than 70 MWh per year.
- 7,500 metres of Uponor Comfort Pipe PLUS pipes were installed in the building, helping to minimise energy use.
- Around 75% of the power generated is fed into the grid.

➤ **By choosing TABS and fresh-air ventilation, companies can keep their staff on-site responsibly, without worrying about the spread of Covid-19 by the HVAC technology.**

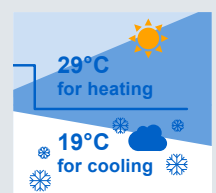
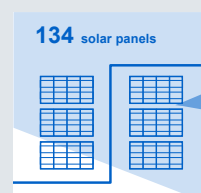
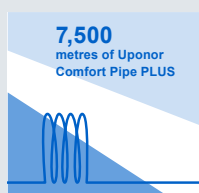
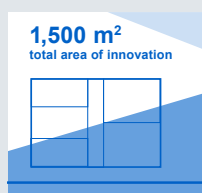
Holmer Deecke, Director International Engineering for Uponor

By using a silent radiant system the offices are free of noise and also free of visual intrusion because of the fully building structure integrated system. The building's orientation, openings and light-regulation sensors ensure that the level of lighting is uniform throughout the work areas. The temperature remains constantly at a comfortable level thanks to the TABS. Especially remarkable is that people perceive a better thermal comfort by the heat exchange with the surrounding surfaces. 'Another advantage of the TABS is that it keeps working even when no one is in the building. This means that the heat can be either delivered or extracted over a longer period of time over the day. This equalises cooling peak loads and helps maintaining comfortable temperatures while it's in use,' states Holmer Deecke.

Incorporating sustainability and environmental considerations into the design allowed for a welcoming and healthy working environment. The latter of which has been made more crucial than ever by the Covid-19 pandemic. Greenspace makes optimal use of natural ventilation, with fresh air circulating throughout the building. 'The need to control the virus has exposed an issue with the use of traditional HVAC systems in buildings. Using radiant systems to provide heating and cooling based on water circulation in building structure integrated pipes means that you can reduce air circulation in the rooms by the ventilation system. The resulting possibility of not using air recirculation at all and focusing on bringing in fresh air from outside is the best option for everyone's health,' says Holmer Deecke. 'By choosing TABS and fresh-air ventilation, companies can keep their staff on-site responsibly, without worrying about the spread of Covid-19 by the HVAC technology.'

➤ Internationally certified

The range of energy efficiency and bioclimatic design measures employed, together with the use of renewable energy, healthy architecture and low-emission materials, has seen Greenspace earn gold certification from LEED. By complying with standards and meeting the LEED criteria in its design, the building has minimised its environmental impact and energy consumption, reducing emissions almost to zero. The LEED certification places Greenspace among the most sustainable buildings in the world. As the first office building in Asturias to earn gold certification, it even serves as a benchmark for future construction projects.



Moving ➤ Forward

Uponor is rethinking water for future generations. Our offering, including safe drinking-water delivery, energy-efficient radiant heating and cooling and reliable infrastructure, enables a more sustainable living environment. We help our customers in residential and commercial construction, municipalities and utilities, as well as different industries, to work faster and smarter. Uponor employs about 3,800 professionals in 26 countries in Europe and North America. In 2019, Uponor's net sales totalled approximately €1.1 billion. Uponor Corporation is based in Finland and listed on Nasdaq Helsinki.

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