Sustainability Case Stories

León

ENVAC OPTIMISES WASTE COLLECTION SYSTEM IN HISTORIC SPANISH CITY

In 2021, Envac completed the optimisation of a pneumatic waste collection system in the historic city of León in northwest Spain that reduced energy use by 39 percent.

The 800-year-old city with a state-of-the-art waste collection system

With an old town dating from the 13th century and a population of almost 130,000 people, León required a cleaner and less disruptive solution to collect waste for its narrow winding streets. An Envac system with 63 waste inlets began serving 1,575 apartments in the old town neighbourhood of Barrio Húmedo in 1999. The system was further expanded in 2006 to include the new neighbourhood of La Lastra with an additional 161 inlets serving 4,025 apartments, plus another 91 inlets that will be brought into use as the neighbourhood grows.

The Envac system was seamlessly integrated into the historic city without compromising its aesthetical value and traditional charm that draw hundreds of thousands of tourists to the city each year. It also avoided the need for waste collection trucks to enter the old town and removed waste bins from the streets, which made the city cleaner and safer for both residents and tourists.

"Traditional street waste collection with trucks was damaging León's medieval infrastructure, posed risks to residents and made the process of waste collection much more difficult for our waste collection teams," says David Fernandez del Rio, Environmental Technician at León Municipality. "Envac's solution ticks all the boxes by enabling us to have a 21st century waste collection solution in a 13th century city. Not only have we futureproofed our waste management, but we've also future-proofed the streets of León in the process," says Fernandez del Rio.

Reducing energy consumption by 39%

Between 2014 and 2021, Envac worked to optimise the system by improving the control and collection processes. The work managed to reduce energy consumption by 39%.

Since 2020, laser sensors have been installed at each of the system's discharge points. These sensors optimise the collection time as they indicate in real time the amount of waste filling each of the downspouts, which helps reduce energy consumption.

Annual energy audits are also carried out by an energy consultant to assess the system and inform the municipality on optimising energy use and electricity procurement.

"Our Envac system has already cleaned up and reduced traffic in our historic city for over 20 years"

David Fernandez del Rio, Environmental Technician at León Municipality
"The optimisation of the system completed in 2021 has further reduced our environmental impact by decreasing our energy use – enabling us to contribute toward our EU commitment to reduce greenhouse gas emissions by 55% by 2030 compared with 1990 levels," says Fernandez del Rio.

The system and its collection terminal have the capacity and potential to be further expanded to more neighbourhoods in León. The municipality is continuing to expand the La Lastra neighbourhood and is investigating the potential to expand the system to more neighbourhoods.

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David Fernandez del Rio,
Environmental Technician at León Municipality.

Envac ReFlow

THE DIGITAL INFRASTRUCTURE THAT DRIVES SUSTAINABILITY AND SMART CITIES

ReFlow is a digital solution that helps Envac users and customers further improve their waste management to meet wider sustainability objectives.

The world's first smart meter for waste collection

ReFlow not only provides the users of Envac systems with convenient guides to improve the sorting of recyclables, but it also provides them with feedback on their recycling rates and how they contribute towards the city's environmental goals. The app is supplemented with entrance screens in apartment buildings that provide recycling information and feedback on a building level.

> **"ReFlow helps residents and Envac customers to make better use of resources"**
> **Hossein Shahrokni, Director of Research at LocalLife**

The solution was developed by behavioural scientists and inspires residents to improve their recycling habits and allows them to compare their recycling to that of their neighbours and community. A study by Envac's development partner LocalLife in 2021 showed that ReFlow reduced waste generation by 12% and increased plastic recycling by 15%, while boosting satisfaction in the Envac system and the neighbourhood in general.

"ReFlow helps residents and Envac customers to make better use of resources," says Hossein Shahrokni, Director of Research at LocalLife, which developed ReFlow together with Envac. "It's a powerful tool to connect residents that use an Envac system with municipal waste management targets and political objectives."

Helping cities to meet their ambitious waste targets

Many municipalities around the world have set ambitious waste plans and need to better engage with residents to improve the sorting of recyclables. ReFlow provides cost-effective ongoing engagement to inspire better waste management from the household level up.

In addition to the apps and screens used by residents, ReFlow combines city-wide information into a 'smart city dashboard' to help the municipality or waste management company optimally manage their Envac system. The dashboard can compare

Hossein Shahrokni, Director of Research at LocalLife

energy use, transportation and recycling rates in different neighbourhoods and buildings.

"ReFlow is powered by artificial intelligence that can for example automatically fix some issues and optimally uses energy by avoiding periods of peak load in the energy grid. This optimisation is of huge value for a city and is already being piloted in Envac's system in Hammarby Sjöstad in Stockholm," says Shahrokni. "Importantly for municipalities, ReFlow provides better waste management data granularity in what is a data sparse field."

Making reusing and sharing easier

Another ReFlow functionality enables residents to share, lend, borrow, buy and sell different items to their neighbours to ensure unwanted items are reused and avoid the need for sourcing new items.

"This additional functionality allows ReFlow to help people to be less wasteful by giving things a longer lifespan," says Shahrokni. "There are similar web-based platforms out there but ReFlow is really unique in how it connects neighbours to help them live more resource efficient and low-carbon lives."

Establishing the first commercial ReFlow project

After refining ReFlow on pilot projects in recent years, the first commercial ReFlow project is being rolled out in the Järfälla Barkarby suburb in Stockholm and will eventually engage residents in 12,000 apartments. ReFlow is being brought to other cities and neighbourhoods around the world from 2022.

"We will continue to respond to the needs of Envac customers by adding and further developing digital infrastructure on top of Envac's physical infrastructure," concludes Shahrokni. "We are looking to further develop ReFlow by adding capabilities to measure user energy use and help customers with green building certifications."

Infectious Waste

REVOLUTIONISING INFECTIOUS WASTE COLLECTION IN HOSPITALS AROUND THE WORLD

Envac is developing innovative systems that are set to revolutionise how hospital infectious waste is collected and treated – to promote patient and personnel health while making significant financial cost savings and reducing environmental impact.

Infectious Waste Case Story

Infectious waste management is a major issue for hospitals around the world as it typically must be manually labelled, put in plastic boxes, moved through hospital corridors and transported across cities for special treatment – while striving to prevent the spread of infection at each stage. The Covid-19 pandemic further exacerbated the challenge by significantly increasing the amount of infectious waste generated by hospitals.

Turnkey Infectious Waste Collection (IWC) systems

Envac has introduced a new pneumatic waste collection solution specifically for infectious waste that prevents the spread of healthcare-associated infections, pathogens and microbes. The IWC solution uses a closed pipe system that minimises manual handling and converts infectious waste into non-hazardous general waste onsite. Envac is a turnkey provider of IWC solutions that designs and manufactures the systems, as well as guaranteeing their function and being able to also maintain and run the system or provide a customer with comprehensive guidance and support

> **"Our new IWC solution enables hospitals to deal with infectious waste at source in a safe and very cost-effective manner"**
>
> **Fredrik Lauritsen, Global Sales Support, Hospitals**

"The systems we are currently developing in France and northern Europe will use waste converters that grind the infectious waste and pasteurise it with microwaves into a non-hazardous waste. But the systems can use various kinds of waste converters depending on customer preference."

Preventing the spread of healthcare-associated infections

Envac's IWC system avoids the need for the manual handling of infectious waste – from bagging and boxing waste to transporting it through the hospital and city streets. This ensures a much safer environment for everyone in the hospital and members of the public who all have minimal potential contact with infectious waste.

"By immediately containing hazardous waste at source, we can minimise the risk of contamination throughout the entire waste management chain," explains Lauritsen. "This includes

the potential infection of logistics personnel, healthcare professionals, patients and hospital visitors."

The IWC system operates with a constant negative pressure and is equipped with filters to ensure that microbes and bacteria cannot escape. The pipes are regularly disinfected with ozone gas, and sensors throughout the pipe system verify that the system is properly disinfected. The ozone gas is filtered and neutralised before being safely released into the atmosphere.

Reducing hospital waste costs

Infectious waste is typically over five times more expensive to handle than non-hazardous waste. Envac's system reduces costs by avoiding the need for special containers, minimising manual

> **"The return on investment of our IWC systems is typically 3-5 years due to the high costs associated with conventional infectious waste management that our solution avoids"**
>
> **Fredrik Lauritsen, Global Sales Support, Hospitals**

– Healthcare handling and transport, saving time spent by healthcare professionals and reducing final waste transport by around 90 percent as the converted waste has much less volume. This also decreases environmental impact by reducing the number of journeys required and the related transport emissions.

These cost and time savings add value by allowing hospitals to use more of their resources for patient care."
The IWC systems can be retrofitted into existing hospitals, although they are easier to install in new hospitals.

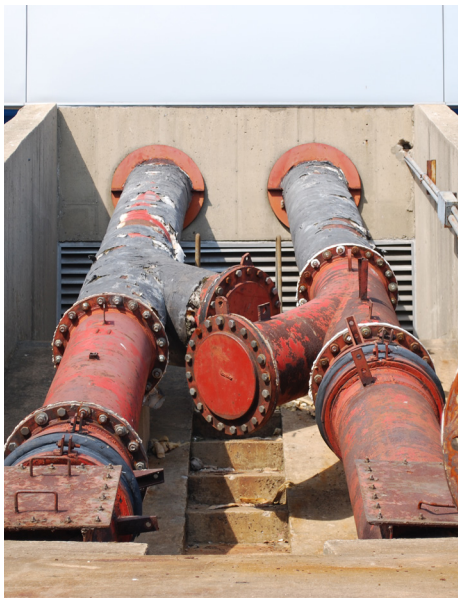
"We have several IWC systems in the pipeline and are currently training our teams to better explain the multiple customer benefits such as the reduced risk of infection and significant cost savings," concludes Lauritsen. "We see huge potential and expect the solution to really take off once our first IWC system becomes fully operational in France in 2023."

Roosevelt Island

50-YEAR-OLD PNEUMATIC WASTE COLLECTION SYSTEM IN NEW YORK CITY GETS A RETROFIT

Envac has retrofitted the system on Roosevelt Island, New York City, in recent years, including installing a new business intelligence tool in 2021 – to improve energy efficiency and reduce operating costs.

The pneumatic waste collection system on Roosevelt Island is owned by the Roosevelt Island Operating Corporation (RIOC) and operated by the NYC Department of Sanitation (DSNY). It collects around six tonnes of waste every day from the 14,000 residents of the island. The system was originally installed by Envac in 1971, when the company was known as Centralsug, and it has been in operation ever since.



Retrofit improves performance

In 2021, Envac installed a business intelligence tool to better automate and optimise the control system. Envac also completed a retrofit between 2019 and 2020 when it installed new exhausters, wiring, volumetric sensors and other significant operating components.

These measures reduced energy consumption by around 67%, which has significantly reduced operating costs for RIOC.

> **"The system on Roosevelt Island really showcases the longevity, resilience and reliability of Envac's waste collection solution"**
>
> **Toni Monclús, Envac Project Manager in New York.**

"We are proud to retrofit and optimise the performance of a solution that has been running for more than half a century" says Toni Monclús

Uninterrupted waste collection during extreme weather events

The Roosevelt Island pneumatic waste collection system has operated reliably for over half a century. In fact, the system has continued to operate during extreme weather events that have hit New York City over the years.

For example, the system ensured that Roosevelt Island was the only DSNY district to have uninterrupted waste collection during the crippling snowstorms of 2010, when garbage trucks were diverted to plough snow and garbage accumulated on the city's streets for almost three weeks. The Roosevelt Island system also continued to operate during the disruption caused by Hurricane Sandy in 2012.

Majadahonda

SPANISH MUNICIPALITY EXPANDS ENVAC SYSTEM TO BOOST RECYCLING AND REDUCE EMISSIONS

The Majadahonda municipality continues to develop its pneumatic waste collection system to drive recycling rates, decrease emissions and reduce costs.

The Envac waste collection system in Majadahonda municipality, which is situated 16 km northwest of Madrid and home to 70,000 inhabitants, has been successively expanded since it was inaugurated in 2000. The system has five waste collection terminals, 1,030 inlets and 25 km of pipe that serve approximately 20,000 homes and the commercial properties in the area. It collects approximately 6,400 tonnes of waste per year, which is equivalent to around 65% of the municipality's total.

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The densest pneumatic waste collection system in Europe continues to expand

The system covers most of Majadahonda, which is the city with the greatest access to pneumatic waste collection per capita in Europe. The municipality has a clear long-term vision to eventually install the system in all its neighbourhoods. All the city's systems to date were installed by Envac.

In 2021, it was decided to construct a new terminal to serve two new neighbourhoods that already have pipes installed. The new terminal is under development and will connect 3,700 additional equivalent dwellings to the system.

> **"It is a cleaner system, we don't have issues with odours and garbage bags on the street, and residents can get rid of their waste 24 hours a day, every day of the week"**
>
> **Marina Pont, Environmental Councillor as Majadahonda City Council.**

"We also avoid noise from garbage trucks in residential streets and traffic jams, and we gain more free spaces for vehicles, pedestrians and green areas."

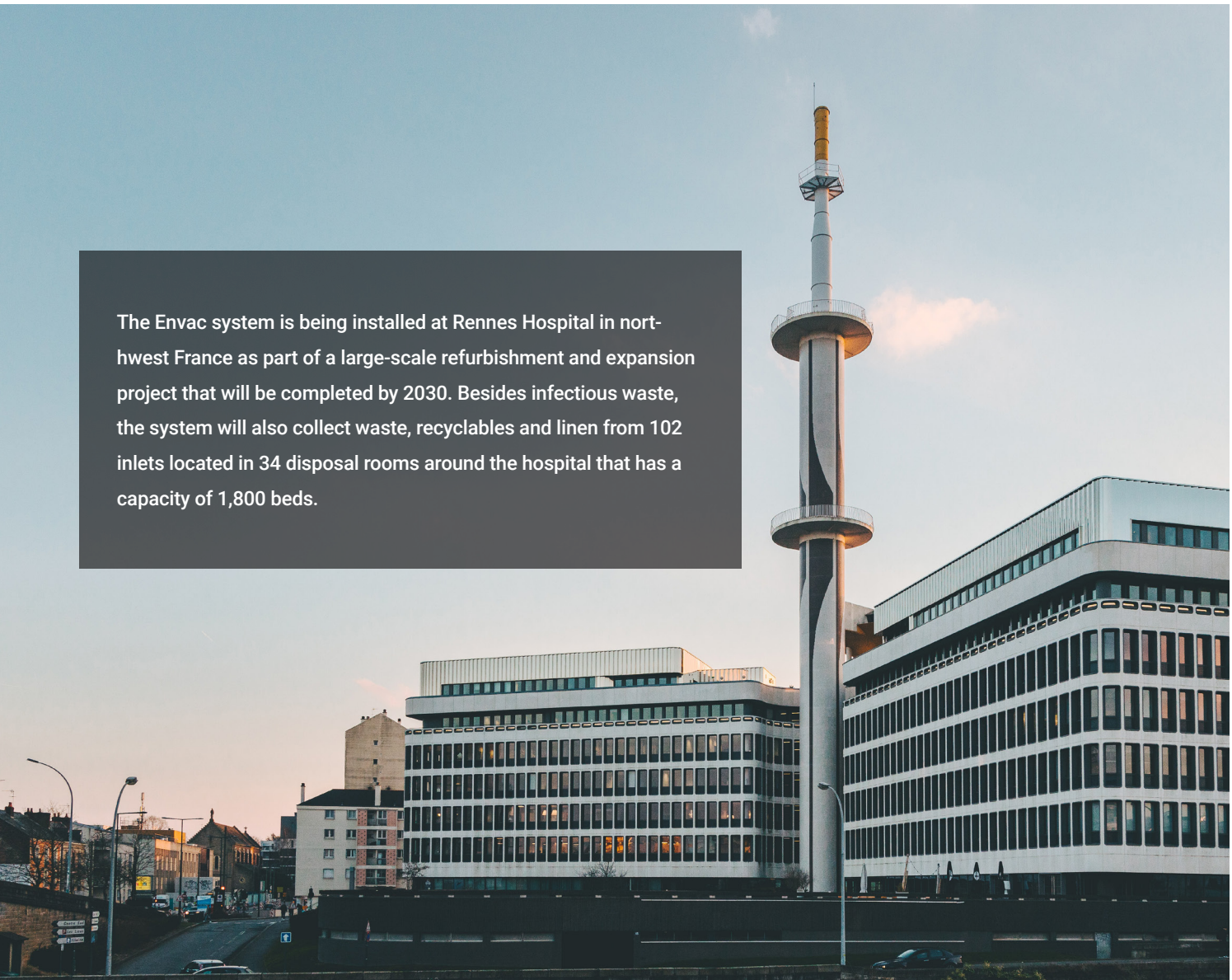
Reducing waste collection emissions

By reducing the amount of truck kilometres by over 90%, the system in Majadahonda decreases emissions by over 7 tonnes of CO2 per year and the number of trucks the municipality requires for the collection of waste and recyclables. By using less fuel and requiring less collection trucks, the system makes significant financial savings for the municipality.

Rennes Hospital

THE WORLD'S FIRST PNEUMATIC WASTE COLLECTION SYSTEM FOR INFECTIOUS WASTE

Envac is installing an infectious waste collection (IWC) solution at Rennes Hospital in France – to prevent the spread of healthcare-associated infections, pathogens and microbes while improving logistics and reducing long-term lifecycle costs.



The Envac system is being installed at Rennes Hospital in nort-hwest France as part of a large-scale refurbishment and expansion project that will be completed by 2030. Besides infectious waste, the system will also collect waste, recyclables and linen from 102 inlets located in 34 disposal rooms around the hospital that has a capacity of 1,800 beds.

Setting the hospital standard for infectious waste collection

The IWC system will use a closed pipe system that minimises manual handling and the spread of healthcare-associated infections, pathogens and microbes. The inlets can only be opened by hospital personnel with a badge and are automatically closed in the event of a fire.

Immediately after collection, the infectious waste is pasteurised with microwaves into a non-hazardous waste in a converter. The pipe network for hazardous waste will be made from stainless steel to avoid corrosion from the ozone gas used to disinfect the system.

> **"The Rennes Hospital project not only demonstrates that our IWC solution can be seamlessly combined with our existing hospital solutions to collect waste, recyclables and linen for example – but also that it can be easily incorporated into both existing and new hospital buildings"**
>
> **Bruno Martin, Director at Envac France**

"The solution will help protect hospital patients, employees and visitors, while reducing long-term lifecycle costs. We expect this to be the first of many IWC solutions in hospitals around the world."

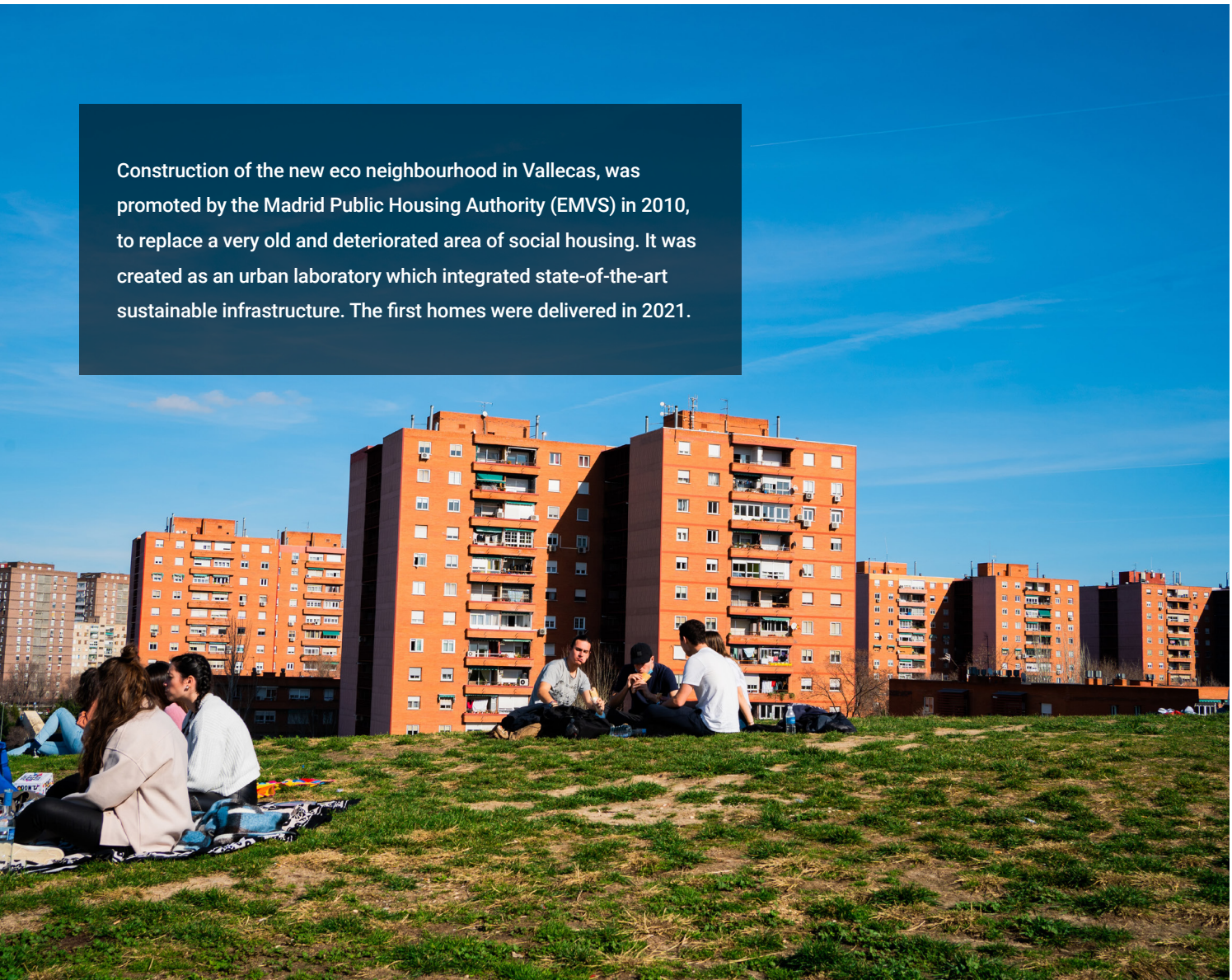
Streamlining and optimising hospital operations for cost efficiency

Like many hospitals around the world, Rennes Hospital struggles with safely managing infectious waste on a daily basis – particularly during the pandemic, which increased the amount of infectious waste material generated by hospitals. The Envac IWC system will significantly improve hospital logistics and reduce long-term lifecycle costs for the hospital.

Eco Barrio Vallecas

ORGANIC WASTE ADDED TO ENVAC SYSTEM IN MADRID ECO NEIGHBOURHOOD TO MEET EU WASTE DIRECTIVE

An organic waste fraction has been added to the pneumatic waste collection system in the Vallecas neighbourhood to meet the EU waste directive to recycle at least 50% of all waste.



Construction of the new eco neighbourhood in Vallecas, was promoted by the Madrid Public Housing Authority (EMVS) in 2010, to replace a very old and deteriorated area of social housing. It was created as an urban laboratory which integrated state-of-the-art sustainable infrastructure. The first homes were delivered in 2021.

Efficient waste collection in Madrid's first eco neighbourhood

In 2021, Envac completed a system upgrade to add the organic waste fraction to the Vallecas system to meet the EU Directive 2008/98/EC on waste to recycle at least 50% of all waste produced. The directive was incorporated into local regulation in 2018 along with a requirement for all homes to sort their organic waste.

The Vallecas pneumatic waste collection system will collect waste, recyclables and organic waste from 1,888 apartments when fully implemented. The Environmental Department of Madrid city has awarded the contract to Envac to run the system, which collects five tonnes of waste per day and has 97 inlets.

Organic waste – from landfill to resource

Before the legislative change, organic waste made up almost half of all domestic waste in Spain, much of which ended up in landfill. The organic waste from Vallecas will undergo a biomethanation process to generate biogas and produce compost for local agriculture.

> **"By adding organic waste to the pneumatic waste collection system in Vallecas, we allow residents to recycle their food waste instead of throwing it in the normal waste where it can end up in landfill"**
>
> **Roberto Rello, Service Manager at Envac.**

"This will significantly reduce the amount of unsorted waste the neighbourhood produces and will help to achieve the EU directive to recycle at least half of all waste," says Rello.

Pneumatic waste collection systems promote resource efficiency in Spain

In 2016, the Spanish Ministry of Development changed the Spanish building code to make pneumatic waste collection systems exempt from requiring waste storage rooms in new developments. In Vallecas, this avoided the need to construct 1,300 m2 waste storage rooms, which avoided around 580 tonnes of CO2 emissions and made financial savings of €1.3 million by reducing construction materials and activities.

Cost-effective upgrade

"Envac systems are relatively easy to upgrade with additional fractions and in Vallecas we were able to add a third fraction with a very small investment," says Rello. "We have recently added organic fractions to other systems in Spain, such as in Galdakano and Bilbao, as the country works towards the EU waste directive."