

SEGMENT

# HOSPITALS

MODERN SOLUTIONS FOR MODERN CARE





# A Scandinavian approach to healthcare

Minimise the spread of infections, reduce manual handling and create a cleaner and safer hospital for both patients and staff.

*Södersjukhuset, centrally located in Stockholm, has implemented an automated waste collection system.*

The Scandinavian approach to healthcare facilities increasingly incorporates advanced automated waste collection systems to improve infection control and hygienic conditions. By automating waste disposal and soiled linen management, these facilities significantly minimise the risk of exposure to harmful pathogens, protecting both healthcare staff and patients. The focus on automation reflects a broader commitment in Scandinavia to integrating sustainable technology into healthcare to ensure safer, more hygienic environments.

Swecare recently launched their informative brochure showcasing the [Swedish solutions in Infection Prevention and Control](#) to aid in the fight against Antimicrobial resistance (AMR.) It states that **1.27 million people die each year** as a direct result of antibiotic-resistant infection.

Previous studies have shown that approximately 70 per cent of resistant infections are hospital-acquired. The report "[Vårdrelaterade infektioner och antibiotikaanvändning på akutsjukhus i Sverige \(ECDC PPM 2023\)](#)" presents the results of Sweden's participation in the European point prevalence survey of hospital-acquired infections (HAI) and antibiotic use in acute hospitals during 2022-2023, involving 54 Swedish hospitals from all 21 regions.

Based on this survey, Folkhälsomyndigheten have estimated that more than 75 000 patients per year get a hospital-acquired infection in acute care hospitals in Sweden. The longer duration of stay seen in patients with HAI can represent substantial healthcare costs. The study further deduces that improvement efforts

should help reduce costs. The data revealed that patients with hospital-acquired infections (HAIs) had a median stay four days longer than those without. In 2022, the average cost per inpatient day was 15,959 kronor, according to SKR's cost per patient (KPP) database. A conservative estimate suggests that avoidable HAI-related costs could account for one-third of the total, approximately **1.6 billion SEK**.

## ENVACS RECOMMENDATIONS FOR IDEAL WASTE COLLECTION IN HEALTHCARE

- Install a vacuum system for general waste, soiled linen and infectious waste.
- Use access-controlled, concealed inlets.
- Ensure negative air pressure in the inlets.
- By using double doors for security and high quality plastic bags for infectious waste enables the healthcare professionals a safe waste management.
- Continuous disinfection of inlets.
- Instead of bulk storage of general waste and soiled linen - use inlets that minimize storage time. Once a linen bag is full, it should be immediately placed into an inlet, preventing bacterial build-up. Manual handling through corridors and lifts increases the risk of spreading bacteria.

By addressing the root causes of infection transmission, we enable healthcare facilities to create a safer patient environment. Through our innovative approach, Envac is committed to delivering comprehensive solutions that prioritise patient well-being and quality of care.

# LESS RISK OF INFECTION, GREATER VALUE FOR PATIENTS

Manual transport of general waste, soiled linens and infectious waste, within healthcare premises, pose a high threat. Automated waste collection systems (AWCS) can contribute to less spread of infection and bacterial growth, better working environment for staff, more space and more efficient logistics for the hospital.

## 15%

of the total amount of produced healthcare waste is hazardous and can be infectious, toxic or radioactive.

## 2 million

healthcare professionals are exposed to pathogens as a result of their daily work routines, globally.

## 11 kg

of hazardous waste per hospital bed per day produced by high income countries.

## 5.2 million

people worldwide die each year, including 4 million children, due to illnesses caused by unmanaged medical waste.

## 1.6 billion SEK

in potential savings in avoidable HAI-related costs in Swedish hospitals.

### LOWER THE SPREAD OF BACTERIA

A [new study](#) from The Royal Institute of Technology in Stockholm suggests that hospitals that have implemented a hermetic pipe system for general waste and soiled linen have lower rates of infection spread than those using traditional handling methods.

Through a comparative analysis between "Hospital A", which is specifically equipped with Envac's automated system, and "Hospital B", which uses the conventional method, the study quantifies bacterial contamination levels using colony-forming units (CFU). The results suggest a significant reduction in infection spread at "Hospital A". "Hospital B" are now in the process of implementing an automated waste collection system.

Read the full study at [www.envacuk.co.uk/insights](http://www.envacuk.co.uk/insights).

### INFECTIOUS WASTE

To further improve hygienic conditions in hospitals, Envac is introducing a system for managing infectious waste.

The waste is placed in special bags, which are disposed of in a separate chute and transported through an independent system. At the collection point it is converted into harmless waste, which is either mixed with other waste or stored in a separate container. The system is automatically disinfected at regular intervals.



# SOILED LINEN SOLUTIONS

It's crucial to keep a safe distance when manually handling contaminated linen in healthcare settings to prevent the spread of harmful pathogens and microorganisms. Appropriate precautions and proper protective equipment are essential to minimise exposure risks.

Implementing an automated linen handling system dramatically improves the safety of healthcare professionals and patients.

- Contaminated textiles and fabrics should be transported in bags via a sealed chute to avoid airborne microbial contaminants.
- Proper design, maintenance, and use of laundry chutes are necessary to prevent the laundry bag from spreading bacteria.
- Maintaining laundry chutes under negative air pressure helps to stop the spread of microorganisms from one floor to another.
- Avoid tossing loose, contaminated laundry into chutes; ensure laundry bags are closed or secured to prevent contents from spilling out.

Effective handling of soiled textiles in healthcare is crucial for preventing infections. Traditional manual handling poses significant health risks due to exposure to infectious agents, highlighting the need for advanced automated solutions.

The introduction of a vacuum-based waste management system and automated handling of textiles can drastically minimise the risk of pathogen spread, thereby protecting both healthcare professionals and patients.



**ENVAC SUSTAINABILITY REPORT SHINES A LIGHT ON HOW MUCH OF AN IMPACT AN AUTOMATED SOILED LINEN SOLUTION CAN HAVE.**

**Read the full report on our website.**

## REDUCTION IN MANUAL HANDLING OF SOILED LINEN (ESTIMATIONS)

PROJECT NAME	TOTAL NUMBER OF BEDS	DAILY SOILED LINEN (TONNES)	REDUCED MANUAL HANDLING BY	ADDED VALUE
Beijing Chaoyang Hospital (East), China	1,000	3	65%	<ul style="list-style-type: none"> <li>■ Saved energy consumption by nearly 40%</li> <li>■ Linen's service life extension by approx. 20%</li> <li>■ 300 sq meters space saved</li> </ul>
Hospital General Universitario Santa Lucía, Cartagena, Spain	500	2.5	64%	<ul style="list-style-type: none"> <li>■ Avoid visual/secondary pollution and risk of infection during waste collection</li> </ul>
Kunshan Eastern Medical Center, China	2,000	2.2	50%	<ul style="list-style-type: none"> <li>■ Reduce labor cost for waste collection</li> <li>■ Energy and space saving</li> </ul>
Hospital de la Santa Creu i Sant Pau, Barcelona, Spain	700	2.7	64%	<ul style="list-style-type: none"> <li>■ Increase efficiency of waste collection</li> </ul>
Sirio Libanes Hospital, Brazil	150	0.5	34%	

Total time used for sorting/handling soiled linen\* + Time used for operation of linen collection system = Envac system time  
 Total time used for sorting/handling soiled linen\* + Total number of beds x Time used for navigating soiled linen in hospital hallways, manually = Manual handling time

\*Total collection time for sorting/handling soiled linen from beds (same in manual and Envac linen system)

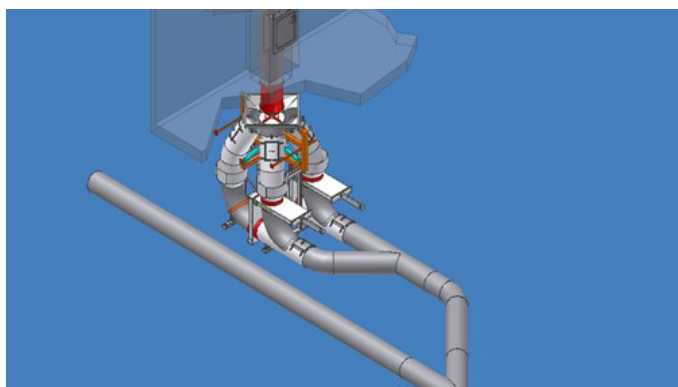
# SORT-MORE

The Sort-More solution is an effective waste management system that addresses several key challenges healthcare facilities face, including the efficient use of vertical and horizontal space, the automation of waste and recycling management, and the prevention of spreading bacteria. Hospitals can unlock many benefits by automating the sorting and transportation of waste and recyclables, from improved patient care and staff efficiency to improved infection control and sustainability.

## HOW IT WORKS

Sort-More, integrated with an automated waste management system, allows hospitals to manage up to four different waste fractions – paper, confidential paper, general waste, and plastic through a single chute. Installed at the bottom of a vertical waste chute, Sort-More is a multi-diverter and an intermediate storage unit, seamlessly sorting and storing the various waste streams.

The system features a user-friendly control panel with buttons, enabling staff to select the appropriate waste type for disposal easily. A pneumatic mechanism, activated by the controls, opens the corresponding shut-off valves in sequence, allowing the waste to be evacuated from the chutes and transported to the collection point.



## OPTIMISING LIFT USAGE AND PREVENTING BACTERIA SPREAD

The closed-pipe network system for material movements significantly reduces the burden on lifts. By separating waste transportation from people's movement, the Sort-More solution helps hospitals maintain a smooth and efficient flow throughout the facility. Significantly, this system also minimises the risk of



cross-contamination. By containing potentially hazardous materials within the sealed pipes, the Sort-More solution can prevent the spread of harmful bacteria and infections, ensuring a safer environment for patients, staff, and visitors.

Our Sort-More solution and the automatic waste management system play a crucial role in material movements, minimising the manual handling of soiled and dirty fractions.

By addressing the root causes of infection transmission, we enable healthcare facilities to create a safer patient environment. Through our innovative approach, Envac is committed to delivering comprehensive solutions that prioritise patient well-being and quality of care.

**"Implementation of the Sort-More solution integrated with the automatic waste management system by optimising the hospital's logistical processes can give the best results.**

**The Sort-More system also ensures efficient movement of materials and waste, allowing the hospital to maintain a seamless flow of operations and prioritise patient well-being."**

Magnus Sjöstrand  
Healthcare solutions expert at Envac

# STREAMLINED LOGISTICS

## BALANCING MANUAL LABOUR AND AGV EFFICIENCY

The manual collection and transportation of general waste, soiled linen and recyclable materials can be labour-intensive and time-consuming. By automating this process, hospitals can free up valuable resources and ensure consistent, reliable waste management, regardless of the day or time. Sort-More solutions can also help reduce the space required for storing general waste and recycling bins, further optimising the use of hospital facilities.

Automated Guided Vehicles (AGVs) are becoming more popular in hospitals but presents challenges in handling dirty, possibly infectious, materials. The AGVs do not eliminate interim storage on each floor. Bins must be full before collection, allowing time for bacteria and pathogens to grow. Additionally, AGVs transport materials through corridors and lifts, further spreading pathogens. Implementing an Envac system for waste and soiled linen can prevent this issue.

Hospitals can improve their operations by combining the Envac systems with Automated Guided Vehicles (AGVs). The Envac systems can manage the handling of general waste, infectious waste, recyclables, and soiled linen. At the same time, the AGVs are ideal for transporting clean items, such as hospital supplies, clean linens, and even food.

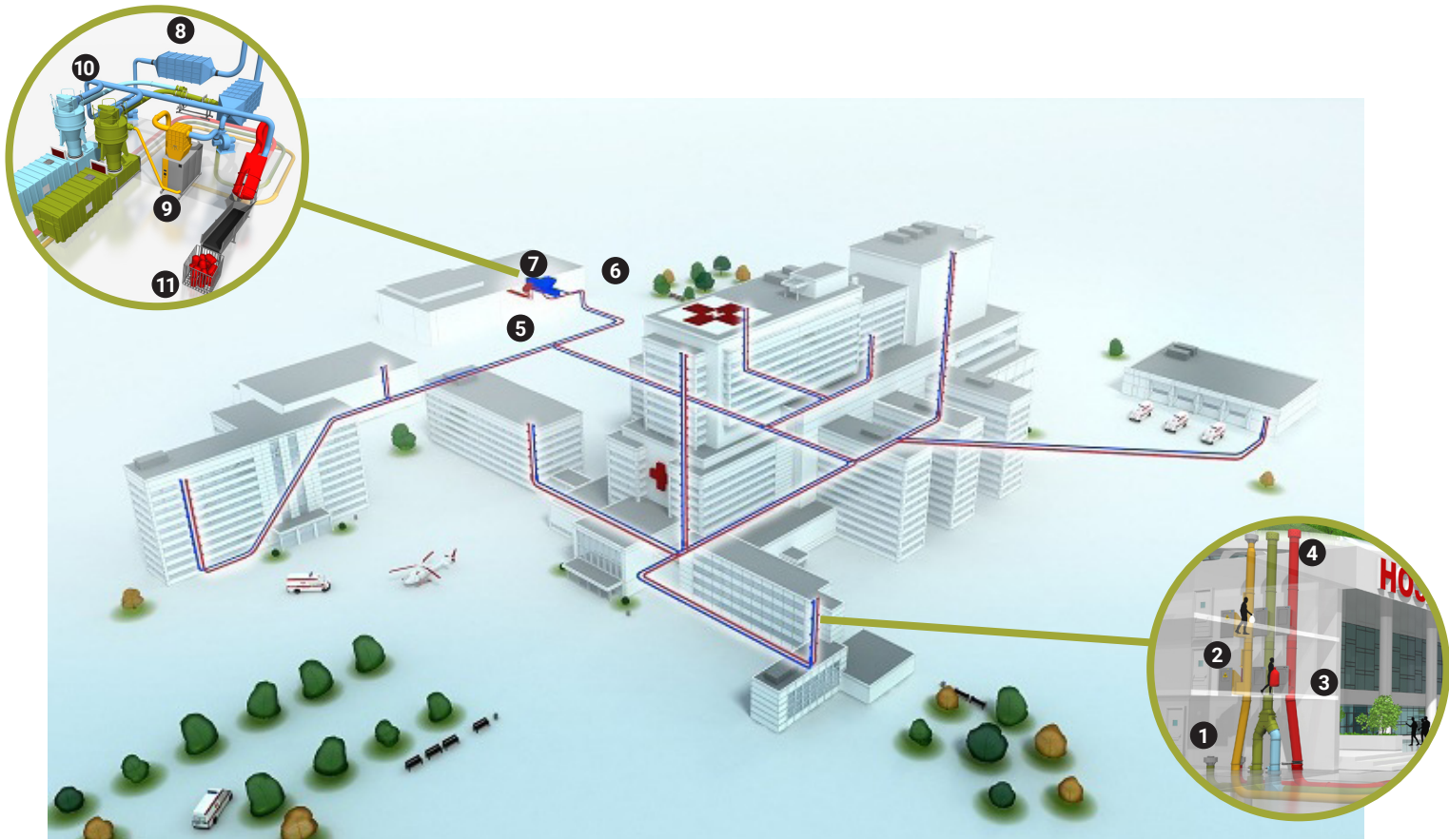
In this way, we contribute to an effective logistical chain overall. AGVs have their place within this chain, but manual labour is also a viable option in specific scenarios.

By optimising Envac's hospital solutions, we free up significant capacity and space, allowing the AGVs to operate more efficiently. This, in turn, can lead to reduced collisions and a significant decrease in critical peak hours within the overall logistical system.



Through streamlined logistics and optimized spaces, hospitals will save money and reduce manual labour. Together we create a safer hospital while reducing operational costs at the same time.





## HOW DOES ENVAC'S SMART, AUTOMATED SOLUTION WORK IN HOSPITALS, CARE FACILITIES, AND NURSING HOMES?

1. Air intake valve for the transport pipe.
2. Infectious waste is collected in a separate, hermetically sealed pipe (yellow pipe).
3. The number of inlets and their locations are defined by the hospital's functions. Here for example we have a green pipe for general waste and recyclable materials, and red pipe for soiled linen.
4. Air intake valve for general waste and soiled linen transport pipes.
5. The pipe network runs from the inlet points to the collection point hidden behind walls, in ceilings, and in service corridors.
6. All processes are controlled automatically by our proprietary Envac Automation Platform (EAP).
7. All material is collected at a single location. The collection point is usually located in a logistics central outside the hospital building.
8. At the collection point, air and material are separated. The material is compacted into containers.
9. The system converts infectious waste into non-hazardous waste, which can be mixed with other general waste or remain in a separate container. To maintain hygienic conditions, this system is automatically disinfected at regular intervals.
10. The air that transports the material through the system is filtered before being released.
11. Soiled linen bags are transported to containers for transport to the laundry facilities.



Scan the QR-code for a video showing how Envacs solutions work for hospitals.





# ERSTA HOSPITAL

**Flexible healthcare facilities for modern, high-quality care centrally located in Stockholm.**

The new part of the hospital opened in 2023 and covers an area of approximately 23,000 square meters. The hospital includes a pharmacy and café on the ground floor, an underground garage, a logistics centre in the basement, patient wards, a dining hall at the top, and several rooftop terraces.

The spaces are bright and modern, reflecting contemporary design with features such as benches made of recycled wood and art installations throughout the floors.

To optimise the internal logistics at the hospital, Ersta hospital chose Envac to install a pneumatic chute system for both general waste and laundry. On each floor, there are 2+2 chutes that lead down to the basement, where the general waste is sucked into a container, and the laundry is distributed into laundry carts.

On each floor, the chutes are complemented by environmental rooms where staff can leave other (smaller and sorted) waste fractions in bins or bags.

Architects for the building are: Tengbom, Emma Olbers Design, Nyréns arkitektkontor, RATIO.

**Location:** Stockholm, Sweden

**Fractions:** 2, general waste & soiled linen

**Inlets:** 32, 4 on each floor

**Launched:** 2023

**Capacity:** 125 tonnes/year for general waste





Renderings from Corpus3

## LANDSPÍTALI UNIVERSITY HOSPITAL, ICELAND

The new Landspítali Hospital (NLSH) is expanding the well-known hospital where a full 70% of Icelanders were born.

The old hospital building was constructed in 1930. The choice of Envac means that the hospital will manage three waste streams— general waste, recyclable materials, and hospital laundry—in the new 100,000 m<sup>2</sup> extension. There are also plans to connect up to 50,000 m<sup>2</sup> of the hospital's existing buildings to the system.

- **3 waste streams** - general waste, recyclable materials, hospital laundry.
- **5.6 tonnes** of general waste/day in collection capacity.
- **0.4 tonnes** of recyclable materials/day in collection capacity.
- **6 tonnes** of hospital laundry/day in collection capacity.



Renderings from Corpus3



Photo Sweco

## HÖGSBO HOSPITAL, SWEDEN

Högsbo Hospital in western Sweden covers approximately 24,500 square metres and includes a day surgery centre with nine operating theatres, an outpatient department with around 60 consultation rooms, radiology services, and support areas for administration and education.

The hospital, designed by Sweco Architects and constructed by Skanska between 2019 and 2023, has no inpatient beds.

It is a modern facility built with the latest technology, emphasising innovation and efficient healthcare delivery. The design allows flexible use of consultation rooms, and the hospital manages patient, staff, and material flows separately.

The project, costing 1.55 billion SEK (below the original 1.94 billion SEK budget), is intended to challenge existing healthcare models, integrating physical spaces with digital technology to maximise resource efficiency.

The hospital has an AWCS from Envac for their general waste and soiled linen.

Västra Götalandsregionen says:

"The project aims to embody innovation and new thinking, challenging existing models of delivering close-to-home healthcare."



## ST. OLAVS HOSPITAL, NORWAY

St. Olavs Hospital in Trondheim with its 206,600 square meters provides treatment to the population of Central Norway. With only one disposal inlet, four different waste fractions (paper, confidential paper, general waste, and plastic) can be collected in the underground pipe transportation system and are then automatically sorted into separate containers. The solution, also known as Sort-More even supports the waste collection for the nearby 20,000 square meter care home Øya Helsehus.

### THE BENEFITS OF THE VISIONARY SYSTEM FOR HEALTHCARE FACILITIES INCLUDE

- One point of collection of general waste and recyclables
- Automated underground transport of general waste and recyclables to collection point.
- Reduction of manual handling, energy consumption, and gas emissions.
- Empowering recycling to reduce waste generation Improved safety, hygienic environment and, reduced risk of transmittable infections.
- No need to transport waste in hospital hallways.

The system is integrated into the hospital's infrastructure to enable efficient operation and service delivery to its patients with high accessibility and utilization. Installed high-quality components and preventive maintenance activities has contributed to its longevity as the system has been in operation since 2005.

### MODERNISATION ROADMAP FOR THE FUTURE-DRIVEN HOSPITAL

To make sure the lifecycle of the system is extended

further with improved efficiency Envac has presented a modernisation plan:

1. Upgrade the control system to the latest version of the Envac Automation Platform to improve energy efficiency with approximately 15% and extend equipment and filter service interval with approximately 20%.
2. With new advanced technology full efficiency in the collection process can optimise operations.
3. Adding Food waste as a fraction to the existing system to contribute to food waste reduction.

With data-driven waste handling and efficient data analysing methods, Envac's automated waste collection system will pave the way to identify operation areas of improvement using smart technology.

## 120 inlets

with touchscreens and sensors.

## 4 fractions

paper, confidential paper, residual, plastic.

## 1800 tonnes

of waste per year in capacity.

## 20 Sort-More

units collecting and sorting the waste.



*"Modern hospitals are rapidly advancing with cutting-edge medical technology, revolutionizing patient care and treatment. However, to truly embody progress, these advancements must be matched by innovations in facility management and waste collection—ensuring a future where healthcare is as sustainable as it is sophisticated."*

Dave Buckley  
Sales Director, Envac UK



Scan the QR-code with your phone to access Envacs information on smart hospital solutions. If you want to know more, please contact us at:

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Sources

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- [Swecare: Infection Prevention & Control - The Swedish way](#)
- [Automated Hermetically Sealed vs. Conventional Waste Management Systems in Hospitals: A Comparative Study of Microbial Presence by Simon Britzelli and Kylie Aziz at KTH, School of Engineering Sciences in Chemistry, Biotechnology and Health \(CBH\), Biomedical Engineering and Health Systems](#)
- [Folkhälsomyndighetens rapport 'Vårdrelaterade infektioner och antibiotikaanvändning på akutsjukhus i Sverige \(ECDC PPM 2023\)'](#)

