

# NORDIC SUSTAINABLE HEALTHCARE

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**#nordicsolutions to  
global challenges**



# A Nordic Whitepaper About Sustainable Healthcare

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## EXECUTIVE SUMMARY

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**Climate change is one of the greatest environmental challenges facing societies today and action must be taken in a wide range of sectors – healthcare being no exception. WHO estimates that around 5% to 15% of the carbon emissions in developed countries derives from healthcare services.**

It is therefore of great importance that this sector is targeted if we are going to reach the UN sustainable goals which have been set. The Nordic countries are world leading in creating a sustainable healthcare. By adapting the operations, setting sustainability criteria when procuring devices and by controlling outputs from the hospitals, the environmental impact is kept to a minimum.

In this document you will find five main focus areas connected to how the Nordic region work with sustainable healthcare.

- A broader perspective
- Creating synergy with the surrounding city
- Innovative actors
- Sustainable hospital buildings
- Sustainable healthcare organizations

Healthcare providers in the Nordic region have a holistic approach when working with sustainability issues in healthcare and are looking for improvement in all aspects. Hospitals are not keeping a singular focus, but rather working for improvement in all aspects. It is also important to recognize that hospitals are part of the city's ecosystem. By interacting with the city, they can both benefit from and contribute to more sustainable systemic solutions.

To be frontrunners, the larger Nordic hospitals have well-established departments for technological innovation. Healthcare providers can also encourage more sustainable innovation by setting procurement criteria and enter in partnerships with suppliers.

Organizing the sustainability work is another important aspect to create a more sustainable healthcare. In Nordic hospitals, this is done by implementing environmental management systems, procuring sustainable technology, capacity building in sustainability and much more.

Healthcare providers and trade promotion agencies in the Nordics have a long tradition of welcoming delegations from all over the world to experience Nordic solutions firsthand. There are numerous interesting places to visit in the Nordics with a focus on sustainable solutions for healthcare and you will find some of them recommended in this white paper.

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Handling plastic waste at Aarhus University Hospital.  
**Photo:** Michael Harder

## INTRODUCTION

**Nordic sustainable healthcare** is considered to be in the forefront in a global context<sup>1</sup>. Why is that and what can other countries and regions around the world learn from the Nordics?

This white paper introduces you to Nordic sustainable healthcare and why it is considered as one of the best in the world. In this document you will find best practice examples, ideas and solutions that can be implemented anywhere in the world.

The way Nordic healthcare operates is an expression of the Nordic way of life – our culture, our politics and our legislations. Nordic inhabitants have a strong tradition of caring for nature and it is the interplay between nature, culture and social responsibility that sets us apart from the rest of the world.

### Why do we need a sustainable healthcare?

Climate change is one of the greatest environmental challenges faced by societies today and action must be taken from a wide range of sectors – healthcare being no exception. WHO estimates that around 5% to 15% of carbon emissions derive from health services in developed countries<sup>2</sup>. Other environmental issues such as pharmaceuticals ending up in the environment and impacting surrounding ecosystems negatively, add to the need to create a sustainable healthcare.

In far too many cases the operations at healthcare facilities are in fact causing harm to people outside the hospital walls. One example of this is burning fossil fuels to heat hospitals and thereby causing asthma and other lung diseases through the emissions.

People from all over the world are looking at the Nordics to see how we meet the growing demands on the welfare systems. The sustainable solutions created in the Nordic countries are one step towards achieving this. In this paper we focus

<sup>1</sup> Eriksson, D., Petterson, M., Turnstedt, L., Grundtman, L. (2018). Hinderanalys – Internationalisering av innovationskluster med fokus på energieffektiv sjukvård

<sup>2</sup> World Health Organization (2015), Health central to climate change action: [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0020/295202/Factsheet3-health-central-climate-change-action.pdf?ua=1](http://www.euro.who.int/__data/assets/pdf_file/0020/295202/Factsheet3-health-central-climate-change-action.pdf?ua=1)



Removing pharmaceutical residue with ozone in Lindköping.  
**Photo:** Tekniska verken in Linköping

## DEFINITION OF SUSTAINABLE HEALTHCARE

**The area of sustainable healthcare is not new. In fact, Nordic countries have been working with both environmental and social issues within this field for a long time.**

on sustainability in healthcare operations with an emphasis on environmental performance. Sustainable healthcare encompasses products, services and healthcare operations with superior environmental performance – without compromising with the quality level of the care itself.

When describing sustainability issues in relation to health and wellbeing there are three different varieties which need to be taken into account.



The first one is **sustainable health**. This area focuses on wellbeing and disease prevention, often before the individual requires care facilities.

**Environmental health**, on the other hand, refers to health risks in the surrounding environment, both outdoors and indoors, and how they affect an individual. Some typical risk exposures are mould, radon, chemicals, heavy metals and noise.

When looking into **sustainable healthcare** as defined in this white paper, it refers to operations taking place after an individual has fallen ill. Such operations could be seen as both out- and in-patient care. Understanding the life cycle



## A BROADER PERSPECTIVE

**Sustainability encompasses many different aspects, forcing actors to work with several areas at the same time. A hospital which focuses solely on one aspect can therefore never be truly sustainable.**

It can be difficult to compare products and services to determine which one has the highest environmental performance. This requires looking at the entire lifecycle, not just the performance inside the hospital. More and more healthcare providers are posing strict demands on their suppliers' transparency in the entire life cycle – from the cradle to grave.

### Is a circular healthcare possible?

While it is probably not possible to eliminate a linear flow completely while still maintaining the same level of patient safety, there are plenty of Nordic solutions allowing a more circular approach in regard to furniture and technical equipment. Thereby thus reducing the immense material flow created by the healthcare.

### Top 5% at everything?

Rather than focusing on specific areas most Nordic hospitals have a broad approach to their environmental performance. Organizations in the Nordic region are therefore applying a holistic approach to their operations where, rather than excelling in one area, while the others are left way behind, they are generally trying to master them all.

So, despite knowing that we cannot be the best at everything, it seems that the Nordic healthcare providers are aiming at being top 5% in everything instead, says Daniel Eriksson, founder of Nordic Center for Sustainable Healthcare.

### Sustainable seating or simply "a chair"?

When the waiting room in Malmö University Hospital needed to be updated with new seating, the sustainability aspect was high on the agenda. Rather than purchasing the same benches they were looking into a new procurement model: the service of leasing sustainable seating.

And a Swedish company had the solution they were looking for! Through careful design their seating options are not only made with renewable materials and easy to repair and refurbish, but they also allow for a more sustainable and long-term approach. All this while ensuring a high level of comfort for patients in the waiting area.

### Reducing plastics in the hospitals value chain

Aarhus University Hospital (AUH) is constantly pushing the limits for their environmental performance. In 2016 they launched a project to manage their plastic waste in a more environmentally friendly way. In collaboration with actors throughout the value chain they have been identifying different plastics used at the hospital. The aim was to reduce the amount and varieties of plastics, increase the amount of recyclable plastic packaging and enable a more circular plastic management.

AUH have been working closely with stakeholders in the entire value chain, such as producers of plastic granulates, sales corporations, procurers, nurses and, of course, the recyclers. This project is part of a regional strategy where Central Denmark Region aims to recycle 70% of the total amount of waste produced in the geographical region by 2025. Through this project, AUH is tackling environmental issues such as energy consumption, emissions of carbon dioxide as well as other effects connected to resource extraction. This project has now spread across the Nordic region and the idea has been adopted by other care providers as well, for instance by Oslo University Hospital.

## CREATING SYNERGY WITH THE SURROUNDING CITY

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**Nordic care providers are part of an extensive ecosystem of solutions catering to the surrounding city and the actors operating within. These solutions play an important part in how Nordic sustainable healthcare can be so successful.**

This ecosystem includes, but is not limited to, solutions for sustainable heating and cooling, wastewater treatment, access to clean energy, etc. It is therefore important to view healthcare in its context and as a part of a larger system.

For instance, the fact that Landspítali University Hospital in Iceland uses over 90% renewable energy is a result of the country's use of geothermal and hydroelectric energy and the actors extracting these natural resources. Another example is the newly built hospital of New Karolinska in Stockholm, Sweden where the use of geothermal energy combined with district heating and cooling results in an almost climate neutral energy consumption.

A hospital is often well integrated in the city. Healthcare providers are part of sustainable solutions provided by the city and its inhabitants, allowing for example for more sustainable transportation solutions for patients instead of driving themselves.

Healthcare providers do not only benefit from the system in which they reside, they can also contribute. This is not only achieved by providing the best care and pre-conditions for a thriving population, but also in a more fundamental way. Hospitals often act as catalysts and first market for innovative solutions and are thereby enabling the creation of a smarter and more sustainable cities.

This interaction between hospitals and their surrounding societal solutions is one important factor in creating a more sustainable way of life.

### **Wastewater treatment in Linköping**

One important aspect of the environmental performance of healthcare facilities is the treatment of wastewater. An example is the city of Linköping in Sweden where the country's first large scale purification plant has been built to remove pharmaceutical residues in the water using ozone. This reduces around 90% of pharmaceutical residues in the wastewater coming from the hospital as well as from the city.

After the ozone treatment, biological processes capture residues left in the water. Another positive side effect is that the process is likely to increase the treatment of organic carbon and nitrogen.





Photo: Sahlgrenska University Hospital

### District heating

By incinerating biomass in a centralized location and transporting the heat to a healthcare facility you allow climate efficient temperature regulation. In comparison with burning oil directly at the hospital, this method saves a significant amount of carbon dioxide. It also reduces negative health effects from the air emissions. The university hospital of Haukeland in Norway has 77 boreholes on an average of 250 m and it takes care of the main part of heating at the hospital<sup>1</sup>.

### District cooling

By harnessing cooling from deep boreholes, deep sea water, or sometimes even snow, you can reduce the temperature in the hospitals in a similar fashion as above. By cooling the hospital using district cooling it is possible to save significant amounts of carbon dioxide.

One such project is planned in Aalborg, Denmark. The new university hospital will install a district solution collecting cooling from a nearby lake. The supplier expects the project to save the hospital around 80% energy compared to a traditional cooling solution and save 500-700 ton in carbon dioxide emissions on a yearly basis<sup>2</sup>.

### Public transportation

Most Nordic hospitals are accessible using public transport such as buses, trams, trains and boats. This doesn't only lower the environmental impact from staff but also from patients. This means that rather than driving to the hospital themselves, patients can travel to and from the hospital in a safe and environmentally sound way. In some regions of the Nordics, such as Region Uppsala in Sweden, the trip to healthcare visits is even free<sup>3</sup>. By making it easier for all to access healthcare facilities, they are adding a social sustainability aspect to transportation issues. Besides healthcare institutions, there are also other important actors who drive sustainability innovation, namely Nordic suppliers. Below you can find some areas where both public and private actors stand out.

<sup>1</sup> Midttømme, Kirsti & Henne, Ingvar & Kocbach, Jan & Ramstad, Randi. (2016). Geothermal Energy Use, Country Update for Norway.

<sup>2</sup> Møller Kjemtrup, N. (2018) Supersygehus får fjernkøling fra Aalborg Portlands enorme kridtsoe, Ingeniøren: <https://ing.dk/artikel/supersygehus-faar-fjernkoeling-aalborg-portlands-enorme-kridtsoe-214682>

<sup>3</sup> Region Uppsala (2018-04-04) Fri 24h-biljett vid vårdbesök: <http://www.lul.se/sv/Vard-halsa/Regler-och-rattigheter/Sjukresor/Fri-24h-biljett-vid-vardbesok/>

## INNOVATIVE ACTORS

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**The larger Nordic hospitals have well-established technological innovation departments. And on top of that, a large quantity of hospitals, counties and regions have been involved in national or EU projects and other activities related to improving their sustainability performance.**

### **Innovative procurement**

A procurement method which is quickly becoming more popular in hospitals is innovative procurement. This is when hospitals act as a launch customer for suppliers of innovative goods or services. This creates a more open culture and results in custom designed, and often sustainable, solutions for healthcare. For instance, a new kind of apron developed on behalf of Region Skåne in Sweden was made with 91% renewable materials and still contributed to cutting costs<sup>4</sup>.

### **Cross boundary innovation**

A hospital is in many ways similar to a small city. Transportation, food, waste management and more are important aspects of a sustainable hospital. This means that innovation processes taking outside of the health sector could still be relevant as they can be applied to other parts of the hospitals, for instance in the food court. Therefore, sustainable innovation within these areas can significantly improve the overall environmental performance of the healthcare sector.

Sara Härmälä, Director of Upgraded, a non-profit association for health and wellbeing startups and innovations in Finland in Finland, says that sustainability aspects play a key role for innovative startup companies today. "We see that sustainability will be a key area for future companies regardless of their main business focus. Taking action in reducing healthcare related greenhouse gas emissions is important for all companies regardless of size, and we want to encourage all health-related companies to assess the environmental impact of their product or service – and turn sustainability into their asset", she says.

### **Faster blood analysis by green innovation**

Good innovations solve one or more problems. One good example of this is the drone delivery project from the University of Southern Denmark. HealthDrone can transport blood samples between hospital units, general practice clinics, nursing homes and laboratories. By using a drone rather than traditional means of transportation the time needed to get from point A to point B is reduced from around 12 hours to just 45 minutes<sup>5</sup>. This is an important feature, as reduced time for transportation means faster analysis of the blood and thereby allowing better treatment for the patient.

By effect, this is assumed to reduce the use of broad-spectrum antibiotics, an important feature to combat antibiotic resistance. Other than the medical advantages, there's also a financial aspect to the project. By implementing HealthDrone, Peder Jest, Medical Director at Odense University Hospital, says that the Danish healthcare system is expected to save around 30 million dollars annually<sup>6</sup>.

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Region Skåne (2016-02-09), Press release: Region Skåne först i Sverige med miljövänliga plastförkläden  
Kjeld Jensen, Project Manager at HealthDrone (2019-05-23)  
Sunhedsdrone press release: Drones carrying blood samples: Could save health service 200 million DKK a year





Photo: Marie Ullnert/Sahlgrenska University Hospital

When looking into the climate aspects, this project is considered to generate a great improvement in reduced climate impact, supported by the fact that the drones are powered by rechargeable batteries and therefore reduce energy consumption and greenhouse gas emissions.

### Can Icelandic cod skin heal wounds?

An Icelandic company have developed a skin-substitute to treat wounds, burns and similar injuries in a sustainable and efficient way. The product consists of intact fish skin which is rich in naturally occurring Omega3 polyunsaturated fatty acid. When grafted onto damaged human tissue such as a burn or a diabetic wound, the material recruits the body's own cells and is ultimately converted into living tissue.

Fish skin have been proven to heal very difficult wounds and clinicians reports patient cases where patients had chronic leg wounds for 20 years and which have healed due to this innovative solution<sup>7</sup>. The product does not only use by-products that otherwise would have gone to waste, it also contributes to the social aspects of sustainability. Using a fish component rather than pig removes cultural or religious barriers for clinician or patient acceptance.

These are just a few of many examples of Nordic innovative companies developing new materials to solve old problems.

<sup>7</sup> SLL Innovation (2017-08-22) Fantastiska resultat med torskskinn på sår: <https://sllinnovation.se/artikel/fantastiska-resultat-med-torskskinn-pa-sar>

## SUSTAINABLE HOSPITAL BUILDINGS

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**By creating more sustainable buildings, the environmental performance in the healthcare sector can be significantly improved. Making sustainably sound choices when planning a new building or improving an old one, sets the framework for the operations within the hospital walls.**

### Healing architecture

Several Nordic architecture firms are changing the way they design hospitals by allowing nature and natural lighting to be included in hospitals. Healing architecture and evidence-based design is proved to improve patient recovery<sup>8</sup>.

In Denmark, the new hospital of North Zealand is being constructed in the organic form of a four-leaf clover to ensure a feeling of safety, as well as an efficient flow in the building. While keeping top performance in economic, social and environmental aspects, the new hospital is also believed to deliver 8% savings due to its efficiency. Another example from Denmark is the new University Hospital in Aarhus. Danish architects have been using evidence-based design to create healing environments such as natural lightning, art and natural elements to increase the healing of patients.

By reducing the time needed for patients' recovery the hospital could be saving important resources supporting sustainability not only in an environmental way but also in an economical way.

### Refurbishing old buildings

When building a new hospital, it is easy to get everything right from a sustainability perspective. However, most buildings are not new. There is a strong tradition in the Nordics to maintain and improve structures. This means that we have best practice examples on sustainability improvements in buildings from the 19th century, or even older, right up to hospitals being constructed today. Buildings from different centuries have their specific challenges when it comes to sustainability and it is important to incorporate these features while maintaining or improving the efficiency in the hospitals.

### Swedish solar cells generate power all year round

In Sweden, Skaraborg Hospital decided to lower their climate impact by installing solar cells. The cells were placed strategically on the roof and above an outdoor parking lot. This allowed for the hospital to harness energy from the sun while at the same time, the construction provided shade and protection for the cars beneath. This solar facility is now one of the largest in Sweden and is expected to deliver 1,3 GWh solar electricity each year<sup>9</sup>.

Joakim Staaf, manager for this project, is pleased with the results and estimates that the energy harnessed from the solar cells can cover around half of the energy needed at the hospital<sup>10</sup>.

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Lawson, Bryan. (2002). Healing architecture. Architectural Review. CCXI. 72-75. 10.1080/17533010903488517.  
Västra Götalandsregionen (2018-04-30). Skas Skövde, solcellspark  
Joakim Staaf, project manager at Västfastigheter (2019-02-08)





Photo: Carin Tellström/ Karolinska University Hospital

**"** *In theory, we could supply half of the hospital's need for energy with solar power.*

**Joakim Staaf, Project Manager  
Västfastigheter in Sweden**

### **Destruction of nitrous oxide**

Nitrous oxide, or laughing gas, is commonly used in healthcare for its anesthetic effects. Unfortunately, the gas has a global warming potential around 310 worse than CO<sub>2</sub>. In some hospitals the use of N<sub>2</sub>O represents up to 30% of the climate impact – making it an issue well worth prioritizing<sup>11</sup>.

Many Nordic hospitals have adopted a Swedish solution for destruction of this gas. One such example is the department of obstetrics at Lund University Hospital in Sweden. With this method, around 99% of the N<sub>2</sub>O used by the healthcare provider is purified and thereby lowering the hospital's climate impact significantly<sup>12</sup>. Professor Stefan Hansson, Head of Department for obstetrics and gynecology is very satisfied with the outcome<sup>13</sup>.

The method also lowers the amount of gas spread in the delivery rooms where it risks causing harm to healthcare professionals due to long-term exposure. Since the method doesn't interfere with the effect of the healthcare procedure, the same high-quality care is given to the patient.

<sup>11</sup> Eriksson, D., Pettersson, M., Turnstedt, L., Yelistratova, A. (2017). Best practice svensk energi-effektiv sjukvård

<sup>12</sup> Ibid.

<sup>13</sup> Professor Stefan Hansson, Head of Department for obstetrics and gynecology at Lund University Hospital, (2019-01-24)



# SUSTAINABLE HEALTHCARE ORGANIZATIONS

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**Hospitals can in many cases be seen driving the change towards creating a more sustainable society. This can be shown in numerous ways, but one thing is always sure: by sheer numbers of employees and their purchasing power, the impact created is huge.**

## Public procurement as a strong tool

Nordic hospitals are for the most part publicly funded and run by the government, regions or similar organizations. That means that public procurement is a strong tool. Hospitals have for many years gone far beyond legislations and have set environmental objectives on different areas, which also that reflects on procurement. Therefore, procurement has been widely used to lower energy consumption, get rid of unwanted substances and move the overall sustainability performance in a desired direction.

## Systems for environmental performance

By using systems and structures to monitor and improve the environmental performance, Nordic hospitals are continuously improving their environmental performance. For instance, all hospitals in Norway are certified in the environmental management system ISO 14001<sup>14</sup>. And almost all hospitals have some sort of sustainability reporting where they provide statistics and facts on how they impact their surroundings. This allows healthcare providers to gain inspiration and knowledge from others and at the same time ensures a transparency for patients and other stakeholders.

## Management

Sustainability has its place on the management board just as one of the many other important issues in healthcare. It does not necessarily have a dominant role, but it is present, requiring the management to make decisions related to it. Those regions and hospitals that work according to environmental management systems push the decisions towards the hospital management and therefore decisions related to sustainability get a higher priority than in many other regions in the world.

## Organizing the sustainability work

Most Nordic hospitals have environmental managers, coordinators or even full sustainability departments. Many also have internal networks with up to 250 environmental coordinators that, besides their ordinary work as nurses and doctors also have dedicated assignments related to sustainability. To maintain a high awareness, hospitals have newsletters and detailed instructions on how to work with sustainability at different levels and departments.

Hulda Steingrimsdóttir, Environmental Manager at the Icelandic University Hospital of Landspítali says that the staff culture has been a big part in launching their sustainability work.

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<sup>14</sup> Tore Havellen, Advisor occupational health at Oslo University Hospital (2019-01-29)



Combatting food waste at Landspítali University Hospital.  
Photo: Daniel Eriksson

"At the beginning, sustainable healthcare started as an issue because of pressure from the staff, wanting better waste sorting etc. That way started a positive spiral which has resulted in engaged staff and continuous improvement [...] Landspítali has a vision to be a role model for environmental issues."

To keep the staff motivated and engaged, trainings in sustainable healthcare is a successful tool. This has been recognized by the Swedish county of Skåne who've held training in sustainability issues for around two decades. Today, the training has evolved, and all employees can take part in online training. The training has been developed by a Swedish company, in collaboration with environmental scientists, and adapted to their specific preconditions. The system allows managers to evaluate the performance of employees and thereby allows users to identify certain areas where the need for further activities is highest.

**"** *As one of the largest university hospitals in the Nordic region, we have a responsibility to work in a systematic way to reduce our environmental impact. At the same time we wish to contribute to the development and distribution of new solutions by collaborating across national borders.*

**Nina Due, External Environment Manager  
Oslo University Hospital**

## FUTURE INNOVATION AREAS

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**Nowadays, the health innovation industry is booming. We are seeing a continuous rise of innovative companies and solutions targeting the healthcare sector. Some good examples are listed below.**

### Digital health as a sustainability supporter

As previously described, digital health is an area of specific interest in the Nordic region and the trends are that the Nordics will continue to be in the forefront in this area in the future as well. Viewing digitalization of processes as a way to boost the healthcare's sustainability performance will allow collaboration between hospital departments and suppliers to reduce the carbon footprint.

Another important aspect is of course the fact that more available data allows for better decision making at the hospitals.

### Sustainable medical technology

Apart from the buildings, the main part of a hospitals' environmental performance is dependent on the medical devices used for its operations. Medtech has therefore been identified as the next focus area in several healthcare regions, for instance Västra Götalandsregionen in Sweden<sup>15</sup>.

Considering energy efficiency, use of chemicals, end-of-life and several other aspects, the procurers are constantly trying to find more sustainable alternatives with the same high quality. The national agency of public procurement in Sweden is working together with the industry to find specific sustainability criteria for medtech to be incorporated in the procurement process all over the country.

### Climate-smart healthcare

Climate change is one of the greatest environmental challenges faced by societies today. To combat this there's a need for both new procedures and solutions to improve energy efficiency and reduce carbon dioxide and other harmful climate gas emissions further. Several countries in the Nordic region have set objectives to ensure independence from fossil fuels by 2020.

### Circular healthcare

Another interesting area is circular economy and sharing solutions for healthcare. Such solutions can reduce the need to purchase new products and thereby limiting the negative impact coming from the production processes. It can also be a way to reduce purchasing costs at the hospitals. One example on how to implement circular solutions at the hospital is done at Rigshospitalet in Denmark. By using a service to get spare parts and reparations on several medical devices, they are not only reducing their environmental impact but are also saving a lot of money<sup>16</sup>.

<sup>15</sup> Hans Bjurbäck, Västfastigheter (2017-10-05) Västfastigheters energiarbete  
<sup>16</sup> Dansk Plejeteknik (2018) Referencer: <https://danskplejeteknik.dk/referencer/>





Wastewater treatment plant in Lindköping.  
**Photo:** Tekniska verken in Lindköping

## GREEN TECH VISITS

**Healthcare systems and trade promotion agencies in the Nordics have a long tradition of welcoming delegations from all over the world. There are numerous interesting places to visit with a focus on sustainable solutions for healthcare. Some areas of interest for green healthcare visits could be:**

### **New innovative and sustainable design of hospital buildings**

There are a wide range of hospitals in various sizes that are being built, or have recently been built, with a strong focus on environmental solutions. From small plus-energy hospitals to university hospitals with minimal environmental impact and new innovative solutions. Good examples:

- Karolinska University Hospital in Sweden
- Tampere Central Hospital in Finland
- New North Zealand Hospital in Denmark

### **Energy solutions for hospitals**

There are many interesting solutions installed in Nordic hospitals. Using geo-energy, solar power or even snow, there are several ways to reduce the energy needs of healthcare. By purchasing energy efficient medical devices, you can reduce the consumption even further. Good examples:

- Kirkenes Sykehus in Norway
- Landspítali University Hospital in Iceland
- Skaraborg Hospital in Sweden

### **Waste management**

Nordic hospitals have well implemented systems that are integrated with the cities' waste stream. You can follow different waste streams from the hospital to the waste managing facility location. Good examples:

- Persaunet helse- og velferdssenter in Norway
- Aarhus University Hospital in Denmark
- Oslo University Hospital in Norway

### **Wastewater treatment**

The wastewater being released from a hospital contains a variety of chemicals and pharmaceuticals. To prevent this water from reaching the ecosystem several Nordic solutions are available. Good examples:

- Herlev Hospital in Denmark
- Tekniska Verken Linköping in Sweden

## EPILOGUE

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**We believe that the Nordic region has the all the expertise needed to help the global healthcare sector to become more sustainable.**

One of the main characteristics of Nordic healthcare is our strive to increase the sustainability performance in our operations. This drive comes from both healthcare itself and from the many solution providers residing in the five countries. As shown in this white paper, the Nordic region is filled with good examples of solutions leading to a more sustainable healthcare. Unfortunately, only a fraction of the best practice solutions was able to be featured in this paper.

There are many arguments for healthcare institutions and suppliers to improve the environmental performance of their operations. And while the main reason might be to create a sustainable future, there are also several other positive effects such as a staff contentment, branding, becoming a more attractive employer, risk minimization and cost savings.

The healthcare industry is such a large part of today's economy that it must be a focus area when moving forward. Regardless if you're talking about climate, chemicals in the environment or other issues, the healthcare industry is a big part of the problem but also holds the key to solving some of them.

However, further research is still needed in this rather new area – to increase the knowledge about which subareas are most important and where the resources are best spent.

Moving forward, it is important to recognize that international collaboration is a necessity. Innovations in one country must be transferred and adopted by actors in other parts of the world. The earth doesn't have time for everyone to reinvent the same bicycle.

Therefore, we would like to leave you with this request:

Use this white paper. Use it for inspiration, to connect with Nordic professionals and colleagues and to improve your environmental performance. And use it as a baseline to continue creating innovations and collaboration with Nordic actors. Regardless of what business area you work with, if you're a supplier to or a provider of healthcare. Sustainability will be essential in the years to come and only by ensuring a high performance are you going to keep ahead.

**Nordic Center for Sustainable Healthcare**



## ABOUT THE NORDIC COOPERATION

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**This white paper is produced** as a part of the Nordic flagship project **Nordic Welfare Solutions** under the Nordic prime ministers' initiative **Nordic Solutions to Global Challenges**, which is coordinated by Nordic Innovation. In the framework of this project organisations and stakeholders from all over the Nordic countries have participated.

The material used for this white paper is based on both a literature review and verbal communication. Over 200 relevant stakeholders to Nordic sustainable healthcare have joined in to provide input to this project.

### **Collecting data**

During the development of this white paper the Nordic Center for Sustainable Healthcare has organized workshops in all Nordic countries to collect input. The workshops were held in collaboration with:

**Sweden:** Swecare

**Finland:** Upgraded

**Denmark:** Danish Technical University, Executive School of Business

**Norway:** Nordic Innovation

**Iceland:** Landspítali University Hospital



This publication is made as part of the **Nordic Welfare Solutions** project, which is one of six flagship projects under the **Nordic Solutions to Global Challenges** initiative coordinated by the **Nordic Council of Ministers**. Nordic Solutions to Global Challenges is an initiative by the prime ministers of the most integrated region in the world. The Nordic region promotes sustainability and progress towards the UN Sustainability Development Goals, sharing knowledge of three themes: Nordic Green, Nordic Gender Effect and Nordic Food & Welfare.



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