

PLASTIC *SMART* HOSPITALS

A review of plastic usage within
the hospital sector: Exploring
methods to reduce, reuse and
recycle plastic.





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Why Plastic Smart Hospitals?

Single-use plastic serves to save time, streamline infection control, and maintain sterility standards. However, the widespread reliance on plastic significantly impacts our health, the natural environment, and the climate. There is an urgent need to reassess our dependence on plastic and its extensive use, also within the healthcare sector.

What does being plastic smart mean?

Being plastic smart doesn't mean that we should stop using plastic altogether. But it's about fostering a critical and conscientious approach to its application. Unnecessary plastic needs to be eliminated. Where possible, we must find alternatives which reduce the use of single-use plastic. Moreover, it's essential to establish a circular system for plastic, ensuring that resources are not wasted after a single use. Hospitals cannot achieve this alone. Ensuring that plastic is recycled is a societal responsibility demanding collaboration from multiple stakeholders.

To become a plastic-smart hospital, it's essential to find the right balance between the usefulness of plastic and its environmental impact in the short and long term. Procurement decisions regarding products and equipment should carefully consider the adverse effects of extensive use of single-use plastic.

The aim of the project

The Plastic Smart Hospital project is a collaboration between Oslo University Hospital (OUS) and the waste advisory company Mepex. It is financed by the Norwegian Retailers' Environment Fund. The aim of the project is to explore how the use of plastic at the hospital can be reduced and how more plastic can be recycled.

Based on our findings and in collaboration with healthcare professionals, we have identified specific measures that we believe can reduce the use of plastic and improve recycling of plastic waste in hospitals.

Small actions can make a big impact: 35% reduction in the use of material in absorbent mats saves about 130 tonnes of residual waste each year.

These measures could help reduce costs and CO2 emissions.

About the figures used in the report

The amount of waste was calculated by scaling up from 200 kg of residual waste produced within 36 hours in three departments at OUS. Figures from procurement are specified when available.

The composition of the waste from different departments may vary, and the figures used are therefore a tentative estimate of the amount and composition. The figures do not include disposed plastic that is infectious waste.

Scaling up from OUS to national volumes is based on the number of patients. There is therefore some uncertainty related to the estimates, but they give a good indication of the challenges, potential and room for opportunity.



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Our method



Step 1: Waste Audit

Analysis of 200 kg of residual waste from operating theatres, the intensive care unit and A&E, and a detailed analysis of plastic in residual waste.



Step 2: Mapping the journey of waste

We followed the plastic's journey through the hospital – from the storeroom, to being used, to ending up as waste. In-depth interviews with procurement officers, healthcare professionals, porters, cleaners and waste disposal personnel.



Step 3: Knowledge sharing/workshop

In workshops with healthcare professionals, porters and cleaners, we discussed products and potential measures with employees. We have also obtained relevant cases from other hospitals that have worked to reduce the use of plastic.



Step 4: Package of measures

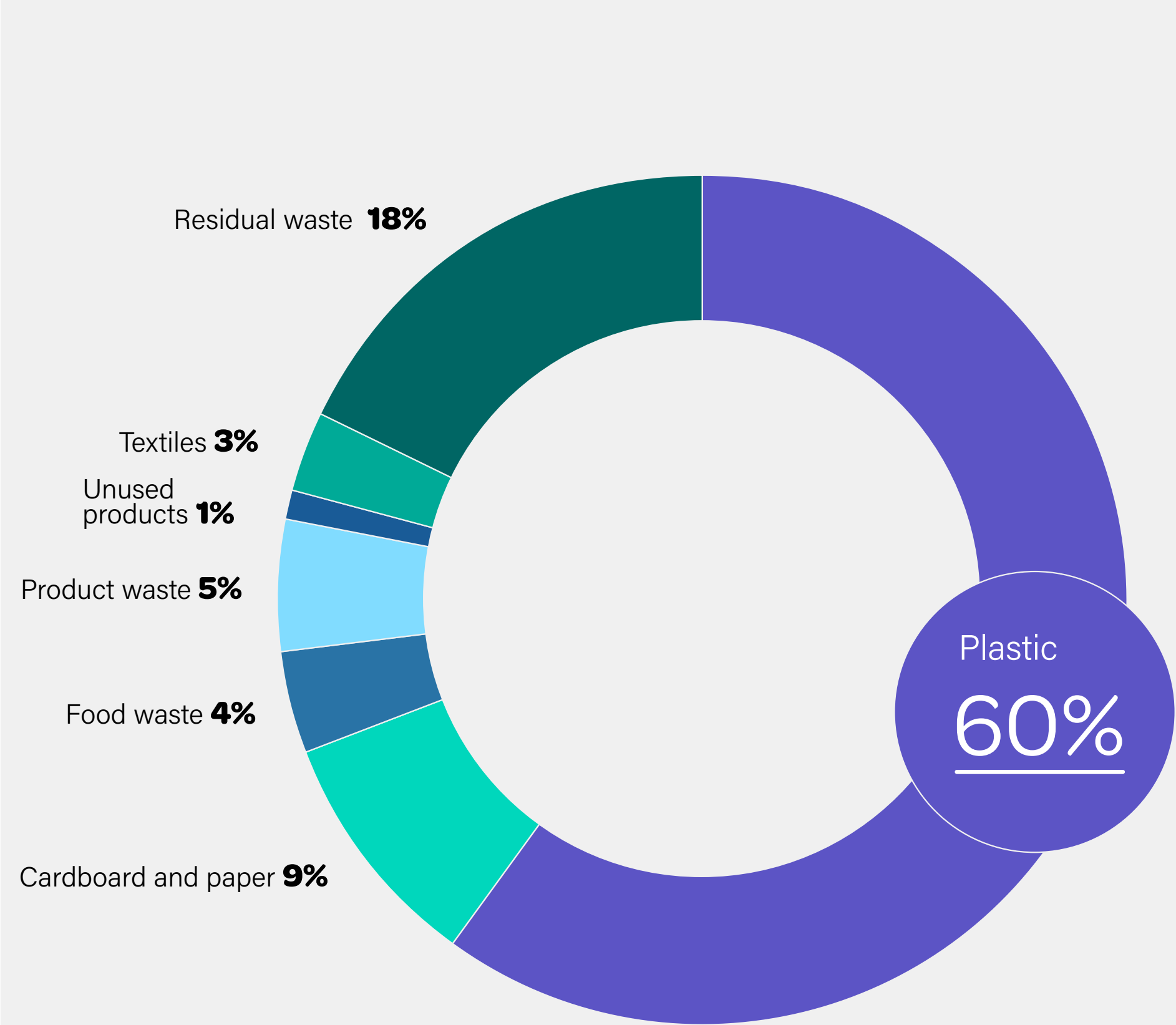
Summary of the most effective measures.



Waste

Waste audit: what we find in the waste?

200 kg of residual waste from the intensive care unit, A&E and operating theatres were analysed.



MAIN FINDINGS

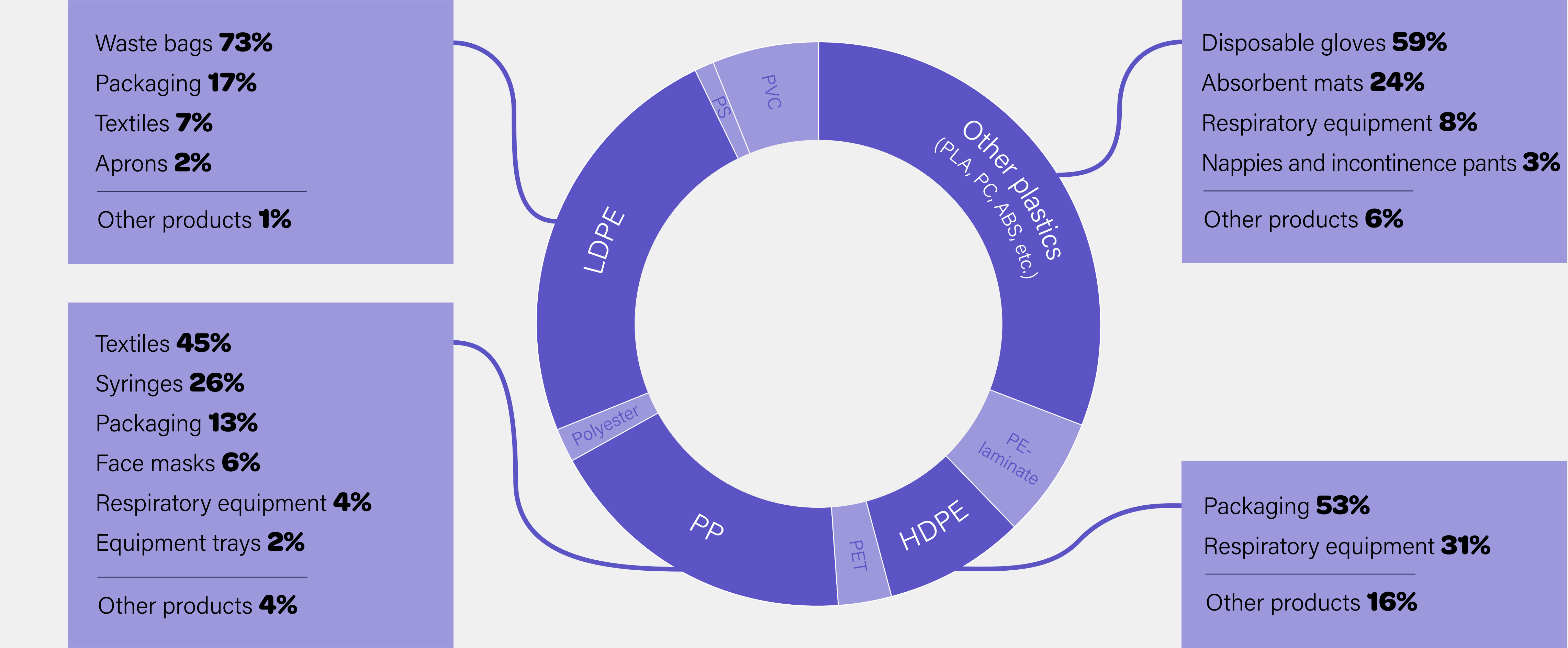
- 60% of residual waste is comprised of plastic. On a national scale, this equates to about 16,000 tonnes of plastic. Assuming the same proportion of plastic in infectious waste, this means that more than 20,000 tonnes of plastic from Norwegian hospitals is incinerated each year.
- About 400 tonnes of unused products end up in residual waste each year.
- In the current market, more than 40% of what comprises residual waste can be recycled.
- 9% is cardboard and paper that can be sorted for recycling.
- Only 18% of the residual waste actually constitutes residual waste.

Can you imagine **100 football fields covered by a one-metre-high layer of plastic**? That is the estimated amount of plastic from Norwegian hospitals that is incinerated each year.

What kind of plastic is most prevalent?



What kind of plastic polymers are most prevalent?



MAIN FINDINGS

GOOD OPPORTUNITIES FOR REDUCING THE USE OF PLASTIC

- There are **good reusable alternatives** to many single-use plastics.
- Each **year, 400 tonnes of unused products** are discarded.
- Plastic gloves are the single-use product of which we find most. Nationally, about **1,300 tonnes of disposable gloves** are used each year.
- **The consumption of waste disposal bags is very high** and constitutes a large amount of waste in itself. Many bags have a very low filling rate.

POTENTIAL TO INCREASE PLASTIC RECYCLING

- A large amount of the plastic is of **high quality and very suitable for recycling**.
- Changes to packaging options will make it possible to **recycle more plastic**:
 - A lot of packaging is **composed of plastic and paper**, making it difficult to recycle. The plastic part of such packaging accounts for 7% of all the plastic.
 - 30% of the plastic consists of a combination of several types of polymers. **Using only one type of material makes it possible to recycle this plastic.**

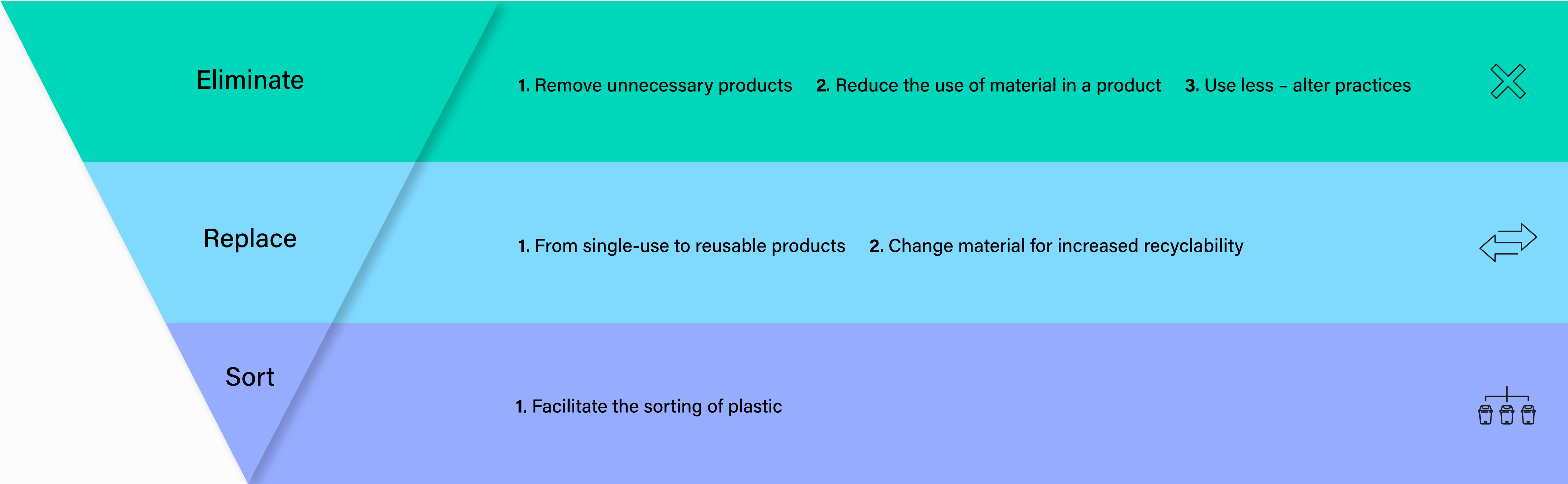


**12 Measures:
How we can reduce
plastic in Norwegian
hospitals**

Reducing the use of plastic in Norwegian hospitals

The waste hierarchy shows us how we should prioritise different measures:

The easiest and most effective way to deal with the plastic is to eliminate and reduce the use of unnecessary products and packaging, which would reduce emissions from waste incineration and lower emissions from manufacturing the products. Many single-use products can be replaced with reusable products. There are many good examples of this from European hospitals.





Eliminate

Elimination is about getting rid of unnecessary products, reducing the amount of material used in products, or changing practices in order not to use more than is necessary.

Elimination is the simplest way to reduce the use of plastic. It creates less waste, reduces greenhouse emissions and saves costs.





Eliminate: remove products



PACKAGE OF MEASURES

Unused products

A large quantity of unused and sometimes unopened products end up in the residual waste. Equipment that is brought to a patient cannot be returned to the store-room. Some products are opened prior to carrying out medical procedures and must be discarded even when they are not used. Procedures should be reviewed in order to ensure that overuse is reduced to the required minimum.

Measure

Increase awareness of the amount discarded and evaluate procedures that result in unnecessary disposal of unused products.



Saves 200 tonnes of plastic

50% reduction in unused products amounts to 200 tonnes less residual waste each year.

Double packaging

A number of products are double packaged medication and liquids and the double packaging cannot necessarily be justified for hygiene reasons.

*The example is calculated for Ringer bags.
The plastic saved by avoiding double packaging will be much greater.*

Measure

Identify products with double packaging and raise the issue with the supplier. Set a requirement for suppliers to avoid unnecessary double packaging.



Saves 110 tonnes of plastic

Eliminating double packaging on Ringer bags reduces plastic usage by 110 tonnes.

Optimising procedure/ cleansing sets

Procedure sets have less packaging and provide improved efficiency when treating patients. Nearly 400,000 such sets are procured annually by OUS. However, healthcare professionals indicate that some of the sets contain unnecessary products that, for various reasons, remain unused.

It should be easier for healthcare professionals to give feedback about content that is discarded without being used or that is seen as unnecessary. The sets should be continuously optimised to ensure that their benefit outweighs the environmental cost.

Measure

Review pre-packaged sets in order to identify unnecessary products.



Saves 20 tonnes of plastic

Reducing the amount of plastic on some types of cleansing sets by 20% would save about 20 tonnes of plastic.

‘When I displayed the product price in the storeroom, fewer were used’

– Auxiliary nurse



Eliminate: reduce use of material



PACKAGE OF MEASURES

Syringes

Each year, 60 million syringes make up about 800 tonnes of plastic waste. Experience from Sweden shows that it is possible to reduce the amount of plastic used in the production of syringes without compromising quality.

CASE 1

Measure

Share experiences with other hospitals and enter into dialogue with suppliers to investigate possibilities.



Saves 80 tonnes of plastic

10% reduction in the use of materials can save about 80 tonnes of plastic each year.

Absorbent mats

About 370 tonnes of plastic in absorbent mats are procured by hospitals annually. Interviews with healthcare professionals suggest that smaller mats may be sufficient for some procedures.

Adapting the size of the mats to the procedure for which they are to be used is a simple way of reducing plastic use and waste.

Measure

Request absorbent mats in sizes that suit different needs.



Saves 130 tonnes of plastic

35% reduction in the use of materials saves about 130 tonnes of plastic each year.

Infectious waste containers

As a rough estimate, Norwegian hospitals send about 300,000 cannula buckets and 700,000 containers for hazardous waste to incineration each year. We should therefore ensure that as little new plastic raw material is used in the manufacturing of infectious waste containers procured, and that the containers are filled.

Infectious waste containers that meet the required standards and contain 30% recycled plastics are available in the market.

Measure

Make the use of recycled material in infectious waste containers a requirement for procurement. Explore the possibility of reducing thickness.



Saves 200 tonnes of plastic

30% recycled materials in infectious waste containers saves about 200 tonnes of virgin plastic being incinerated each year.

‘Since coronavirus, the use of gloves has skyrocketed. We need conscious retraining efforts’

– Procurement officer



Eliminate: reduce use



PACKAGE OF MEASURES

Disposable gloves

More than 200 million disposable gloves are used each year. Since coronavirus, usage has increased by close to 20%. A study from Sweden shows that 6% of glove usage is due to gloves ending up on the floor and having to be discarded. The gloves stick together and fall out when being removed from the packaging. Disposable gloves are also included in some procedure sets. They are rarely used as staff prefer to use gloves that is their size.

CASE 2 and 3

Measure

- Review procedures to ensure correct glove usage and retraining after coronavirus
- Internal information campaign to reduce usage. See the campaign 'The Gloves are off'
- Speak with suppliers about smarter packaging.
- Eliminate gloves from pre-packaged sets.



Saves 400 tonnes of plastic

30% reduction in glove use saves 400 tonnes of plastic.

Face masks

Each year, around 60 million face masks are disposed of in Norwegian hospitals. As with disposable gloves, the coronavirus epidemic has contributed to increased use which has to be addressed. .

Measure

Review procedures to ensure correct usage and retraining of infection control measures.



Saves 30 tonnes of plastic

15% reduction in use saves 30 tonnes of plastic.

Waste bags

The waste analysis suggests that almost 3,000 tonnes of bags and larger sacks are disposed of each year. The small waste bags often have a very low filling rate.

Measure

Change the cleaners' emptying routines.



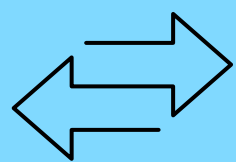
Saves 280 tonnes of plastic

Reducing the use of small waste bags by 20% can save about 280 tonnes of plastic each year.

'How well documented is it that you have to change your face mask so often?'

– Anaesthesiologist





Replace

In hospitals, single-use products have gradually replaced reusable products. Single-use products are easy to use and they reduce the need for sterilising reusable equipment. This results in such facilities being scaled down, making it even easier to choose single-use products.

However, single-use products generate huge amounts of waste and do not necessarily lower costs in the long run. On the contrary, experience from several European hospitals shows that reusable products quickly save costs.

If convenience is weighed against environmental cost, we see that the use of single-use products can be reduced and the capacity for sterilisation can be improved.





Replace from single-use to reusables



PACKAGE OF MEASURES

Textiles

Each year, more than 2,000 tonnes of plastic textiles are incinerated as part of residual waste. This includes surgical garments, isolation gowns, warm-up jackets, cloths and mats that are only used once before being discarded. Hospitals have good systems in place for washing recycled textiles, and it should be possible to send more types of textiles into this flow. Experience from the USA and Spain have shown positive environmental benefits from switching to reusable textiles.

CASE 4 and 5

Measure

Introduce washable warm-up jackets. Change to washable reusable fabrics where possible.



Saves almost 100 tonnes of plastic

Reusable warm-up jackets save 100 tonnes of plastic. Using more reusable textiles could potentially save 2,000 tonnes of plastic each year.

Disposable cups/ tableware

Norwegian hospitals use an estimated 45 million disposable cups each year. These are plastic cups and paper cups lined with plastic film. Very often, disposable cups are used in areas where a dishwasher is easily accessible. Experience from Norway, England and Switzerland has shown that switching from disposable to reusable tableware saves a lot of waste and money.

CASE 6 and 7

Measure

Eliminate disposable cups in areas where a dishwasher is accessible. Consider phasing out disposable cups throughout the hospital.



Saves almost 120 tonnes of plastic

Eliminating disposable cups saves about 120 tonnes of plastic each year, depending on the extent of use.

Products

Examples of products where reusable alternatives are suitable include clamps, scissors, forceps, equipment trays, parts for ventilators etc. The ability to choose reusable products over single-use products depends on infection control, the need for efficiency in the procedure and the possibility of sterilisation.

Measure

Ensure that reusable alternatives and environmental costs are considered early in the procurement process.



Saves almost 100 tonnes of plastic

Reusable forceps, clamps and equipment trays save 100 tonnes of plastic

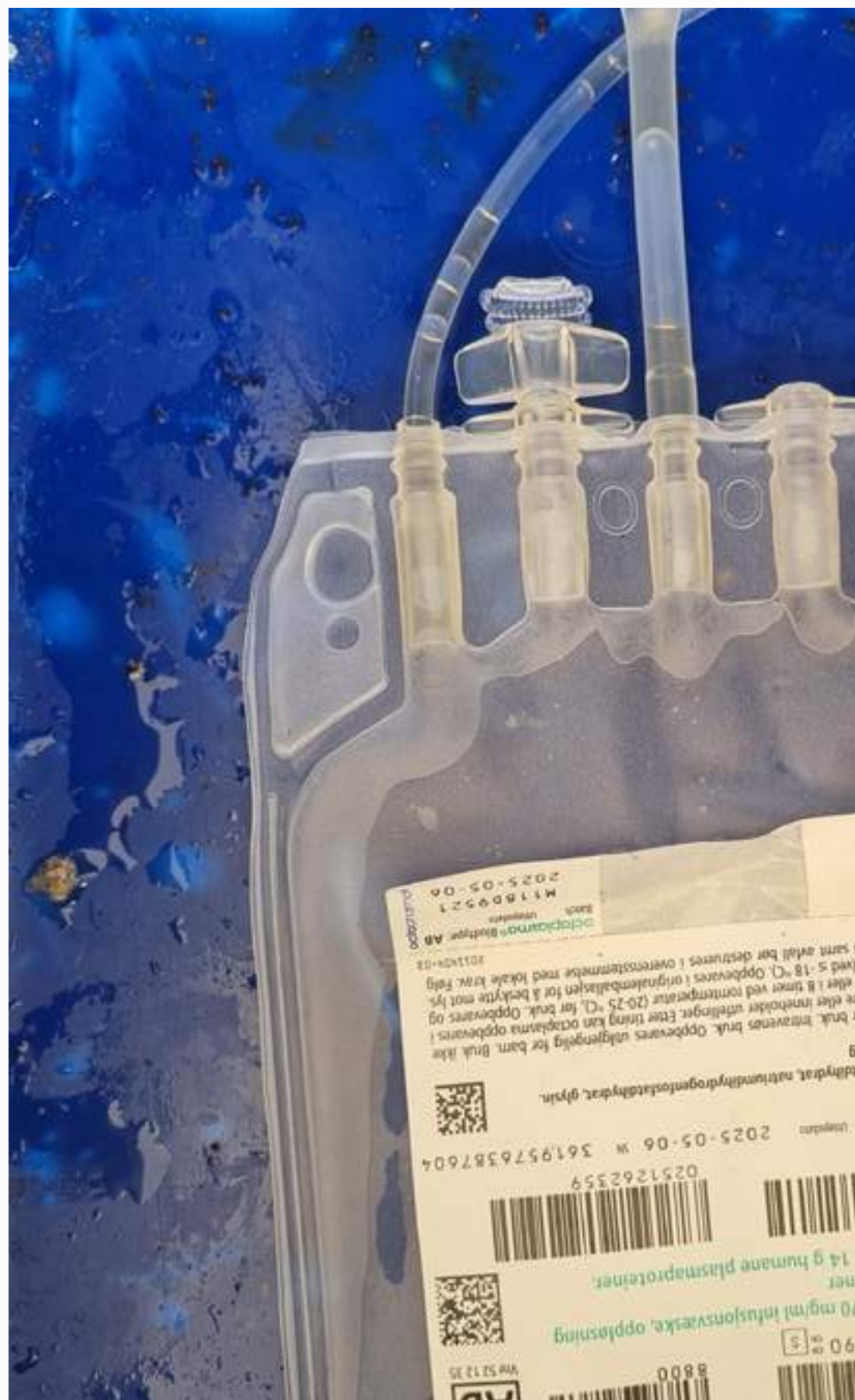
‘Disposing of warm-up jackets after one use only is taking it too far.’

– Nurse



Switching to recyclable materials will only have an effect if it is possible to separate the plastic.

Replace recyclable materials



PACKAGE OF MEASURES

Recyclable plastic in packaging

A large amount of packaging is made of plastic that cannot be recycled, often without good reason. Suppliers should be required to use recyclable materials in their packaging.

Measure

Set a requirement in tenders for recyclability and the use of uniform materials. Ideally specify which types of plastic can be used.



Saves 1000 tonnes of plastic

Recyclable plastic in packaging can reduce the incineration of up to 950 tonnes of plastic.

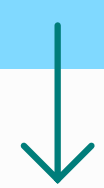
Replace packaging made from paper and plastic with a mono material

It is not easy to sort packaging when paper and plastic are glued together.

An alternative is to switch to packaging that consists of one material: only plastic or only paper.

Measure

Speak with suppliers about possible solutions for using mono material packaging.



Saves almost 600 tonnes of plastic

Switching to paper-only packaging saves 600 tonnes of plastic. Replacing the paper part with mono material plastic means the plastic can be recycled.

Recyclable plastic in IV bags

Some IV bags are made of PVC or PE laminate that cannot be recycled, while others are made of PP plastic that can be recycled. Suppliers should be able to use recyclable materials in their packaging.

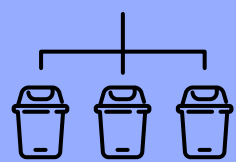
Measure

Engage in market dialogue with suppliers and set a requirement for recyclability in tenders.



Saves almost 200 tonnes of plastic

Recyclable plastic in IV bags can increase recycling by up to 200 tonnes.



Sorting

From 2023, hospitals will fall under a statutory requirement to sort household-like plastics. It is technically possible to recycle a large amount of hospital plastic, but the market is immature. There is a lot happening in this area and the market is rapidly changing. Developments need to be monitored.

Sorting of individual products can increase the amount of plastic recycled and this can be done where it is easy to separate uniform products. At the same time, it would be more practical to create a solution for mixed plastics. In parallel, efforts should therefore be made to establish sorting of mixed plastics in large parts of the hospital's infrastructure.



Possible solutions for sorting and recycling plastic

Sorting of plastic waste in hospitals

Hospitals have good sorting procedures for infections waste. This provides good opportunities for efficiently sorting high-quality plastic.

The sorting of individual plastic products

More plastic can be recycled if uniform product types or materials are sorted. A number of solutions are available, but it can be difficult to ensure that the sorting of waste is of a high enough standard.

The sorting of mixed plastic

There are stakeholders in the market that can receive mixed plastic from hospitals and separate it for material recycling. However, not all plastics are desirable in such a flow. This would need to be tested on a smaller scale, such as in one department.

The mechanical post-separation of plastic from residual waste

Plastic can be mechanically separated from residual waste, but this solution is not currently available to hospitals. There are few such facilities in Norway. Those that exist are owned by local authorities and are reserved for household waste. However, more sorting plants are being built and capacity is expected to increase in the next few years.

Material recycling of sorted plastics

Sorted mixed plastic must be more finely sorted, either mechanically or manually, before being sent for recycling. The plastic is then sorted according to the quality and type of plastic. Recycling solutions for different plastic grades vary between mechanical and chemical recycling. New recycling solutions are continuously being built and developed in the marketplace.

Material recycling of sanitary products

The market for recycling sanitary products, such as nappies, incontinence pants and absorbent mats, is constantly evolving. It is estimated that such sanitary products constitute more than 2,000 tonnes of waste from Norwegian hospitals and are not very suitable for today's incinerators.

Energy recovery

Plastics that are not sorted or cannot be recycled are usually burned in incineration facilities, where the material is destroyed but energy is harnessed.



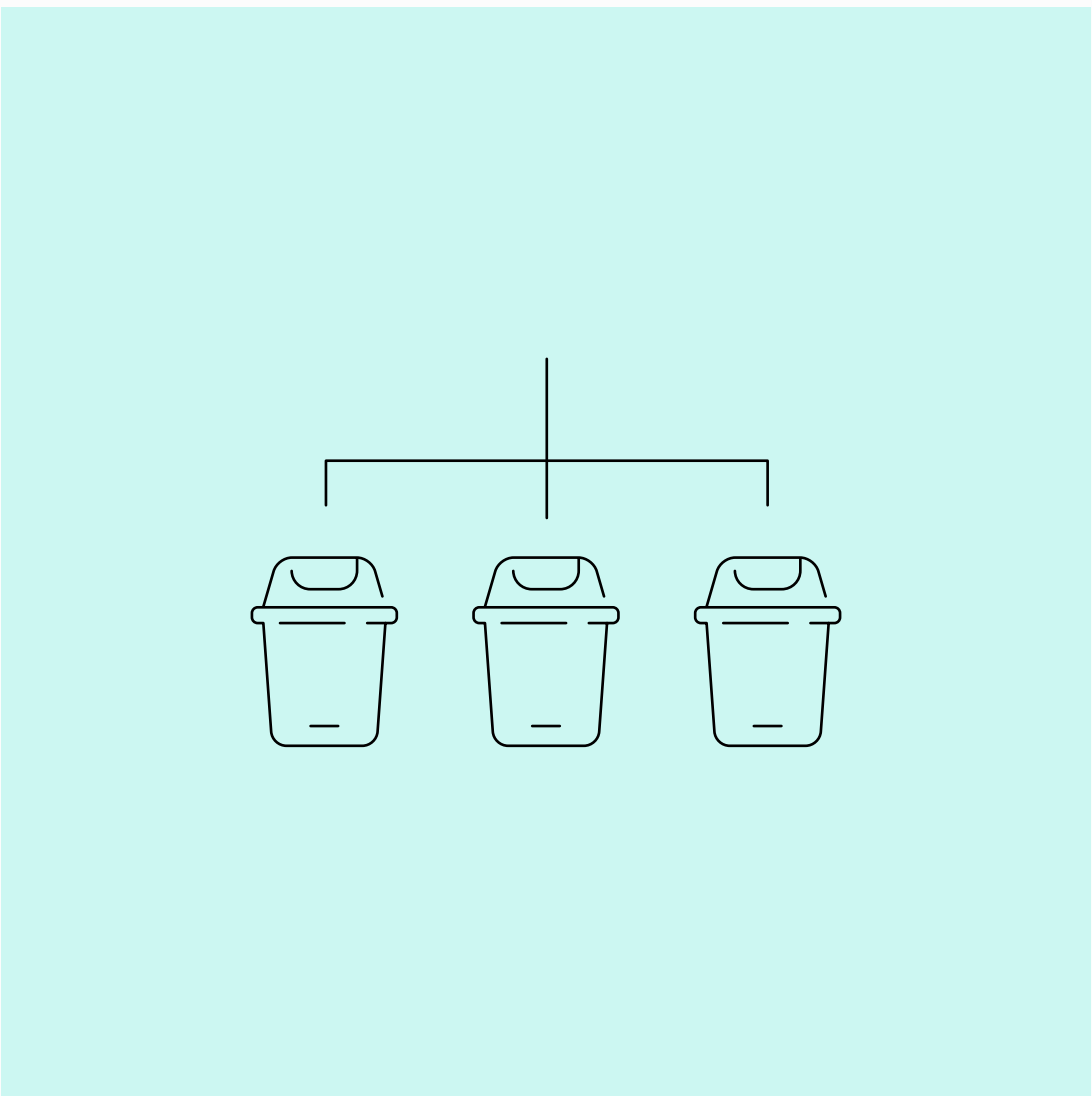
Three steps to successfully sorting plastic

We recommend that hospitals continue to facilitate more plastic sorting in three ways:



1. Enter into downstream agreements for sorting plastics

Various solutions can be piloted.



2. Customized containers

Invest in easy-to-use waste containers that are customized to different environments.

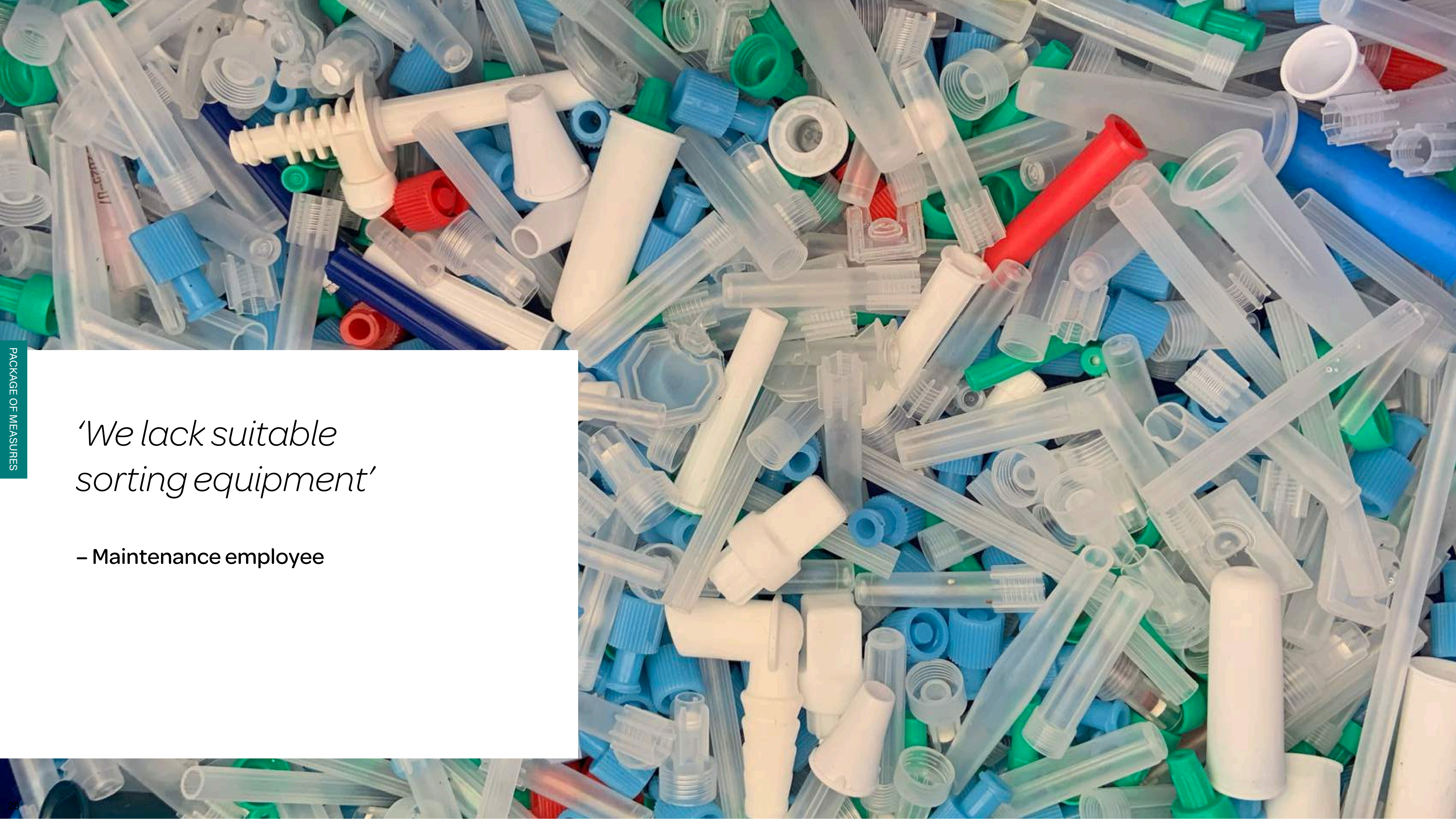


3. Clear and simple communication about what should be sorted

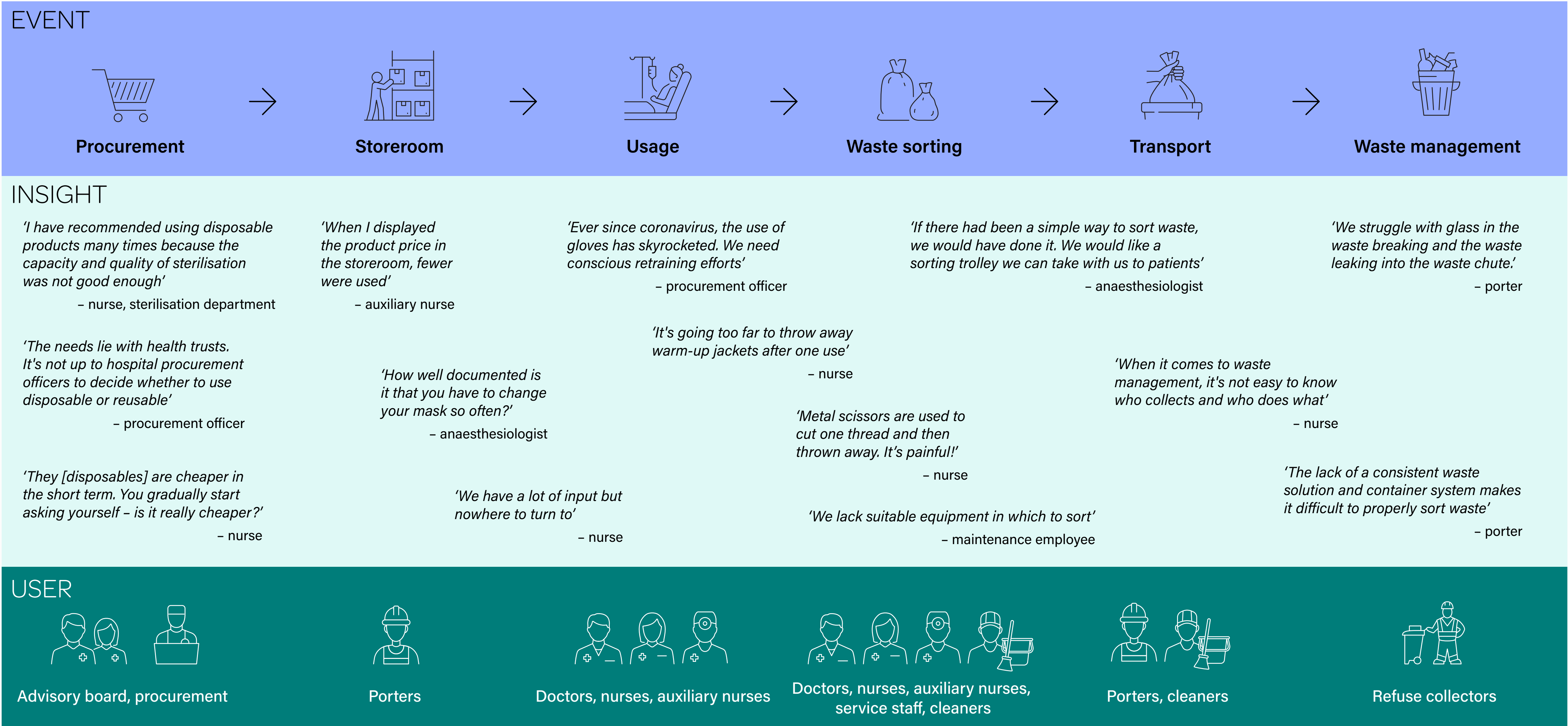
Sorting procedures should be clearly and visually communicated.

*'We lack suitable
sorting equipment'*

– Maintenance employee



The journey of waste



Improving the waste journey

Plastic smart hospitals have shown that there are opportunities for improvement throughout the waste journey. The environmental cost of plastic needs to be emphasised as early as possible in the procurement process and taken into account when setting requirements. Ensuring the best use of personnel in waste management will allow professional resources to be freed and save costs. Better facilities and clear communication is necessary if more plastic is to be sorted.

Emphasising environmental cost in procurements

In order for environmental criteria to be an important part of an overall assessment and weighted against others considerations, the environmental impact of product and packaging choices must be considered before and when needs are defined. This will require increased awareness, and requirements for and opportunities to emphasise the environmental cost throughout the value chain.

The transition to single-use products reduces the need to maintain the capacity for sterilisation. This can be a factor in choosing not to use reusable equipment.

Adequate cost assessments must be carried out in order to determine whether it is actually cheaper to use single-use products. A number of European hospitals have found the opposite to be true.

CASE 4, 5, 7 and 8

Assess waste procedures and responsibilities

As can be seen in the journey of waste, there are many people involved in the handling and transport of waste. Clear procedures and responsibilities will help ensure good quality materials are sorted and an efficient use of time.

Switching between patient care and handling waste leads to an increased use of protective equipment. It is not appropriate for a critical healthcare professional to spend time transporting and handling waste beyond what is necessary in their own department. Given that nurses spend 15 minutes each day on waste management, it is possible to save about NOK 110 million annually on better use of resources, by having sufficient staffing of personnel with support functions.

Improved waste logistics, more defined division of responsibilities and dedicated resources can free up valuable professional resources.

User-adapted communication and equipment

If several types of waste are to be sorted, personnel who unpack and use products and packaging should receive information on how to use and sort different types of waste.

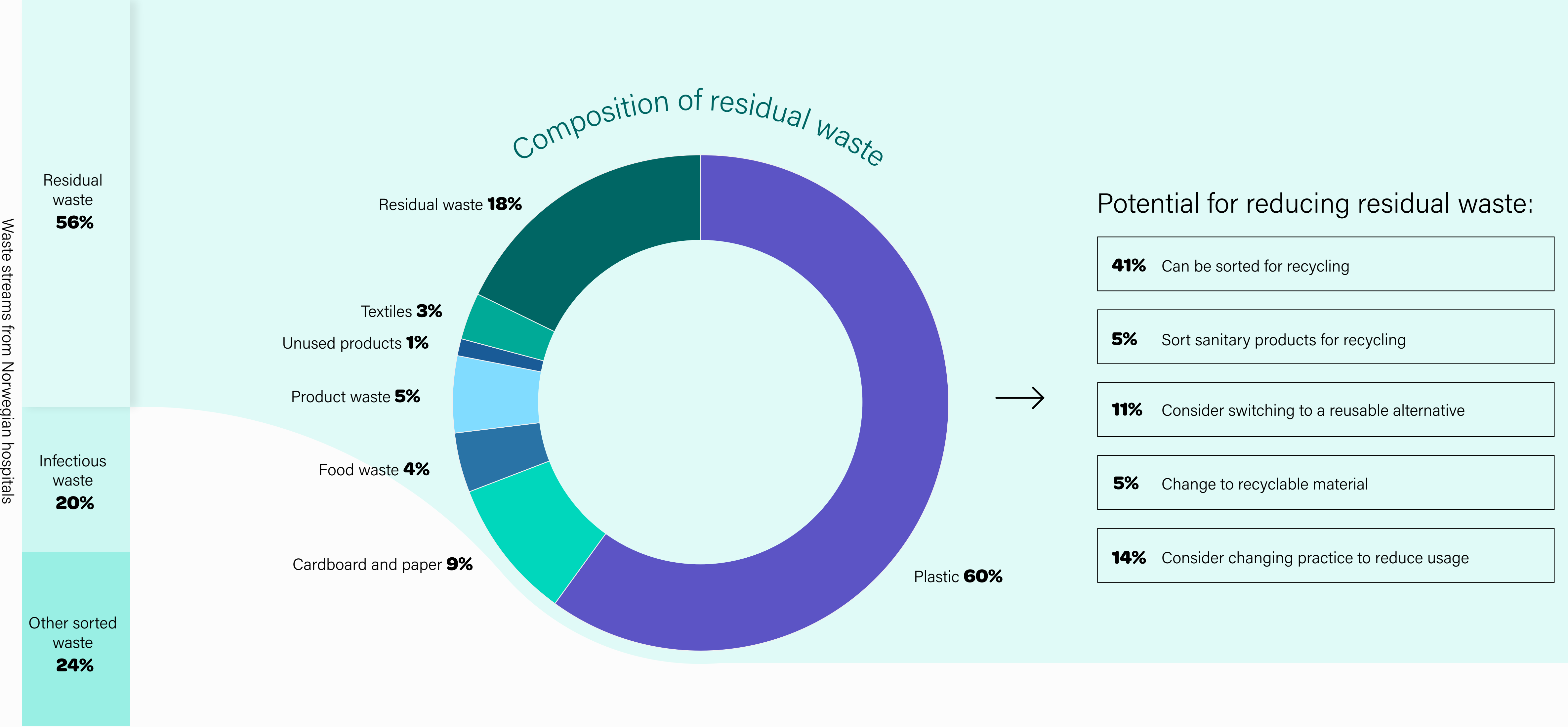
The current equipment for sorting waste varies greatly and is not particularly customised for users. Containers should be customised for different rooms and sorting situations and be well marked. Standardised waste sorting symbols should be used.



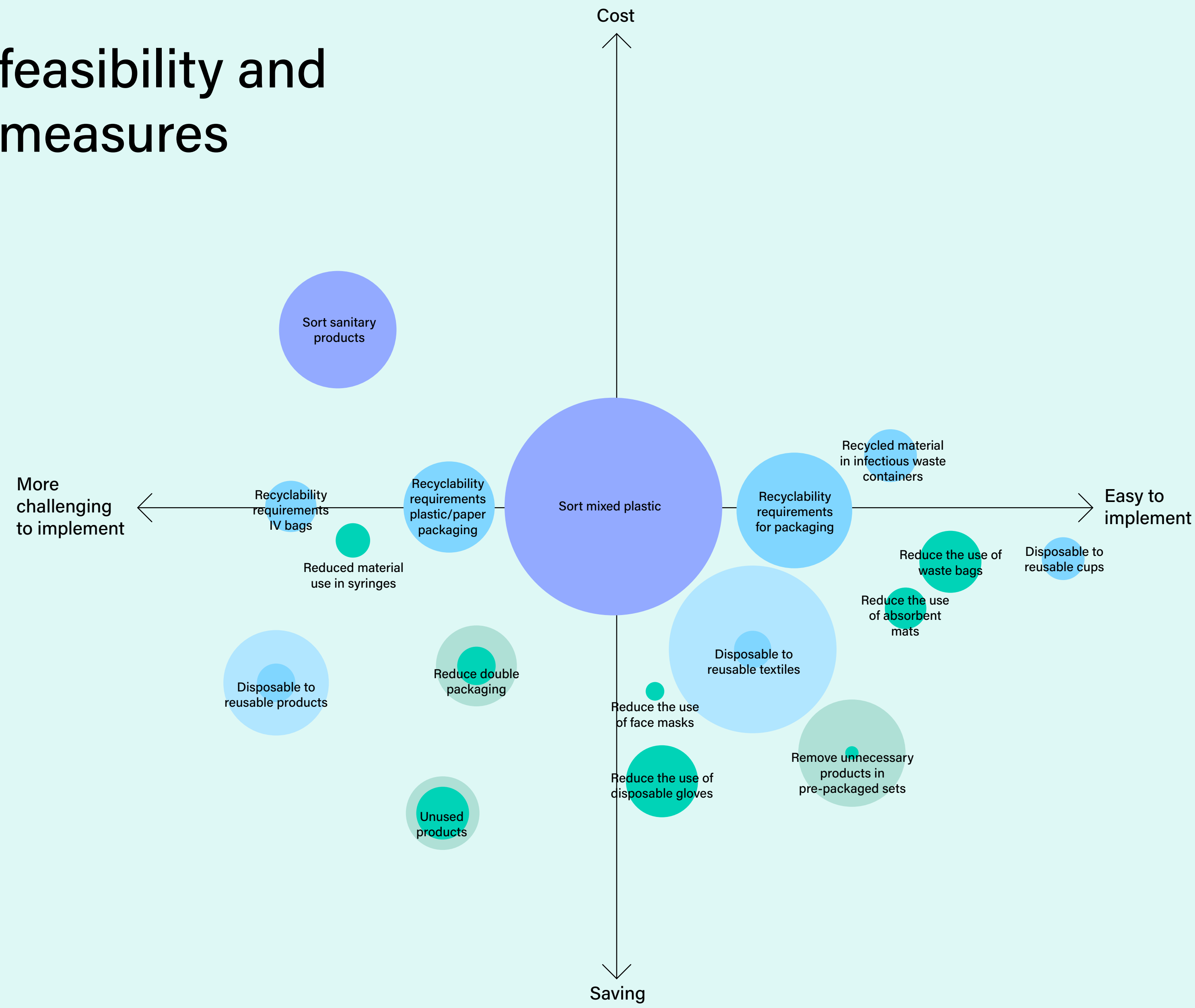
The background of the slide features a close-up, artistic shot of crumpled paper and a green mesh net. The paper is in various shades of light green and white, with some areas appearing more translucent. The green mesh net is draped over the paper, creating a textured, wavy pattern. The overall color palette is soft and natural, with a focus on greens and whites.

Effects of measures

How residual waste can be reduced




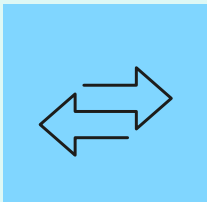
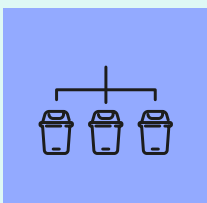
The effect, feasibility and cost of the measures



Tonne:

Effect of chosen measure.
E.g. warm-up jackets

Estimated potential.
E.g. Disposable textiles

- Measure:**
-  Eliminate
 -  Replace
 -  Sort

Overview of measures

PACKAGE OF MEASURES

<div><div></div><div>Eliminate – reduce the use of plastic</div></div>		
Product	Measure	Effect in tonnes
Unused products	Reduce disposal by 50%	200
IV bags (e.g. Ringer bags)	Eliminate unnecessary double-packaging	110
Procedure sets	Optimise procedure sets (example: cleansing set)	20
Syringes	10% reduction in the use of material with lighter syringes	80
Absorbent mats	35% reduction in the use of material with correct sizes	130
Infectious waste containers	30% recycled plastic replaces virgin plastic	200
Disposable gloves	30% reduction in use	400
Face masks	15% reduction in use	30
Waste bags	20% reduction in use	280
Total ~1,500 tonnes		

<div><div></div><div>Replace – reduce use of plastic and increase recyclability</div></div>		
Product	Measure	Effect in tonnes
Warm-up jackets	Replace single-use disposable with reusable ones	100
Disposable cups	Replace disposable cups with reusable cups	120
Single-use products	Replace e.g. equipment trays, clamps and forceps with reusable ones	100
Unrecyclable plastic packaging	Replace with recyclable materials	950
Plastic/paper packaging	Replace with mono materials	600
IV bags	Replace non-recyclable IV bags with recyclable	200
Total ~2,000 tonnes		

<div><div></div><div>Sort – increase and improve recycling</div></div>		
Product	Measure	Effect in tonnes
Sanitary products (nappies, incontinence pants and mats)	Sort into separate flow for recycling	600
Mixed plastic	Facilitate the sorting of mixed plastics and find recipients for recycling these sorted materials	3,500
Total ~4,000 tonnes		

Many of the measures remove volumes from the same potential. For example, by reducing the amount of material in a syringe, the amount of recycled plastic is also reduced. To prevent double counting, the effects of the measures are adjusted for such cross effects.

The background of the slide features a close-up, artistic shot of crumpled paper and teal-colored mesh fabric. The paper is light beige and has a rough, fibrous texture. The teal mesh is a fine, woven fabric with a consistent pattern of small holes, creating a semi-transparent effect. The materials are layered and folded, creating deep shadows and bright highlights that emphasize their textures. The overall color palette is muted, with the teal providing a subtle contrast to the neutral tones of the paper.

Reference cases

Reference cases

1

Region Skåne, Sweden: Replaced syringes with a lighter alternative

After identifying that syringes made up a large part of their plastic waste, the hospital worked with the supplier to switch to lighter syringes. This resulted in a waste reduction of 4.5 tonnes.

Healthcare Without Harm, 2021, Measuring and Reducing Plastics in the Healthcare Sector, p. 46

TO REPORT

2

Region Skåne, Sweden: Reduced consumption of unused gloves by setting a requirement for smarter packaging in procurement.

In Region Skåne, it was found that 6% (almost 3 million) of the gloves ended up on the floor and therefore had to be discarded. This was because many gloves often get stuck together, pulling out other gloves with them. When procuring gloves, the region set a requirement for smarter packaging of gloves in order to reduce unnecessary waste.

Healthcare Without Harm, 2018, Measuring and Reducing Plastics in the Healthcare Sector, p. 8

TO REPORT

3

Great Ormond Street Hospital, London: information campaign to reduce the use of disposable gloves

The hospital developed the campaign ‘The Gloves are off’ to reduce the use of disposable nitrile gloves.
During the first year, the use of gloves was reduced by 4.3 million gloves. This led to savings of 21 tonnes of residual waste and cut costs by more than NOK 1.3 million (GBP 100,000 in procurement costs and GBP 1,500 in waste costs)

Healthcare Without Harm, 2021, Measuring and Reducing Plastics in the Healthcare Sector, p. 53

TO REPORT

4

Lifecycle assessment of disposable and reusable isolation gowns

The study showed that reusable garments reduce costs by 30% and score better on four different environmental parameters compared to disposable garments.

Vozzola et al., American Journal of Infection Control, 2016.

TO REPORT

5

Murcia, Spain: Reusable plastic-textile gowns resulted in large cost savings

During the pandemic, the increased demand for single-use personal protective equipment meant that some hospitals had to test reusable alternatives, simply because supplies were not available. The University Hospital Virgen de la Arrixaca tested two different types of reusable gowns made of a plastic textile that offered various degrees of protection. Both gowns reduced plastic consumption, waste and their carbon footprint, and the gown with the lowest level of protection resulted in cost savings of up to 67%.

Healthcare Without Harm, 2021, Measuring and Reducing Plastics in the Healthcare Sector, p. 55

TO REPORT

6

Vaudois, Switzerland: Replaced disposable plates with reusable plates in canteens

Lausanne University Hospital removed disposable plates from its cafes and introduced a deposit scheme on reusable packaging. The change led to a reduction of more than 4.3 tonnes of plastic waste per year and an annual cost saving of 44,000 Swiss francs (about NOK 470,000).

Healthcare Without Harm, 2021, Measuring and Reducing Plastics in the Healthcare Sector, p. 49

TO REPORT

7

Newcastle, England: Replaced single-use plastic for serving patient meals

The hospital foundation invested GBP 12,000 to replace disposable plastic plates used for patient meals with reusable ceramic alternatives. The investment cost was recovered within two months, and the foundation has saved GBP 80,000 annually (about NOK 1 million).

Healthcare Without Harm 2021, Sustainable Food Contact Materials in the European Healthcare Sector, page 20-21.

TO REPORT

8

Canada: staff given the opportunity to give feedback on products

As part of quality assurance, the hospital gave staff the opportunity to provide feedback on specific products (including excess packaging). This formed the basis for discussions with suppliers. For one product, it reduced packaging by 17%, and for another product it reduced the unit price by 20 cents.

Healthcare Without Harm, 2021, Measuring and Reducing Plastics in the Healthcare Sector, p. 47

TO REPORT

PLASTIC *SMART* HOSPITALS 2023

