



## Potential mattress bag solutions and use cases scenarios

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# POTENTIAL MATTRESS BAG SOLUTIONS AND USE CASES SCENARIOS

Workshop with citizens from Odsherred Municipality, with the purpose of selecting a mattress bag, identifying relevant use cases scenarios, and planning the upcoming test plan for the mattress bag.

**Keywords:** Mattress bag, reuse, workshop, use case scenarios and market analysis.

## SUMMARY

Previous test collections of discarded mattresses have shown, that many mattresses are wet and dirty when collected. Because of this, they cannot be recycled. To increase recycling possibilities, the need of a mattress bag was identified, which can be used on old mattresses, when they are put out for waste collection. Previously, DTU Sustain has worked on designing and testing different mattress bags (research brief 4). In this research brief the following has been researched: What types of mattress bags exist and how much do they cost? What mattress bags can manufacturers currently produce? What is the most optimal use case scenario from distribution of the mattress bag, as well as the journey of the mattress from the citizen's home to recycling? The answers to these questions are presented in this note, as well as a description of upcoming test trials of mattress bags for the collection of bulky waste in Odsherred municipality in fall 2024, weeks 36-39.

## BACKGROUND

To ensure the development of the most optimal mattress bag solution, the following steps were conducted: A market analysis of existing mattress bags, interviews with possible manufactures and development of new mattress bag solutions.

## MARKET ANALYSIS

The purpose was to compare a number of parameters on the existing mattress bags: price, waterproofness, handle, materials, closing mechanism, weight and possible sizes. Figure 1 shows a selection of some of the existing products. The prices varied from DKK 35-513, and they were found in all types of quality. The cheapest ones are made of transparent polyethylene, either without the possibility of closing or recommended closing with tape. The most expensive bags are made from a type of polyester/oxford fabric with a waterproof zip closure. The bags are available in all sizes, both with and without handles. Handles are often additionally secured in the stitching, to ensure that they don't break. One bag is equipped with a breathing hole in the middle to avoid condensation on the mattress. The results from the survey were used to develop interview questions for potential manufacturers, as well as develop mattress bag solutions.

## INTERVIEWS WITH MANUFACTURES

Potential manufacturers of the mattress bag were identified and interviewed through phone, based on the results of the market analysis. In the interviews the following topics were touched upon: the purpose of the bag and the possibilities for production. The primary interview questions were:

- *Is this type of bag being produced now? If not, is it possible?*

- *What materials are recommended to keep the bag waterproof?*
- *What type of closure mechanism can be made?*
- *What are the options for implementing handles?*
- *What will the price approx. be on different sized bags?*

Through the analysis two manufacturers were identified in Denmark, who could be potential manufacturers of the bag: Soldana and TRIOworld. Soldana already produces a mattress bag in LDPE, which is closed with tape, and they can be made in all sizes. TRIOworld would have to custom manufacture a machine to produce the bag, which would be expensive and added to the price. Both manufacturers advised against fitting handles or special bag closures (e.g. zips), as this would require extra processes, new machines and thus be costly. If the bag is to be made in another, more robust, material (e.g. PP or Oxford), it will have to be custom-made and therefore both expensive and cannot be produced immediately. The price will vary according to what type of bag is produced and how many.



Figure 1: A selection of the different mattress bags found during the market analysis.

## DEVELOPMENT OF THE SOLUTION

Based on results from the previous tests (research brief 4), the market analysis and the interviews with manufacturers, were used to develop new concepts for the mattress bag. This was narrowed down to two final mattress bag solutions. These, as well as various use case scenarios, were presented at a workshop with Odsherred Municipality and are described on the next page.

## WORKSHOP: ODSHERRED MUNICIPALITY

The purpose of the workshop was: 1) Get feedback on mattress bag solutions (see figure 2), 2) Discussion and identification of relevant use case scenarios, and 3) Prepare first iteration on test and implementation plan. The workshop was held online 05.03.2024 with three employees from Odsherred Municipality.

### Selected bag: Solution 1 – the normal bag

The selected mattress bag solution is an ordinary bag in recycled LDPE, closed with pp05 tape or a knot. It was chosen by the workshop participants because: It can be produced by Soldana already today, can be produced in all sizes, has low production costs, can be produced in recycled plastic, can be recycled (LDPE 04) and the transparent material means, that the condition of the mattress can be seen before recycling. The disadvantages of this bag are: The bag will be disposable, there is some risk of water/moisture as it does not close completely, as LDPE is not a particularly robust material, there may be a risk of the bag breaking. The following must be investigated further: If the bag is a success, should it be produced in a more robust material, themselves, PP? Is it possible to close the bag in alternative ways? Is it possible, that the opening on the bag is on the side, so that it is easier to take the mattress in?

### De-selected bad: Solution 2 – closed bag.

Solution 2 is almost identical to solution 1, but it has a closure, either in the form of a click or zip closure. Advantages of having a completely sealed bag is that the bag becomes 100% waterproof, and at the same time, increases the possibility of reusing the bag. The bag was de-selected, as it is currently not possible to have it produced. It requires specially made machines and processes to manufacture this type of closure, which entails higher production costs and thus a collector's horizon, compared to when the bag can be ready for use.



Figure 2: The two mattress bag solutions presented at the workshop. TH: the normal bag. TL: the closed bag.

### FINANCING

Two funding options were identified at the workshop:

Option 1: Waste fee, at present, it is not known how much a mattress bag should or must cost. In Odsherred, around 1 million DKK is spent on waste management this year, distributed among 40,000 households and holiday homes = DKK 20-30 per household.

Option 2: The citizen pay. Most citizens would prefer to avoid paying, even if it is a small amount. If citizens pay, the price must be able to match the price of bulky waste weighted against the comfort of having the mattresses picked up rather than driving them yourself.

### USE CASE SCENARIOS

During the workshop, different use case scenarios for the bag were discussed both before, during and at the end of use of the bag. Figure 3 shows five possible use case scenarios, with the aim of having the mattress bag delivered and put into use. The scenarios can be varied but are the most realistic proposals and developed based on the knowledge gathered in the workshop. Most important insights about usage scenarios:

**Before using the bag:** Communication about the bag must be shared, just when citizens need to use it, in connection with the disposal of the old mattress. Communication can take place through the municipality's website, Facebook, out at the recycling sites, online or physically when buying a new mattress. Website and 'flyers' are unsafe channels, as it is uncertain whether citizens will see it.

**During the use of a bag:** The best solution was indicated as handing out a bag, when buying a new mattress. Citizens may be reluctant to collect the bag themselves and distribution points require manual work, which is difficult in busy environments such as libraries or community services. Postage will be too expensive with the porto and processing costs. Stores can deliver the bag together with a new mattress. The use of the bag can be uncertain in relation to whether citizens can close it correctly, as storage outside requires a proper closing of the bag. Citizens must keep the bag until collection, if the waste company puts the bag on the mattress. The waste collector's role in the process is uncertain, as it can be a difficult lift without a handle on the bag. All of this requires testing with both citizens and the waste company.

**End of use of the bag:** The mattress bag must stay on the mattress until reuse. It requires personnel or a machine that can remove the bag at the final destination. Storage of the bag and mattress must be in a closed container or under cover in e.g. warehouses. There should be pallets on the floor to avoid moisture.

	FØR BRUG AF POSE		UNDER BRUG AF POSE		SLUT BRUG AF POSE	
	Kommunikation omkring pose	Udlevering af pose	Påsætning af pose	Opbevaring indtil afhentning	Opbevaring på genbrugsplads	Genanvendelse
<b>SCENARIO 1</b>	Fysisk Kommunikation i- og omkring madrassbutikker	Udleveres ved køb af ny madras i butik eller online (Iysk, IKEA, lign)	Tager selv madras i pose	Madrass opbevares udenfor i pose indtil afhentning	Madrass opbevares i pose i lukket container	Pose fjernes under genanvendelse
<b>SCENARIO 2</b>	På kommunens hjemmeside eller i flyer	Afhentning og pose bestilles online og pose udleveres med posten	Tager selv madras i pose	Madrass opbevares udenfor i pose indtil afhentning	Madrass opbevares i pose i lukket container	Pose fjernes under genanvendelse
<b>SCENARIO 3</b>	På kommunens hjemmeside eller i flyer	Genbrugsstationer, Bibliotek, Viceværk, Detail	Tager selv madras i pose	Madrass opbevares udenfor i pose indtil afhentning	Madrass opbevares i pose i lukket container	Pose fjernes under genanvendelse
<b>SCENARIO 4</b>	På kommunens hjemmeside eller i flyer	Borger skal afhente afhentning fra skraldefirma	Skraldefirma afhenter og tager pose på madras	Madrass opbevares indenfor uden pose indtil afhentning	Madrass opbevares i pose i hal	Pose fjernes under genanvendelse
<b>SCENARIO 5</b>	Information ude på genbrugspladsen	Udleveres på genbrugsplads ved afskaffelse af madras	Tager selv madras i pose ude på genbrugspladsen	Ingen afhentning	Madrass opbevares i pose i lukket container	Pose fjernes under genanvendelse

Figure 3: Use case scenarios

### NEXT STEPS

The test collection in Odsherred Municipality will take place in the fall of 2024. Before then, uncertainties regarding optimal use scenario, business case, number of bags needed, price, etc. should be investigated. This data is collected from citizens and waste collection companies at workshops.

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## Partners in the project

Vejle kommune, Odsherred Kommune, Københavns Kommune, ARC, ARGO, Vestforbrænding, Danfoam/Tempur-Sealy, Bramming Plast Industri, Region H.

