

# EXPLORING THE FACTORS INFLUENCING ORGANIC WASTE SORTING IN DENMARK

An Interactive Qualifying Project



## ABSTRACT

Biogasification harvests energy from recycled and treated food waste. Sorting food waste is key to Denmark's goal of recycling 50% of household waste by 2022. This project, sponsored by Dansk Affaldsforening, researched practical and motivational factors influencing Danish sorting of household food waste through interviews with citizens and waste sector experts, waste treatment plant site visits, two surveys and a social media photo survey. Our recommendations for an effective campaign to sort waste include: give clear, simple information; show results to intrinsically motivate people; and focus on children to perpetuate the habit. These results yield valuable insights for Dansk Affaldsforening's members for implementation of future food waste sorting campaigns.

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# Exploring Factors Influencing Organic Waste Sorting in Denmark

An Interactive Qualifying Project proposal submitted to the Faculty of  
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## Executive Summary

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Organic waste is the biodegradable component of the waste stream and can be broken down into simpler components by microorganisms. In 1998, the Danish Government released Waste 21, a waste management plan that announced raised targets for recycling rates, which required the separate collection of bio-waste and increasing the collection of paper and glass. Now 15 years later, the Danish Government has released a new waste management plan, dubbed *Denmark without Waste*. In conjunction with the European Union's waste hierarchy, shown below in Figure 1, Denmark is seeking to incinerate less and recycle more, exploiting the energy in waste even more efficiently than it is now.

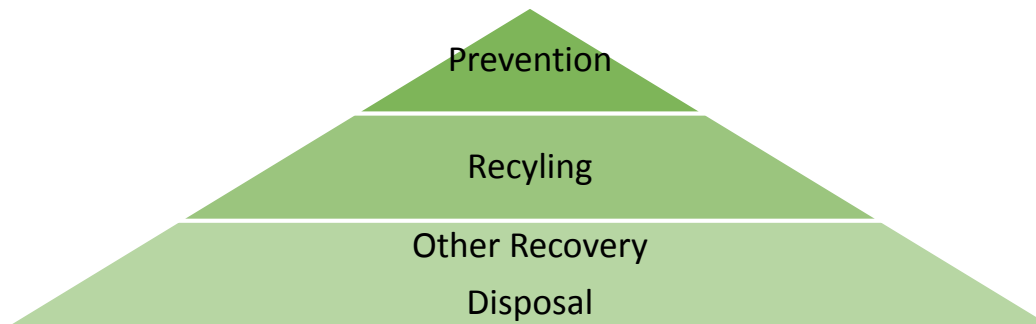


Figure 1: Waste Hierarchy

As a greater demand is placed upon the recovery of material and energy resources, Denmark aims to have waste incineration play less of a role. In 2012, the Danish Parliament passed the Danish Energy Agreement, which aims to produce 35% of Denmark's energy through renewable resources, like biogas and wind. Denmark's current waste management plan emphasizes the view of seeing waste as a resource. In the words of Ida Auken, former Danish Minister of the Environment, "We have become too good at incinerating and too bad at recycling." Thus in order to satisfy Denmark's goal to recycle 50% of household waste by 2022, methods of sorting organic waste for recycling, and motivation must be identified and provided.

### Goals, Objectives, and Methods

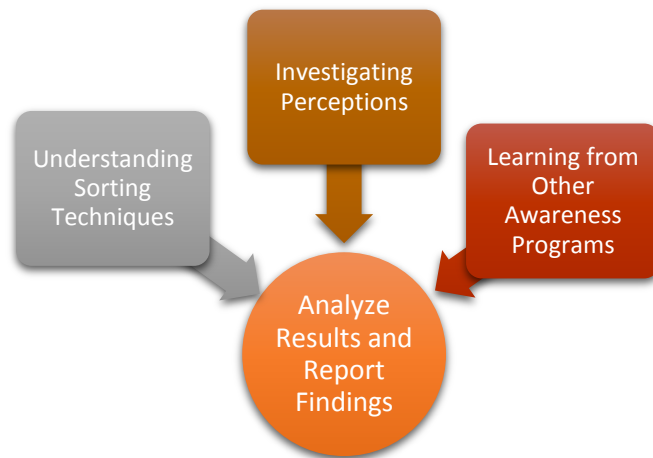
**The goal of this project was to assist Dansk Affaldsforening in understanding the practical and motivational factors that influence sorting household food waste in Denmark.** In order to do this, the team focused on assessing organic waste sorting practices already in place, and discerning the public view on sorting organic waste within the household. The team investigated the barriers and motivations

that affect how residents participate in a waste sorting system. The Facebook survey submitted to 12,000 followers of Nulskrald asked questions such as, “What challenges do you face?” and “What motivates you to sort?” in an effort to further this investigation. These surveys, and the interviews that supplemented them, resulted in the creation of insights that can be used to create a more successful and sustainable system of sorting.

To attain the project goal, we accomplished four objectives:

1. Understanding organic waste sorting techniques and practices within Denmark
2. Investigating perceptions of householders concerning organic waste
3. Learning from other waste management awareness programs
4. Analyzing the results gathered and reporting our findings.

We used these objectives in the process of our methodology. Each of the first three objectives occurred simultaneously to create insights that are both accurate and useful. By waiting until these objectives were accomplished before conducting an analysis, we ensured the formation of accurate and supported conclusions. This process is shown below in Figure 2.



*Figure 2: Methodology Implementation of Objectives*

#### Objective 1: Understanding Organic Waste Sorting Techniques and Practices within Denmark

Our first objective was to gain an understanding of the current waste sorting techniques and practices employed in Denmark and Sweden. By investigating the successes and barriers to sorting strategies already implemented, we used history and experience in conjunction with our own findings.

Previous research in biogasification, the process by which organic waste becomes usable methane, provided a sufficient understanding to conduct interviews with biogas plants and municipalities alike.

#### Objective 2: Investigating Perceptions of Householders Concerning Organic Waste

The second objective was to investigate the perceptions of typical householders in the area of sorting organic waste within the home. Although interviews and case studies within the population were performed, the team focused on conducting three surveys within Tversted, Høje-Taastrup, and online, via a Facebook page with 12,000 likes at the time of this project.

#### Objective 3: Learning from Other Waste Management Awareness Programs

The third objective was to learn from information campaigns and waste management awareness programs conducted. The team traveled to Tversted and Malmö, Sweden to investigate both the Nulskrald movement and Tack för Maten campaign. In both cases residents sorted organic waste separately from the residual waste stream, however the approaches were different. The Swedish campaign employed a 'top-down' method where the government managed all aspects of the system, and participation was mandatory. Tversted utilized a 'bottom up' method, where the campaign provided the population with relevant information, and it was up to the citizens to create their own household organic waste sorting system.

#### Objective 4: Analyzing the Results Gathered and Reporting our Findings

The team gathered data continuously throughout this study. This data included interviews, surveys, and site visits. Residents of Tversted, followers of Nulskrald's Facebook page, and customers of IKEA were surveyed to investigate their perceptions of household waste. The team analyzed the interviews and site visits through an open coding system, and the surveys were examined through comparing demographic information with the resident's motivations, reluctance, and reasons for sorting waste.

#### Findings:

Evaluations of the results lead to a series of findings. First, Peter Brønnum told us that, "**Our challenge is not to get a purer fraction. Our challenge is to get a larger mass.**" Biogasification plants such as BioVækst use methods of separating plastic impurity from the organic waste. Although reducing the impurities present within organic waste will reduce the cost of the system, it is more important to BioVækst that residents separate a larger percentage of their total organic waste, so that less potential material is incinerated.

Second, **patience must be used in the formation of a sorting system.** When Dansk Affald created a system of organic sorting among 300 random households, there was initial reluctance to take part. People often expressed that they did not have the time or energy to sort. However, by the end of the study, impurities were below 1%, and residents asked who they should vote for to continue the sorting system.

Third, **people desire a pre-made system for sorting within the kitchen.** From the surveys conducted, 88% of respondents opined that they desired a system provided to them, rather than to create their own system from provided information. People were evenly split (44%) between a system given to them including bags and bins and a system given to them with different options available. Only, 12% chose creating their own system but they want the campaign to provide the relevant information in order to do so.

Fourth, **paper and biodegradable bags have the highest purity of sorted organic waste.** Paper bags have a greater than 99% pure organic waste fraction, meaning that more than 99% of the waste placed within them was organic matter, separated from the garbage. Biodegradable bags were a close second at 98%. When people see the paper or different nature of the biodegradable bag, they realize that plastic and other impurities should not be placed inside them.

Fifth, **clear, understandable information and simple explanations allow people to sort.** Information campaigns should provide distinct and understandable information to residents to allow them know the proper material to sort from their residual waste into the organic fraction. By using simpler phrases like 'food waste' rather than organic, using consistent colors and symbols and passing information to representatives within the household residents will know what is organic and what is not, reducing the amount of impurities within the collected organic waste fraction.

Last, **providing motivation to the population encourages participation.** Although information is key in allowing residents to understand what they should sort, campaigns should provide motivation to encourage this sorting. By using factors like politics, economics, and social pressures residents will be motivated to use the knowledge they have and apply it. Although every person is different, a combination of these factors will likely be successful in motivating them. By using motivation in conjunction with information, residents will know why they should sort their waste, increasing the amount of organic waste separated from the residual waste stream.

## Insights:

Based on the findings and researched background information, we created a list of three insights for our sponsor, Dansk Affaldsforening, their members, and future researchers. We believe these insights are the basis upon which household sorting can be implemented.

1. **Sorting is social.** When sorting becomes a part of everyday life, people accept it as an efficient and popular solution. By using peer-to-peer interaction and conformity within a closed population, residents can be motivated to sort their waste through intrinsic rather than external motivating factors. Additionally, these same factors maintain a clean sorting of waste within the population for a period after any extrinsic influence is removed, due to the formation of habit and the peer pressure that is associated with being in a community that sorts.
2. **Children create a closed-loop.** Teaching children what organic waste is and how to properly sort it into a different fraction creates a closed-loop system for organic waste. As these children grow and develop, they transform from children who sort into adults who sort. In turn as they have children themselves, they will instill their children with the same values they learned including a desire to sort waste cleanly and effectively. Although this focuses on a long-term result rather than a short-term one, by influencing the children of today, the adults and children of the future can perpetuate the system.
3. **Information is key in the development of any sorting campaign.** In addition to making the information easy to understand for the residents who received it, the information must contain the reasoning behind why the municipality implemented the sorting system. Although residents will take part in a mandatory sorting campaign, instilling them with a sense of purpose and showing them the results of their sorting leads to the collection of a larger quantity of organic waste as well as a cleaner fraction.

## Conclusion:

This project has the potential to be implemented in every municipality in Denmark. Due to the independent and unique nature of these 98 municipalities, the insights, discussion, and results of the surveys and interviews performed can be used to create distinct systems suited to the needs and challenges of each region. With Denmark's focus on recycling and using waste as a resource, a sustainable system of organic waste sorting must be implemented. By using the information, motivation, and factors identified in this report, municipalities in Denmark are one-step closer to becoming a zero waste society.