

## COLLECTION SYSTEM'S IMPACT ON ENVIRONMENTAL PERFORMANCE OF THE WASTE MANAGEMENT SYSTEM

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A law proposed by the Norwegian Environmental Agency requires municipalities to obtain a separation rate of 70% of food waste and plastic waste from households within 2035. The separation rate of waste seems to be affected by the collection system. For example, separation rates for plastic packaging waste spans from 17 to 58%. Average higher separation rates are obtained in municipalities with plastic sorting in separate container or large transparent bag compared with sorting in colored bags and an optical bag sorting system.

In this study life cycle assessment methodology is applied to assess the environmental impacts from the current collection systems for plastic packaging and food waste in Norway. This includes impacts from the waste collection bags, containers and vehicles and the downstream burdens and benefits associated with the waste treatment. The functional unit was defined as collection and treatment of the amount of plastic packaging and food waste generated in average per person per year in Norway (24 and 83 kg respectively), including the avoided burdens when the recycled material substitutes virgin materials and energy generated from waste substitute other energy carriers

There are three main systems for plastic packaging waste: sorting in separate container or bag (approximately 70% of the inhabitants), home sorting with colored bag (approximately 15%) and central sorting system (15%). For food waste there are two main systems: home sorting and separate container with either paper, plastic or biodegradable plastic, and home sorting with colored bag with a central bag sorting system. An overview of the systems is shown in the table below.

		<b>Sorting system</b>	<b>Type of waste bag</b>	<b>Container</b>
Plastic packaging	F0	No sorting, in residual waste	Grocery, plastic bag	Residual waste 240 l
	F1	Manual sorting	Large transparent bag	-
	F2	Manual sorting, optical bag sorting	Purple plastic bag	Co-mingled, 240 l
	F3	Central sorting	Grocery, plastic bag	Residual waste 240 l
Food waste	F0	No sorting, in residual waste	Grocery, plastic bag	Residual waste 240 l
	F1	Manual sorting	Paper bag	Separate, 140 l
	F2	Manual sorting	Biodegradable plastic	Separate, 140 l
	F3	Manual sorting + optical bag sorting	Green plastic	Co-mingled, 240 l

The preliminary results from this study show that separation rates have a large influence on the results. For plastic packaging waste, central sorting can result in larger environmental benefits than separate collection. Particularly in urban areas, high collection rates can be difficult to obtain even with a separate container. In such areas, a central sorting system for plastic may be beneficial, but this requires a high collection rate for food waste.

For food waste, separate container result in highest environmental benefits. Collection of food waste in plastic bags result in relatively high emissions from treatment of reject in the biogas plant. Results from this study suggest that using single use plastic bags to collect food waste should not be recommended.