The best choice: carrier bags made from recycled plastic

Published in January 2009 by the Finnish Environment Institute and the Technical University of Lappeenranta, a comparative study titled OPTIKASSI examines the life cycle impacts of the shopping bags used by the Finnish retail sector, with an emphasis on greenhouse gas emissions. Five types of bag were scrutinised in this study: plastic bags made from virgin raw material, bags made of recycled plastics, paper bags, cotton bags and biodegradable plastic bags.

The aim of the project was to gather information on the greenhouse gas emissions and climatic impacts of different types of carrier bags throughout their life cycle. An additional goal was to identify the best usage and waste management models for the bags. A practical purpose of the OPTIKASSI study was to provide consumers with comparable data on carrier bags, in order to heighten their awareness and assist them in making informed choices.

Backgrounds of the life cycle study

The OPTIKASSI study applied the system-analytic life cycle assessment approach (LCA), which involves the consideration of all process stages involved in the materials procurement, manufacture and disposal of the bags, including the greenhouse gas emissions produced during each stage.

Since shopping bags serve additional purposes besides carrying purchases, their life cycle cannot be examined outside the general social context. The study compares the usage of different carrier bags in Finland, taking account of the impact of behavioural changes on waste management and energy recovery.

To ensure an unbiased comparison, all of the benefits of the different bags were included in the analysis. This was achieved through a compensation system, based on which emissions avoided, by switching to the use of a by-product of the alternative in question, were taken into account (for example, re-using a shopping bag to line a waste bin eliminates the need for producing a new garbage bag). Taking the current situation as the zero base, changes are depicted as either a burden (positive emissions) or mitigation (negative emission).

Results and conclusions

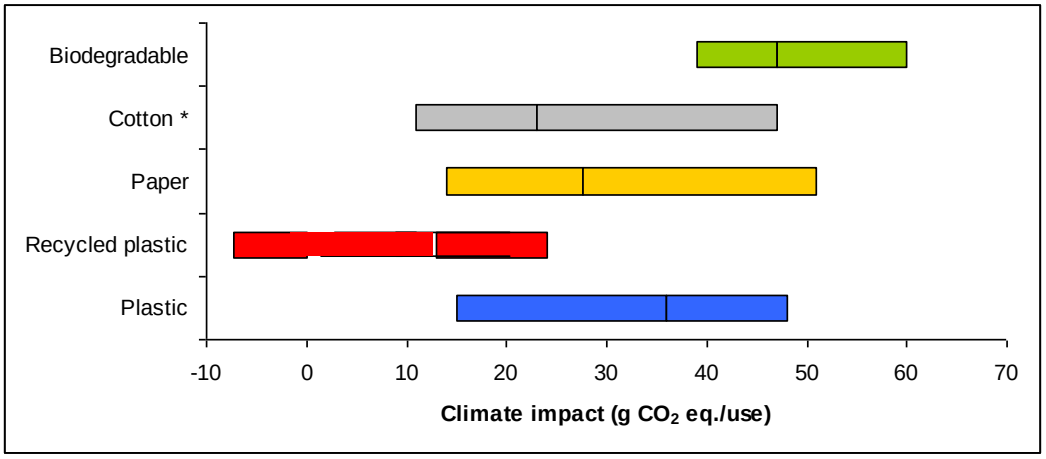
According to the OPTIKASSI study, shopping bags do not account for a significant part of Finnish households' climatic impact. For example, at worst the carrier bags used for 100 shopping trips account for only a fifth of an average day's greenhouse gas emissions (0.06 % of annual per household emissions).

The following table lists the greenhouse gas emissions produced by one bag during its life cycle (source: Finnish Environment Institute).

	Paper	Plastic	Recycled plastic	Biodegradable plastic	Cotton
Total impact, g CO2 equiv./bag	14-51	15-48	-7-24	38-60	1100-3160
Raw material	33 %	87 %	77 %	70 %	87 %
Electricity and heat	22 %	12 %	22 %	3 %	
Waste management	22 %	0 %	0 %	25 %	11 %
Transport	23 %	0 %	1 %	2 %	2 %
Material compensation	-48 %	-29 %	-55 %	-20 %	0 %
Energy compensation	-2 %	0 %	0 %	0 %	0 %
Stored fossile coal	-9 %	0 %	0 %	0 %	-5 %

Table: Contribution of different life cycle stages to the total result based on average source data. In addition, the change interval of climatic impact is shown (confidence interval: 95 %.) Contrary to the tables below, the above results are presented on a per bag basis, disregarding the varying frequency of re-usage for different bag types.

The results of the study show that plastic bags made from recycled material appear to be the most favourable alternative. Unlike the results of earlier studies, cotton bags did not emerge as the best product, the reason for this being the substantial amount of energy and irrigation water required in cotton production, and the resulting greenhouse gas emissions. Biodegradable plastic bags turned out to be the worst alternative due to the fossil ingredients which are added to their material mix to enhance stability. Their biodegradation, whether through composting or as landfill waste, has a negative effect on the climate.



*Graphic: Life cycle climatic impact of different bags in a present-day scenario. The bar depicts a 95 % confidence interval, the upright line indicating the most likely value (median). * Usage of cotton bags: 0.7 - 2 pcs per 100 pcs of other bags*

The graphic above shows the climatic impact resulting from transporting the amount of goods corresponding to 100 single-use bags (source: Finnish Environment Institute). Negative emissions from bags manufactured from recycling material are the result of situations where one shopping bag replaces multiple (up to 2) heavy (14 g) trash bags.

The environmental focus of the OPTIKASSI study rested on climate change, analysing the consumption of non-renewable sources of energy and the usage of water and land (see table below; source: Finnish Environment Institute). No account was taken of additional environmental or other implications. Indicators depicting social ramifications are of particular importance when comparing production in industrialised and emerging countries. These problems mostly apply to the life cycle of cotton bags.

	Plastic	Recycled plastic	Cotton	Biodegradable plastic	Paper	Relation between smallest and largest value
Non-renewable energy (MJ)	1,3	0,31	21	0,88	1	70
Water consumption (litres)	0,12	0,08	357	0,13	1,1	4500
Land usage (m²a)	0,0009	0,0009	0,8	0,01	0,001	900

Table: Environmental effects of shopping bags other than climate effects, per single bag. The applied waste management scenario corresponds to the present situation.

Consumer behaviour plays a decisive role

Shopping bags are part of a greater whole, and it pays for consumers to steer their shopping customs and waste management in a more ecological direction by making a conscious choice over their carrier bags. The most efficient way to reduce the climatic impact of shopping trips is to reduce their number and buy a whole bagful of goods at a time.

Although shopping bags have a low impact on climate change, consumers are demanding products that support an ecologically sound lifestyle. Recycling plastics significantly helps to reduce global warming, and the increased usage of recycled materials in the production of carrier bags is recommended.

Amerplast introduced the first plastic bags made of recycled material as early as 1995. Ever since, we have actively developed our range of bags made from recycled plastics. As part of our product development, we search for ways of improving recycling facilities for the products we have in the market.