s m a r t plastic

A Report on the Carbon Footprint of Plastic Bags

A review of the Life-Cycle Analysis on Common Plastic Bags

In February 2011, The UK Environment Agency published a report, **Life Cycle Analysis on Carrier Bags.**

An assessment across all types of carrier bags

- Conventional plastic
- Hydro-biodegradable plastic
- Oxo-biodegradable plastic
- Cotton/Jute
- Paper

- The UK Environment Agency study shows how plastic bags* are the most environmentally friendly.
- **If these were banned, it would be worse for the environment as the alternatives to plastic bags have a higher Global Warming Potential.**

*Conventional HDPE plastic bag Source: UK Environmental Agency

[2]Based on: Return flight from London Heathrow to Hong Kong (1,750kg CO_2)

CO_2 impact of carrier bags

Everyday actions compared to bags

1 Average daily car trip[1] = **781** bags

1 Long haul flight[2] = **137,000** bags

[1] Based on: 30-mile trip, 12,000 miles per year, 2008 Ford Focus 1.6 (10kg CO_2)

Global Warming Potential

The following shows the GWP of different carrier bags, made from a variety of materials

Bag type	Average bag weight (g)	CO_2 equivalent per 1 kg of bags	CO_2 equivalent per bag (kg)
HDPE vest carrier	8.12	1.578	0.0128
Oxo-degradable vest carrier	8.27	1.750	0.0145
Starch based biodegradable vest	16.49	4.184	0.0690
Paper bag	55.2	5.525	0.305
LDPE 'Bag for Life'	34.94	6.924	0.242
Non-woven PP bag	115.83	21.510	2.491
Woven PP Bag	120	23.088	2.770
Cotton bag	183.11	271.533	49.720
Jute bag	190	273.111	51.891

Global Warming Potential

Global Warming Potential (GWP) gives an indication of gas release which contributes to global warming

Examples of Global Warming Gas:

- **Water vapour**
- **Carbon dioxide**
- **Methane**
- **Nitrous oxide**
- **Others**

Global Warming Potential

Comparison: plastic bags and other bags

How many times do you need to re-use one of these bags to have the same GWP?

HDPE plastic bag **1**

LDPE “Bag for Life” **4**

Paper bag **5**

Non-woven PP Bag **14**

Cotton/jute bag **173**

Global Warming Potential

Comparison: plastic bags and other bags

If carrier bags are re-used (as most of them are), the impact on the environment is greatly reduced.

Bag type	First use	40.28% Second use (UK average)	100% Second use (ideal
HDPE bag	2.082	1.578	0.83
Oxo-biodegradable bag	2.254	1.750	1.00
Starch based biodegradable bag	4.691	4.184	n/a*

*Unlikely to be achievable due to the type of material used

Kg/CO_2 equivalency

Global Warming Potential

Total CO_2 impact of different carrier bags

HDPE plastic bag

oil extraction	7.68g
manufacture	3.584g
transport	0.896g
waste processes	0.65g
Carbon footprint per bag	**12.8g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Oxo-biodegradable plastic bag

oil extraction	8.7g
manufacture	4.032g
transport	1.015g
Waste processes	0.725g
Carbon footprint per bag	**14.5g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Starch based bag

Grown crops	0g*
Extraction/production of raw materials	34.5g
transport	13.8g
Waste processes	20.7g
Carbon footprint per bag	**69g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Paper bag

Grown crops	0g*
Material production/manufacture	228.75g
transport	39.65g
Waste processes	36.6g
Carbon footprint per bag	**305g**

Global Warming Potential

Total CO_2 impact of different carrier bags

LDPE Flexi-loop bag

Grown crops	157.3g
Material production/manufacture	48.4g
transport	16.94g
Waste processes	19.36g
Carbon footprint per bag	**242g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Non-woven PP bag

Oil extraction	1.868g
Manufacture	249.1g
transport	249.1g
Waste processes	124.55g
Carbon footprint per bag	**2491g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Woven PP bag

Oil extraction	2.077g
Manufacture	277g
transport	277g
Waste processes	138.5g
Carbon footprint per bag	**2770g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Cotton bag

Grown crops	0g*
Manufacture	42.262g
transport	4.972g
Waste processes	2.486g
Carbon footprint per bag	**49.720g**

Global Warming Potential

Total CO_2 impact of different carrier bags

Jute bag

Grown crops	0g*
Manufacture	44.11g
transport	5.189g
Waste processes	2.595g
Carbon footprint per bag	**51.891g**

Other comparisons

Other ways to consider the impact

Paper vs Plastic

Paper bags have a much higher level of impact on the environment compared to plastic bags.

Height of 1000 bags	117 cm	10.16 cm
Weight of 1000 bags	63.50 kg	7.26 kg
Shipping/Energy	100%	18%
Fresh water usage	100%	3%
Waste generation	100%	20%
Recyclability	100%	9%

Source: Peer Reviewed Published data: Franklin Associates, David Cornell, et al.
US Environmental Protection Agency. Questions about your Community Shopping Bags: Paper or Plastic
DOE Energy Information Administration

True or False about bags

Myths and facts on plastic carrier bags

Plastic bags are a problem to the environment-both land and sea-if not recycled or disposed of correctly ✓ TRUE

Conventional plastic shopping bags have the greatest environmental impact ✘ FALSE

Conventional plastic shopping bags have the lowest Global Warming Potential (GWP) ✓ TRUE

Plastic used in carrier bag production requires a large amount of the world's oil reserves ✘ FALSE

Plastic used in carrier bag production is generated from a by-product of oil which used to be wasted ✓ TRUE

Heavy duty, hand finished shopping bags are better for the environment ✘ FALSE

Heavy duty, hand finished shopping bags require more resources to be produced ✓ **TRUE**

Bags made from "sustainable" material are better for the environment ✘ **FALSE**

Bags made from "sustainable" materials have to be reused an unrealistic number of times to achieve the equivalent GWP levels of conventional plastic shopping bags ✓ **TRUE**

The way forward

Plastic is

- **useful, light, flexible and durable**
- **relatively cheap to manufacture**
- **a by-product of oil**
- **oil reserves are still abundant**

But to limit its impact on the environment, users can:

- **reuse plastic objects**
- **reduce the amount of plastic required**
- **recycle**
- **incinerate to recover the calorific value**
- **use a biodegrading additive**

Smart Plastic Technologies
555 Allendale Drive, Wheeling, IL 60090
847-940-9635

www.sptweb.com