How to Live the Greenest Way Possible

Science Café

7/8/19

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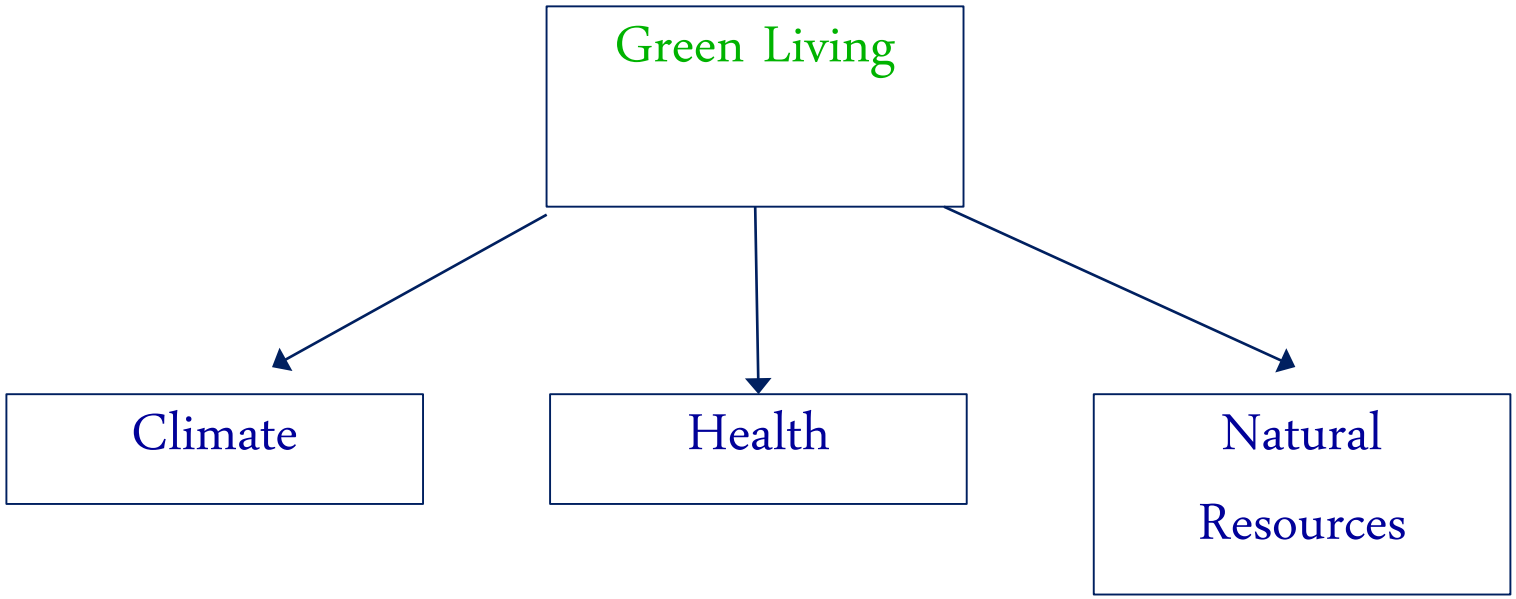
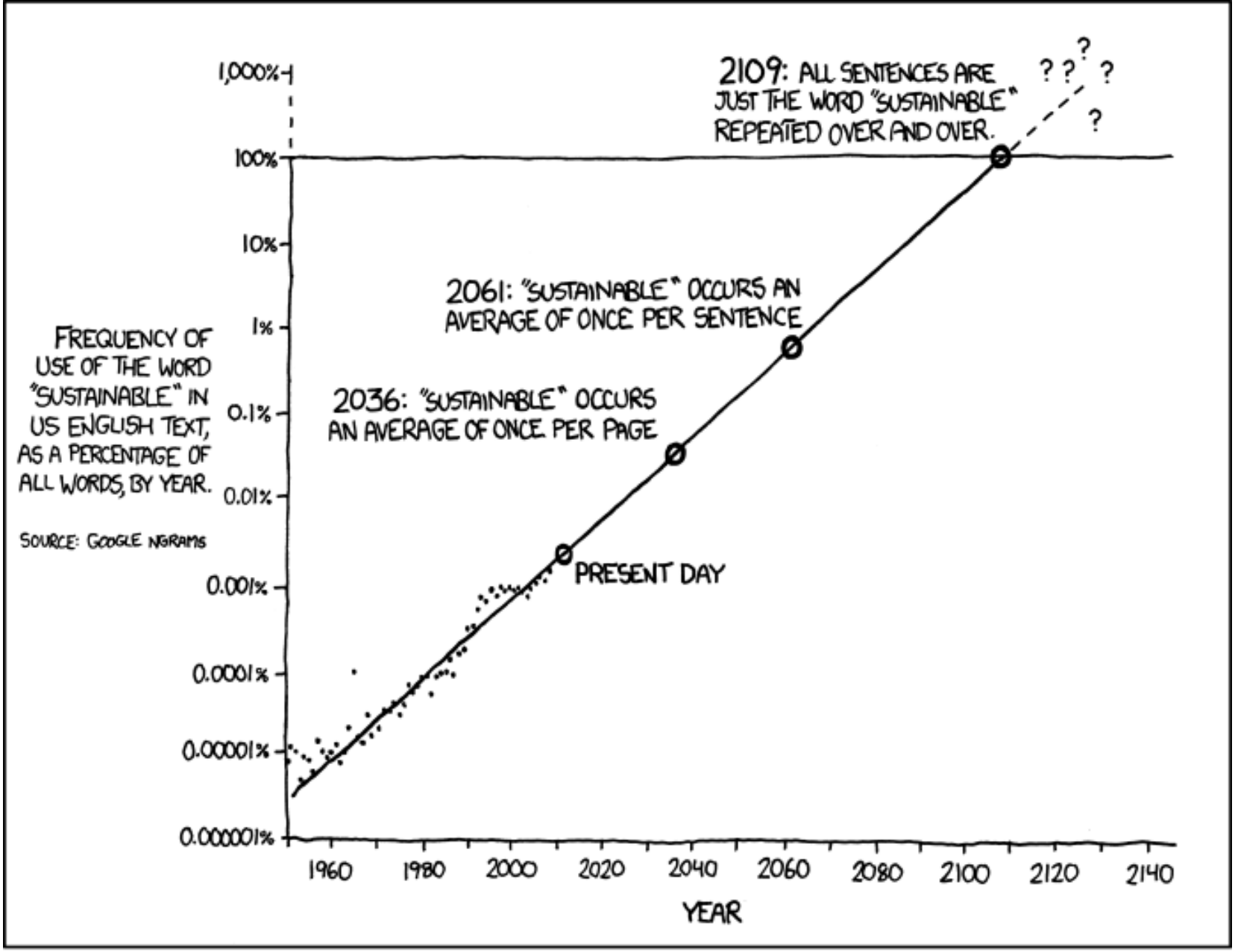
What is Green?

Living healthy lives without compromising the ability of future generations to meet their own needs.





THE WORD "SUSTAINABLE" IS UNSUSTAINABLE.

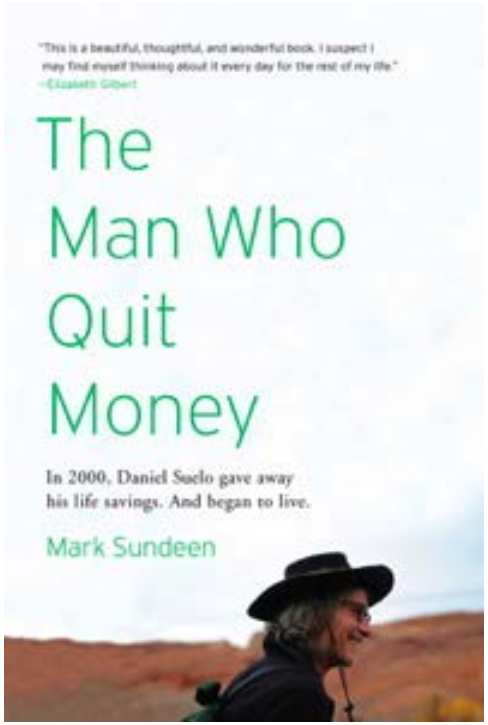
http://imgs.xkcd.com/comics/sustainable.png

U.S.

Homeless by Choice: How to Live for Free in America

More than a decade ago, Daniel Suelo closed his bank account and moved into a desert cave. Here's how he eats, sleeps, and evades the law.

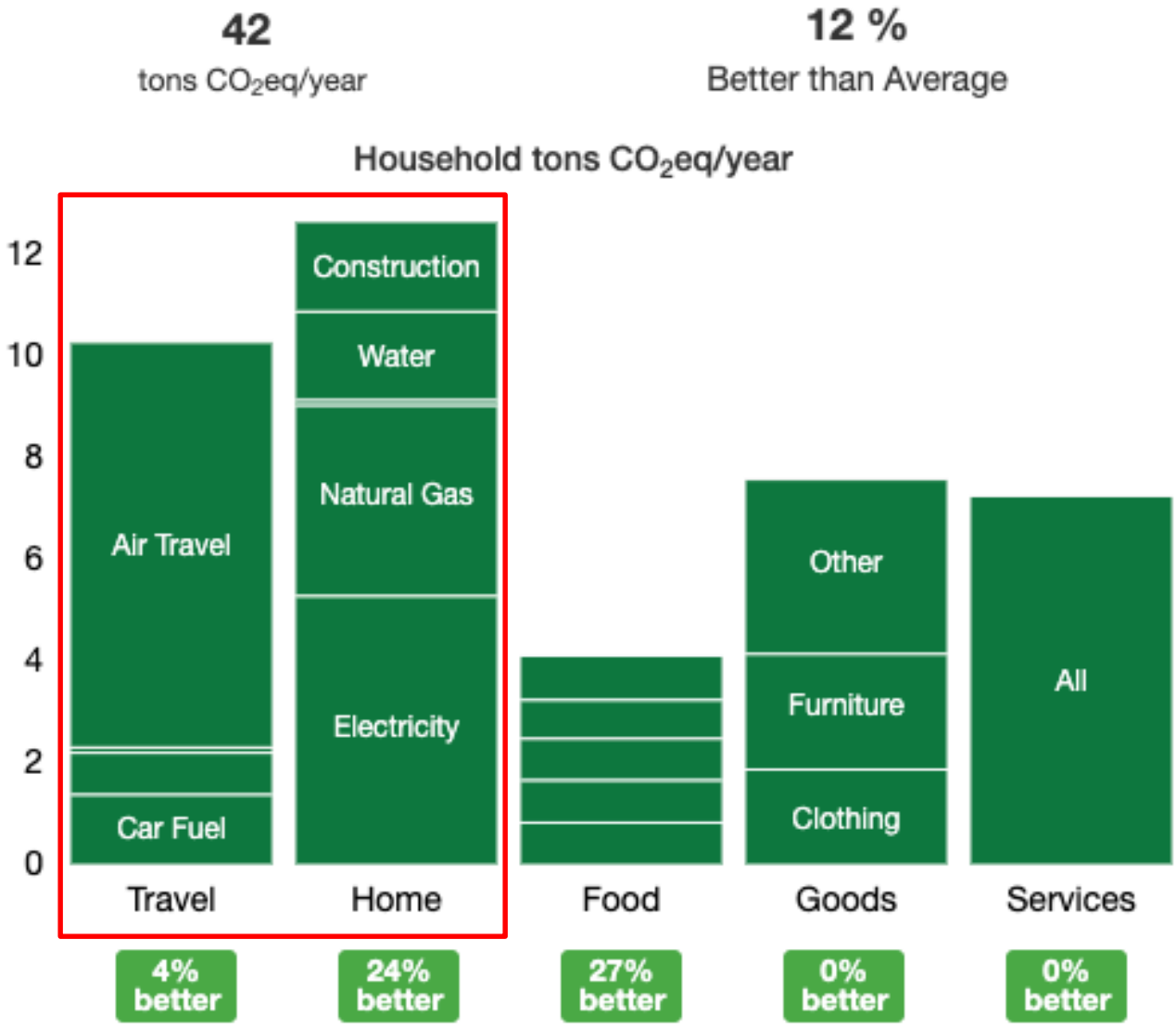
MARK SUNDEEN MAR 7, 2012



Without a car or a home to heat and cool, he produces hardly any carbon dioxide. Foraging for wild raspberries and spearfishing salmon has close to zero environmental cost--no production, no transportation. And although food gathered from a dumpster must be grown and processed and shipped, rescuing it from the trash actually prevents the further expenditure of energy to haul and bury that excess in a landfill.

https://www.theatlantic.com/national/archive/2012/03/homeless-by-choice-how-to-live-for-free-in-america/254118/

Greenhouse Gas Footprint



https://coolclimate.berkeley.edu/calculator

Big Tips for Reducing Greenhouse Gas Emissions

- Drive less (carpool, public transit, bike, etc.)
- Drive more fuel efficient car
- Insulate home
- Adjust thermostat

Consume Less

Life Cycle Analysis:

Evaluating a product's "cradle to grave" impact on an ecosystem

- Can encompass
  - Energy consumption
  - Raw material consumption
  - Greenhouse gas production
  - Hazardous emissions

Cloth vs. Disposable Diapers Debate

1990 – The American Paper Institute finds disposable diapers preferable

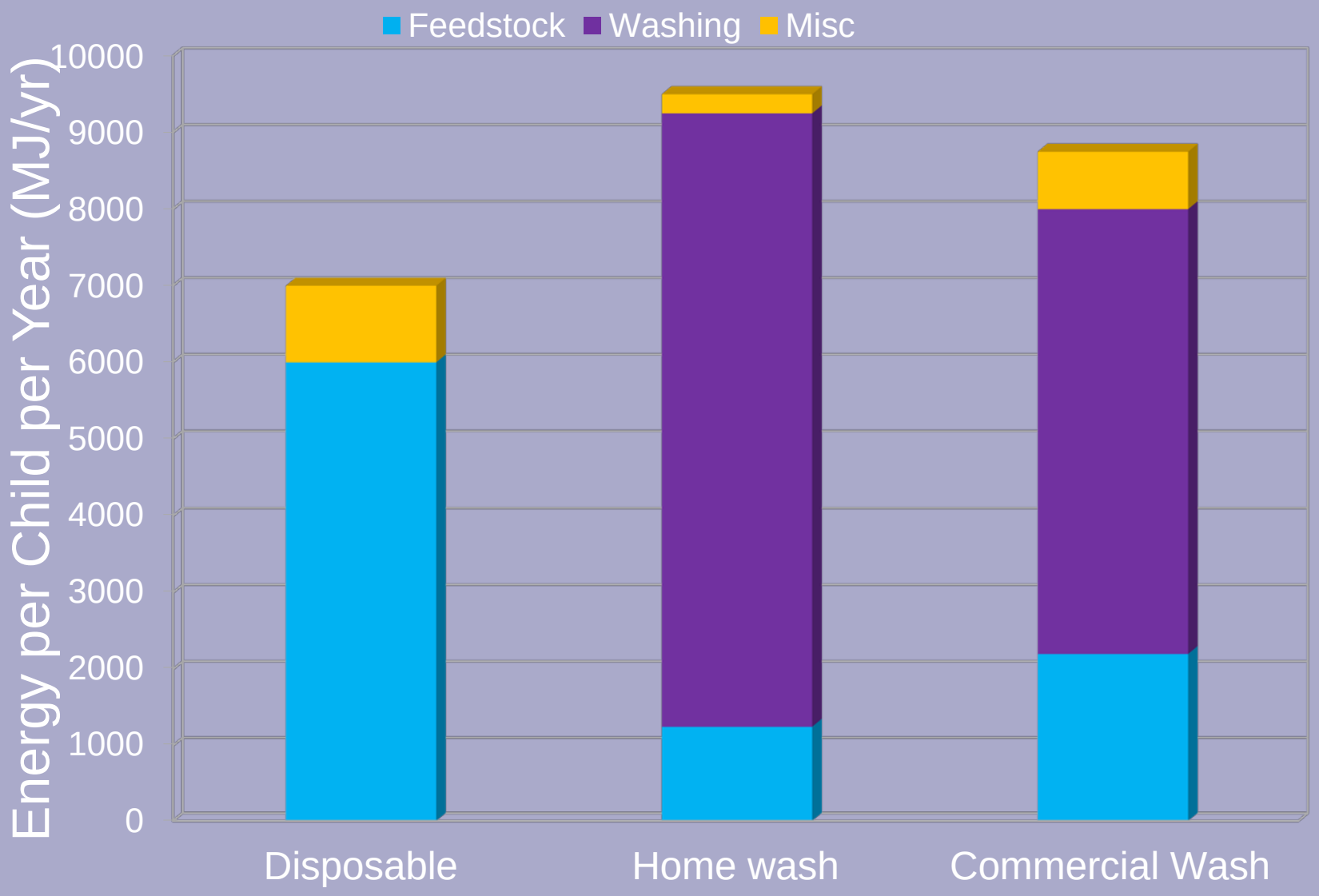
1991 – The National Association of Diaper Services concludes cloth diapers better

1992 – Procter & Gamble reverses conclusion once more.

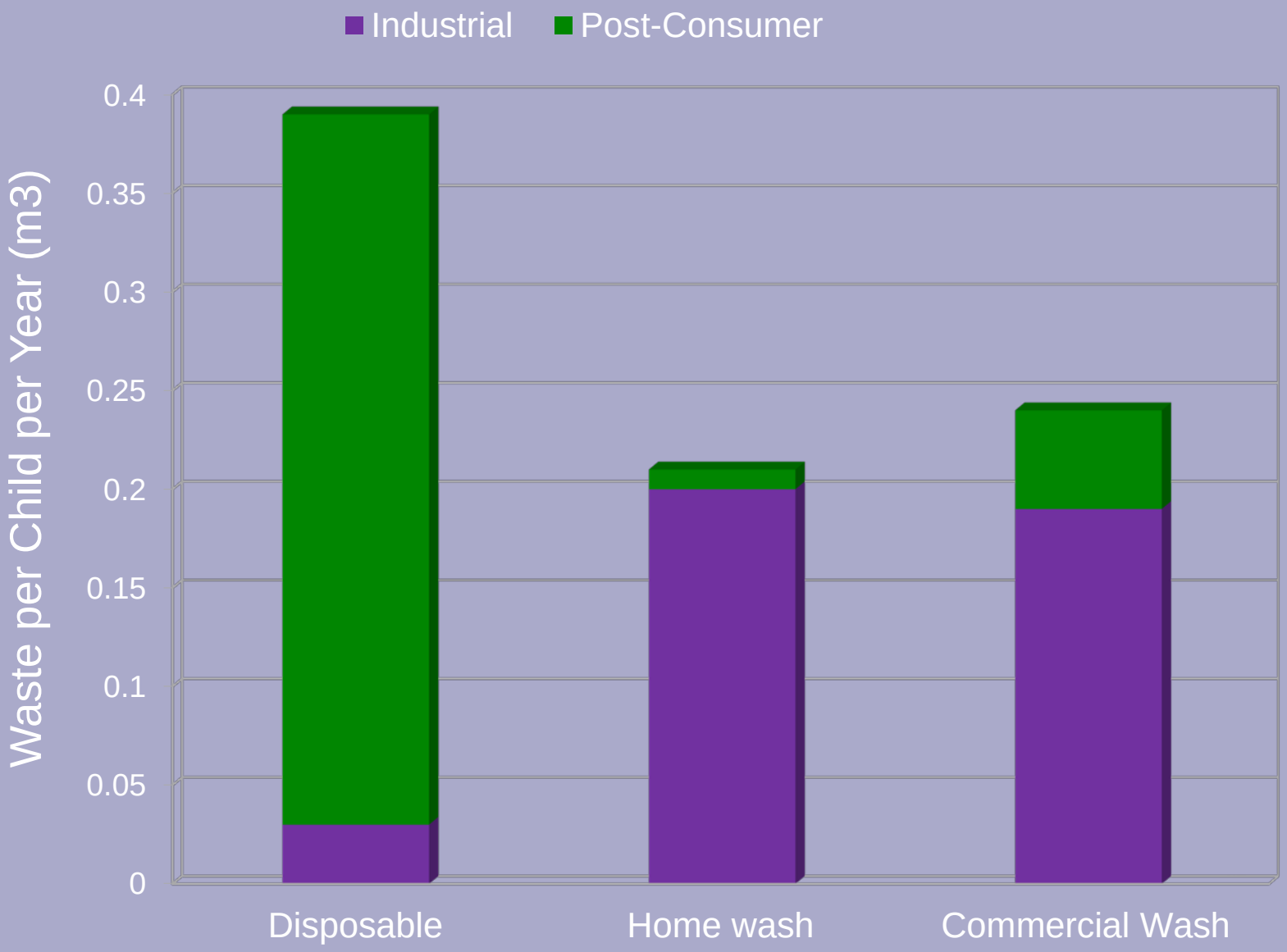
(includes impacts of paper production and production of detergents)

1992 – New study by Franklin Associates, concludes answer depends on water or solid waste.

Energy Usage

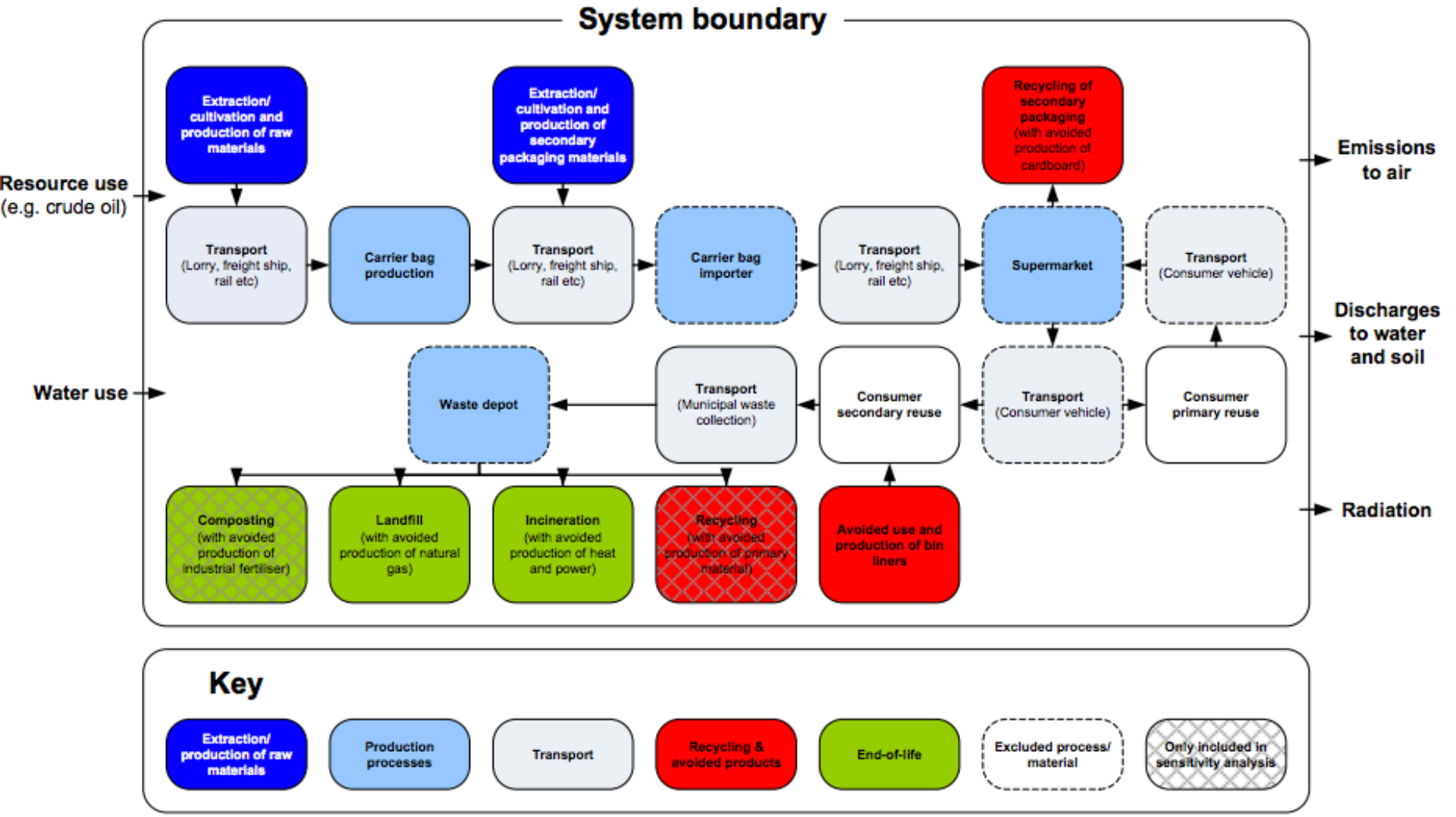


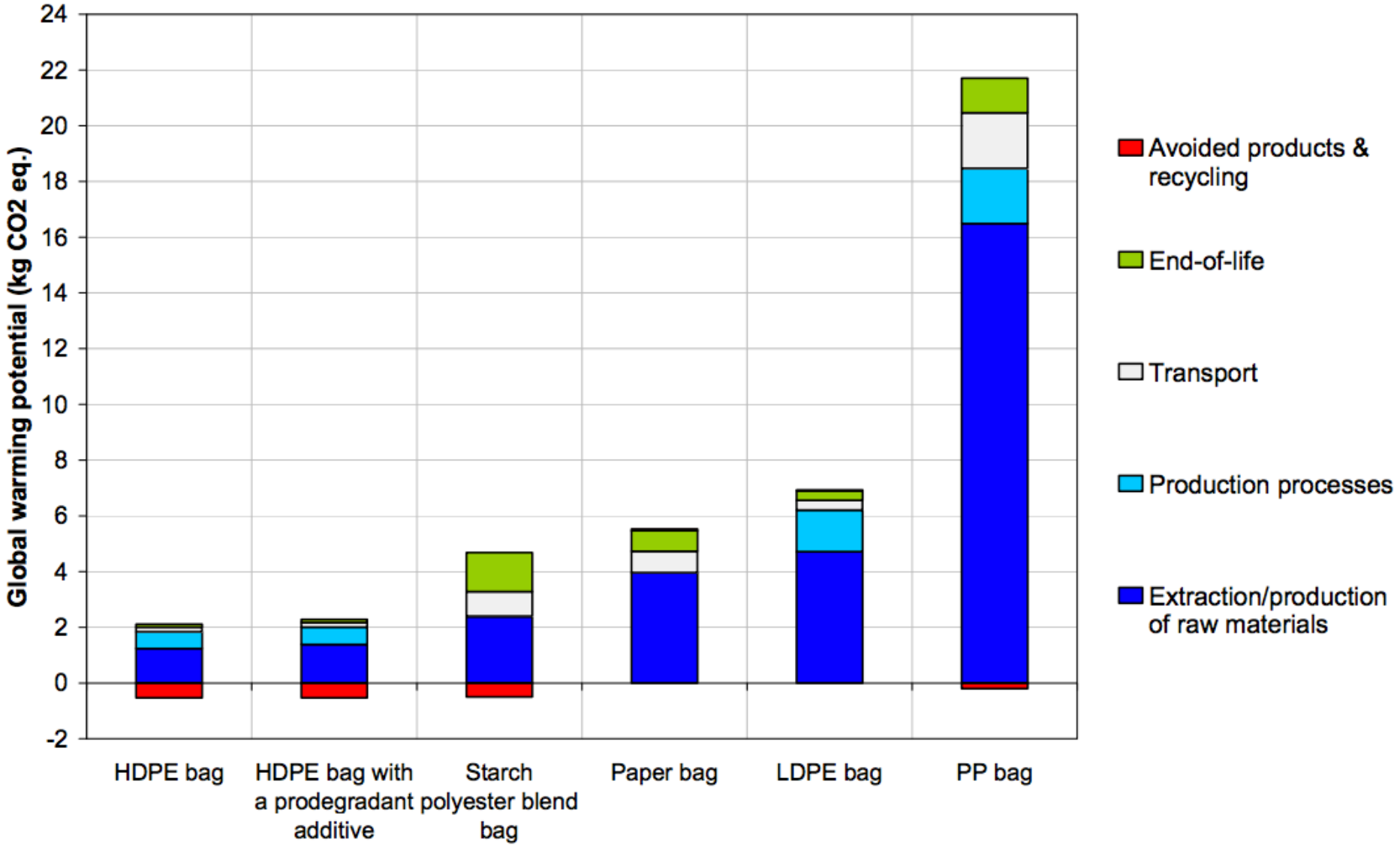
Waste Production

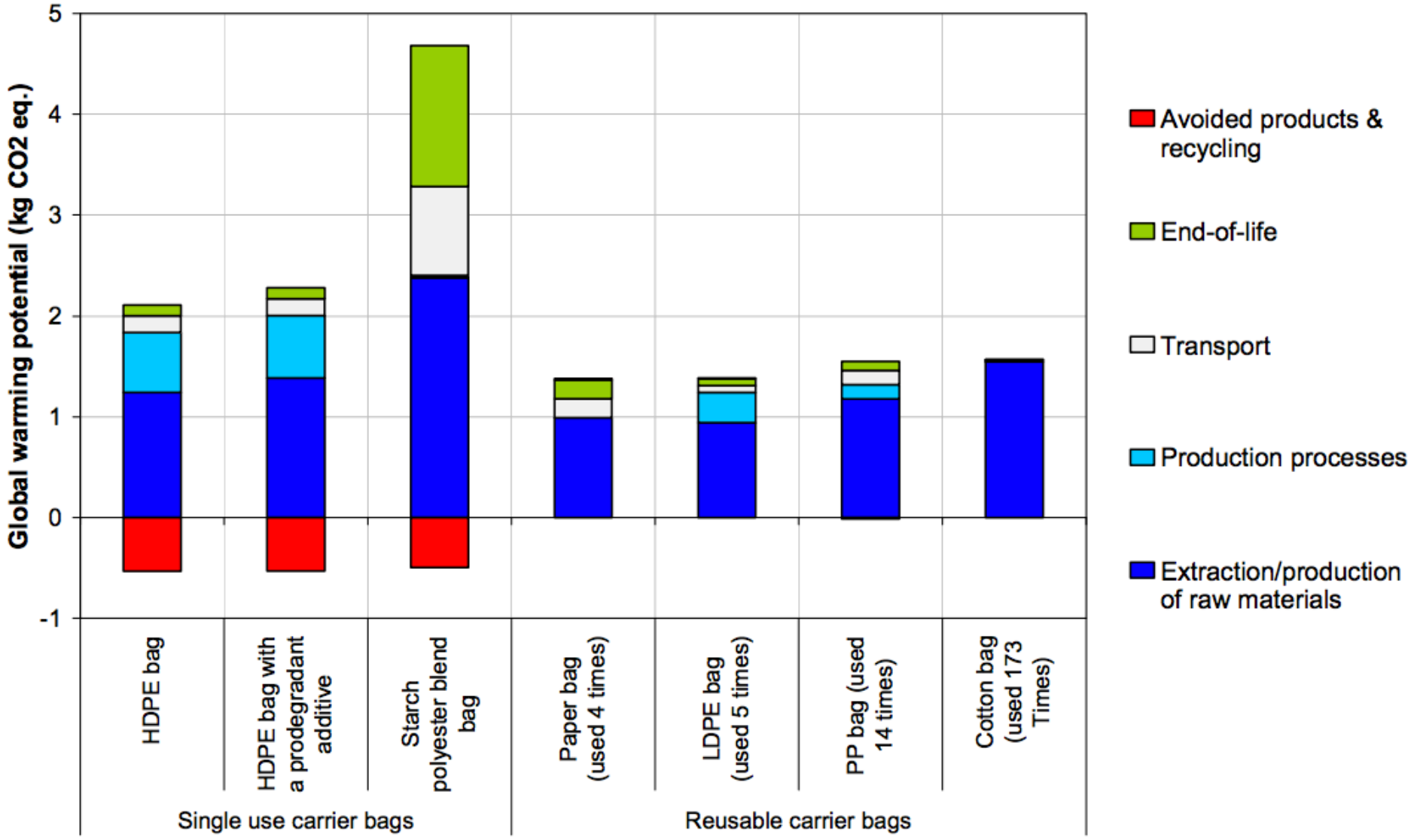


Life Cycle Assessment of Supermarket Carrier Bags, UK EA, 2011

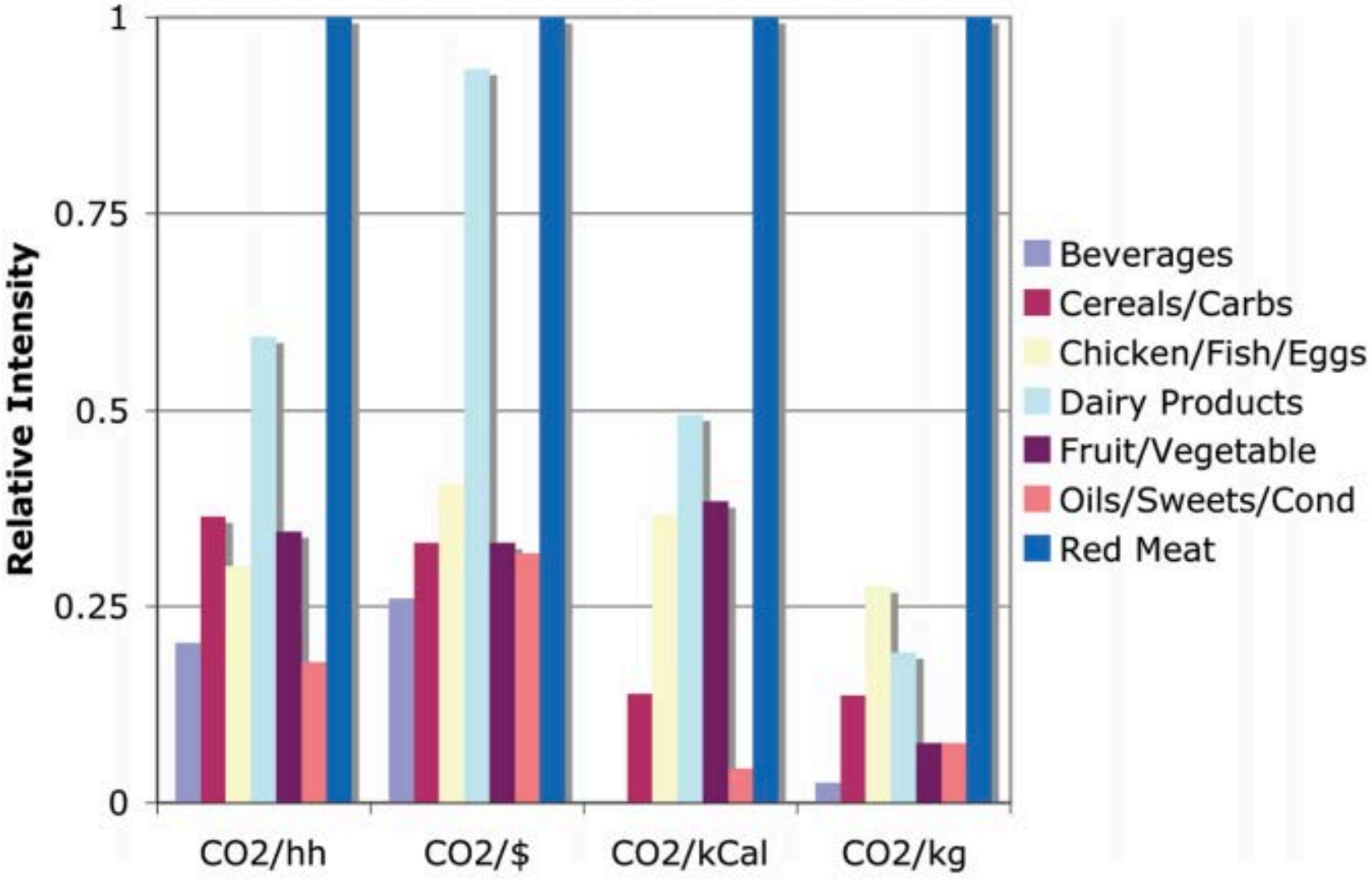
Bag type	Picture example	Weight* [g]	Volume capacity* [litres]
Conventional HDPE bag		7.5 – 12.6	17.9 – 21.8
HDPE with prodegradant additive		5.9 – 8.2	16 – 19.6
Heavy duty LDPE bag ('bag for life')		27.5 – 42.5	19.1 – 23.9
Non-woven PP bag		107.6 - 124.1	17.7 – 21.8
Paper bag		55.2	20.1
Biopolymer bag		15.8	18.3
Cotton bag		78.7 – 229.1	17 – 33.4


System boundary
Extraction/ cultivation and production of raw materials
Extraction/ cultivation and production of secondary packaging materials
Recycling of secondary packaging (with avoided production of cardboard)
Resource use (e.g. crude oil)
Emissions to air
Transport (Lorry, freight ship, rail etc)
Carrier bag production
Transport (Lorry, freight ship, rail etc)
Carrier bag importer
Transport (Lorry, freight ship, rail etc)
Supermarket
Transport (Consumer vehicle)
Discharges to water and soil
Water use
Waste depot
Transport (Municipal waste collection)
Consumer secondary reuse
Transport (Consumer vehicle)
Consumer primary reuse
Radiation
Composting (with avoided production of industrial fertiliser)
Landfill (with avoided production of natural gas)
Incineration (with avoided production of heat and power)
Recycling (with avoided production of primary material)
Avoided use and production of bin liners
Key
Extraction/ production of raw materials
Production processes
Transport
Recycling & avoided products
End-of-life
Excluded process/ material
Only included in sensitivity analysis


Global warming potential (kg CO2 eq.)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
HDPE bag
HDPE bag with a prodegradant additive
Starch polyester blend bag
Paper bag
LDPE bag
PP bag
Avoided products & recycling
End-of-life
Transport
Production processes
Extraction/production of raw materials

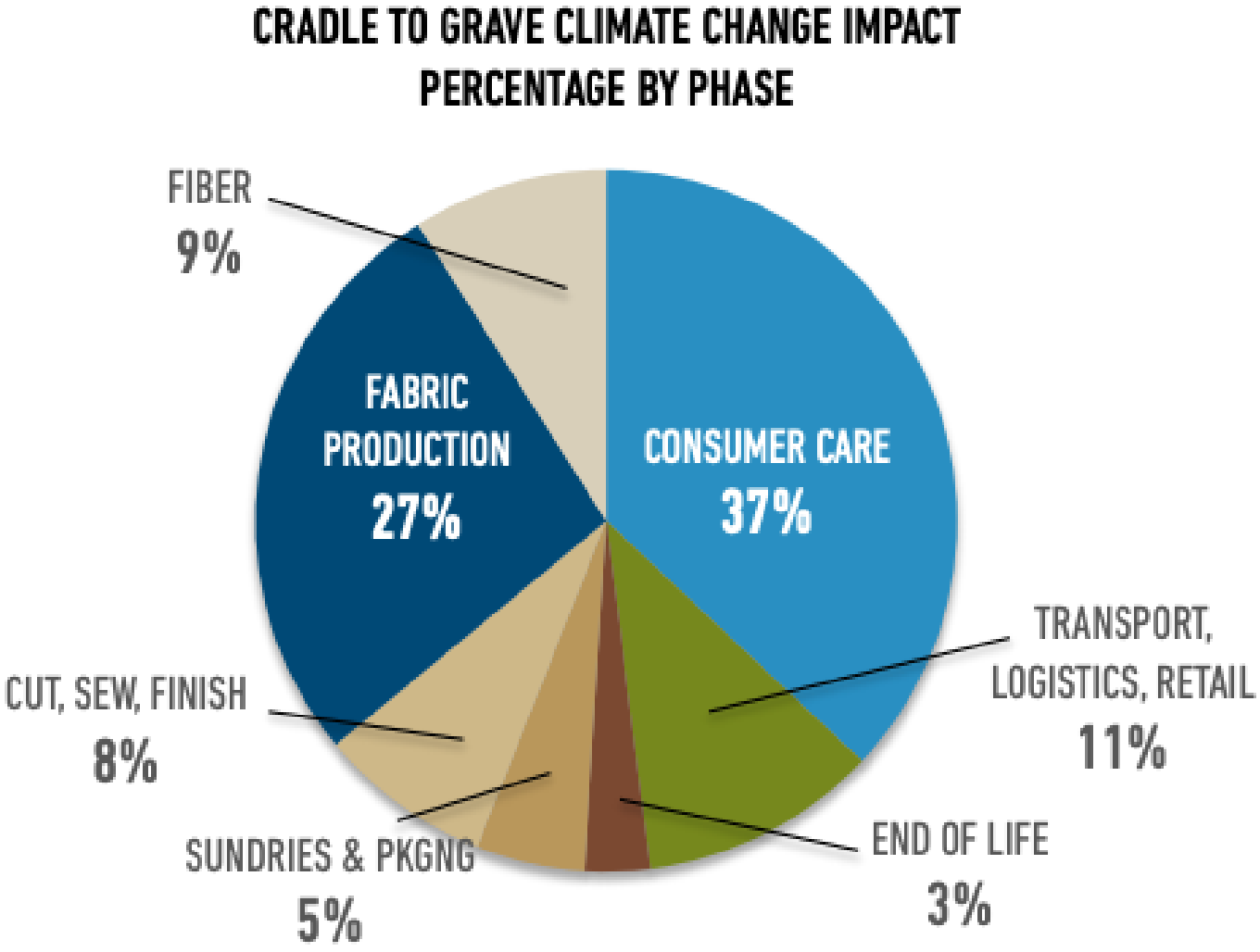

Global warming potential (kg CO2 eq.)
5
4
3
2
1
0
-1
HDPE bag
HDPE bag with a prodegradant additive
Starch polyester blend bag
Paper bag (used 4 times)
LDPE bag (used 5 times)
PP bag (used 14 times)
Cotton bag (used 173 Times)
Single use carrier bags
Reusable carrier bags
Avoided products & recycling
End-of-life
Transport
Production processes
Extraction/production of raw materials

LCA Comparison of Foods



Weber and Matthews, Environ. Sci. Tech., **2008**

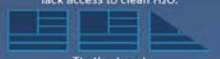
Levi's 501® Jeans LCA



IT'S TIME TO COME CLEAN

THE GLOBAL WATER ISSUE

750 MILLION PEOPLE
lack access to clean H_2O.



That's almost
2.5 times the U.S. population.

Globally, around
1.1 BILLION PEOPLE
don't have access to safe drinking water.

By 2025 it is estimated that
TWO OUT OF THREE PEOPLE

will live in a water-stressed area.

H_2O CONSUMPTION
IN THE LIFE OF A PAIR OF LEVI'S® 501® JEANS

3,781
LITERS

=

3 DAYS
OF HOUSEHOLD USE
IN THE U.S.

WASH LESS

On average, in the U.S., jeans are worn just twice before washing.

In the U.K. and France, jeans are worn nearly three times before washing.

In China, jeans are worn four times before washing.

WASHING JEANS AFTER 10 WEARS REDUCES WATER, ENERGY AND CLIMATE IMPACT BY

77%
in the U.S.

↓

Annual H_2O needs for
1.3 MILLION PEOPLE

Enough for the population of San Diego, Calif., U.S.

75%
in the U.K. and France

↓

Annual H_2O needs for
429,000 PEOPLE

Enough for the population of Nice, France

61%
in China

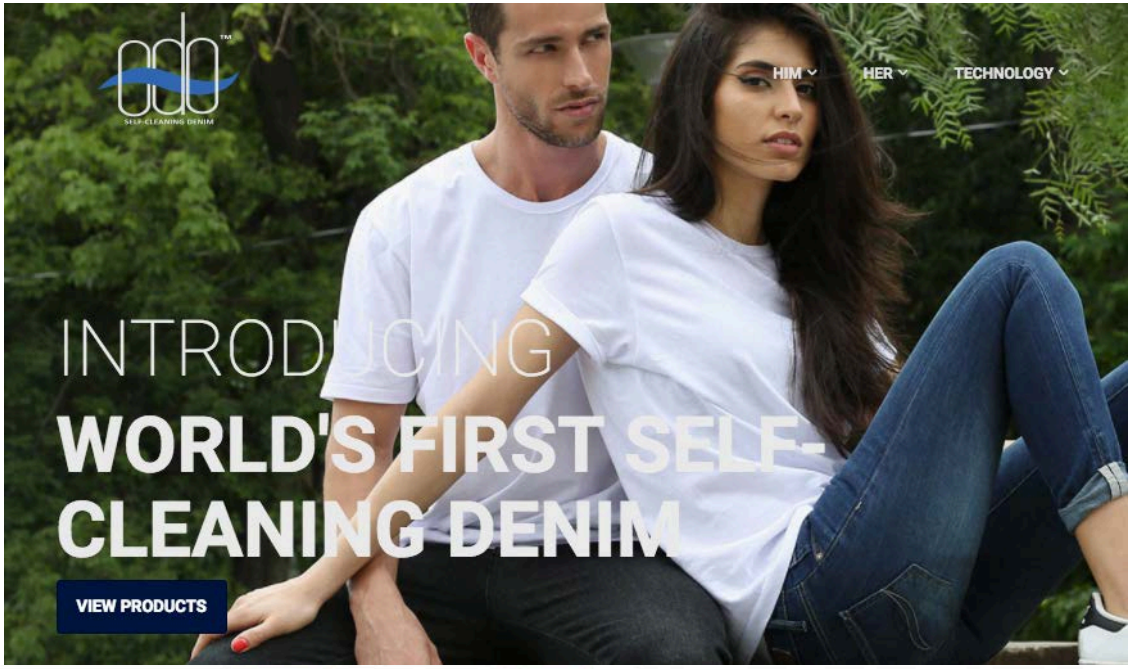
↓

Annual H_2O needs for
20.4 MILLION PEOPLE

Enough for the population of Beijing, China

Sources: Water.org; World Water Council, United Nations Environment Programme (UNEP), Levi Strauss & Co. Lifecycle Assessment Study

“STOP WASHING YOUR JEANS:”
LS&CO. CEO CHIP BERGH AT BRAINSTORM GREEN


HIM
HER
TECHNOLOGY
INTRODUCING
WORLD'S FIRST SELF-CLEANING DENIM
VIEW PRODUCTS

Inspired from Leaves
self-cleans by repelling everyday water & oil based stains.
Inspired from Space
woven with Silver that kills odor permanently.

SKIP LAUNDRY DAY
cut your washing machine some slack

EACH PAIR
HELPS SAVE

7200
GLASSES
OF WATER

Pet Cat LCA

Domestic cat *(Felix silvestris catus)*					
Impact category	Food production	Plastic	Transportation	Waste	Total
CC	860	30	44	8	941 kg CO_2 eq
SA	15				16 kg SO_2 eq
ME	6				6 kg N eq
HTP	16	8	16		41 kg 1,4-DB eq
FPM	2				2 kg MP_{10} eq
TE	17				17 kg 1,4-DB eq
EFW	3				4 kg 1,4-DB eq
RI	7	4	3		15 kBq U235 eq
OAL	714	2			717 m^2
OUL			2		3 m^2
ST	5				5 m^2
WD	6				7 m^3
MD		1	2		4 kg Fe eq
FFD	63	19	15	2	98 kg oil eq

Vs. Dogs

Domestic dog *(Canis lupus familiaris)*

Impact category	Food production	Plastic	Transportation	Waste	Total
CC	2006	30	8	17	2061 kg CO_2 eq
SA	36				36 kg SO_2 eq
ME	14				14 kg N eq
HTP	38	8	3		49 kg1,4-DB eq
FPM	5				5 kg MP_{10} eq
TE	39				39 kg 1,4-DB eq
EFW	7				7 kg 1,4-DB eq
RI	17	4			22 kBq U235 eq
OAL	1665	2			1668 m^2
ST	12				12 m^2
WD	15				16 m^3
ME	1	1			3 kg Fe eq
FFD	146	19	4	1	168 kg oil eq

Herrera-Camacho, et al. 2017 preprints.org

Shim's II
ORGANIC • PROFESSIONAL
CLEANERS
CLEANERS
OPEN
SAME DAY SERVICE
DROP OFF : Before 10:00 AM
PICK UP : After 5:00 PM
Free Pick Up
& Delivery
203-354-5540
WASH & FOLD
RUGS & CARPETS
ORGANIC
DRY CLEANING
EXPERT
LEATHER & SUEDE
Shim's
CLEANERS
CUSTOMER PARKING ONLY
Shim's
CLEANERS
CUSTOMER PARKING ONLY

Tips on Being Green

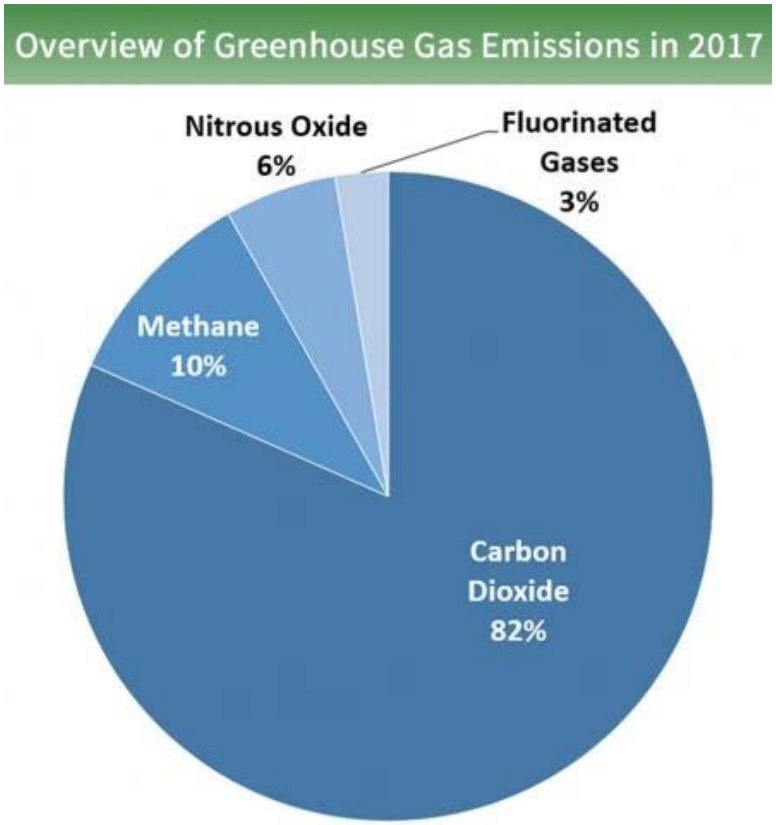
- Keep on reducing consumption
- Eat less meat
- Don't trust Greenwashing terms like "eco-friendly", "Earth-safe", or "Green"
- Calculate your own Carbon Footprint
- Google "XXX Lifecycle Analysis"

Discussion Time

Table 5.1 The environmental impact of the HDPE bag

Method	Impact category	Unit	Total
IPCC 2007	**Global warming potential**	kg CO2 eq	1.578
CML 2 baseline	**Abiotic depletion**	g Sb eq	16.227
	Acidification	g SO2 eq	11.399
	Eutrophication	g PO4--- eq	0.775
	Human toxicity	kg 1,4-DB eq	0.211
	Fresh water aquatic ecotox.	g 1,4-DB eq	66.880
	Marine aquatic ecotoxicity	kg 1,4-DB eq	126.475
	Terrestrial ecotoxicity	g 1,4-DB eq	1.690
	Photochemical oxidation	g C2H4	0.531

Climate


Overview of Greenhouse Gas Emissions in 2017
Nitrous Oxide 6%
Fluorinated Gases 3%
Methane 10%
Carbon Dioxide 82%

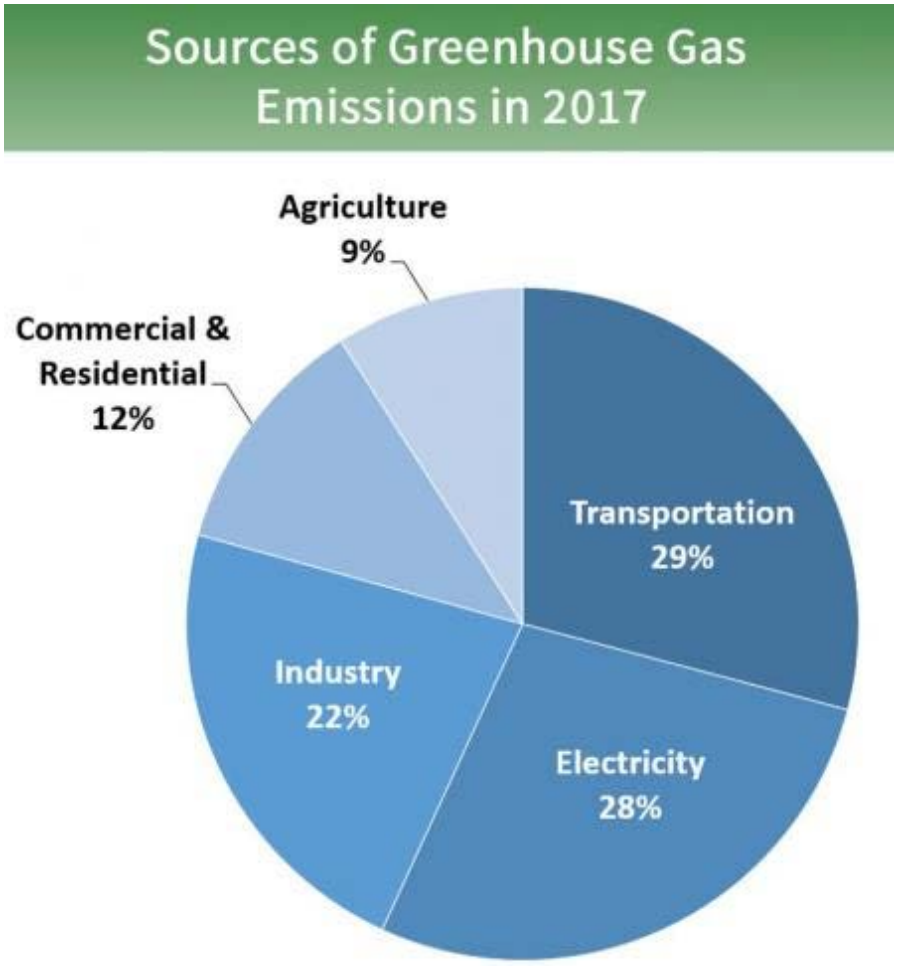

Sources of Greenhouse Gas Emissions in 2017
Agriculture 9%
Commercial & Residential 12%
Transportation 29%
Industry 22%
Electricity 28%

Table 1. Mid-point environmental impact categories.

Category	Symbol	Unit
Climate change	CC	kg CO_2eq
Soil Acidification	SA	kg SO_2 eq
Marine Eutrophication	ME	kg N eq
Human toxicity potential	HTP	kg 1,4-DB eq
Formation of particulate matter	FPM	kg PM_{10} eq
Terrestrial ecotoxicity	TE	kg 1,4-DB eq
Ecotoxicity of fresh water	EFW	kg 1,4-DB eq
Radiative Ionization	RI	kBq U^{235} eq

prints.org) | NOT PEER-REVIEWED | Posted: 4 July 2017 doi:10.20944/preprints201707.0004

Occupation of agricultural land	OAL	m^2
Occupation of urban land	OUL	m^2
Soil transformation	ST	m^2
Water Depletion	WD	m^3
Metal depletion	MD	kg Fe eq
Fossil Fuel Depletion	FFD	kg oil eq