



MADE



People's concern about their families' chemical exposure translates into a multi-billion dollar demand for safer products.

THE MEANING OF ORGANIC FOOD



Source: Beyond Natural and Organic 2010. The Hartman Group



**POLLUTED BY
SINGLE-USE PLASTIC**

FOOD PACKAGING



OUR NETWORK



PACKAGING FUNCTIONS

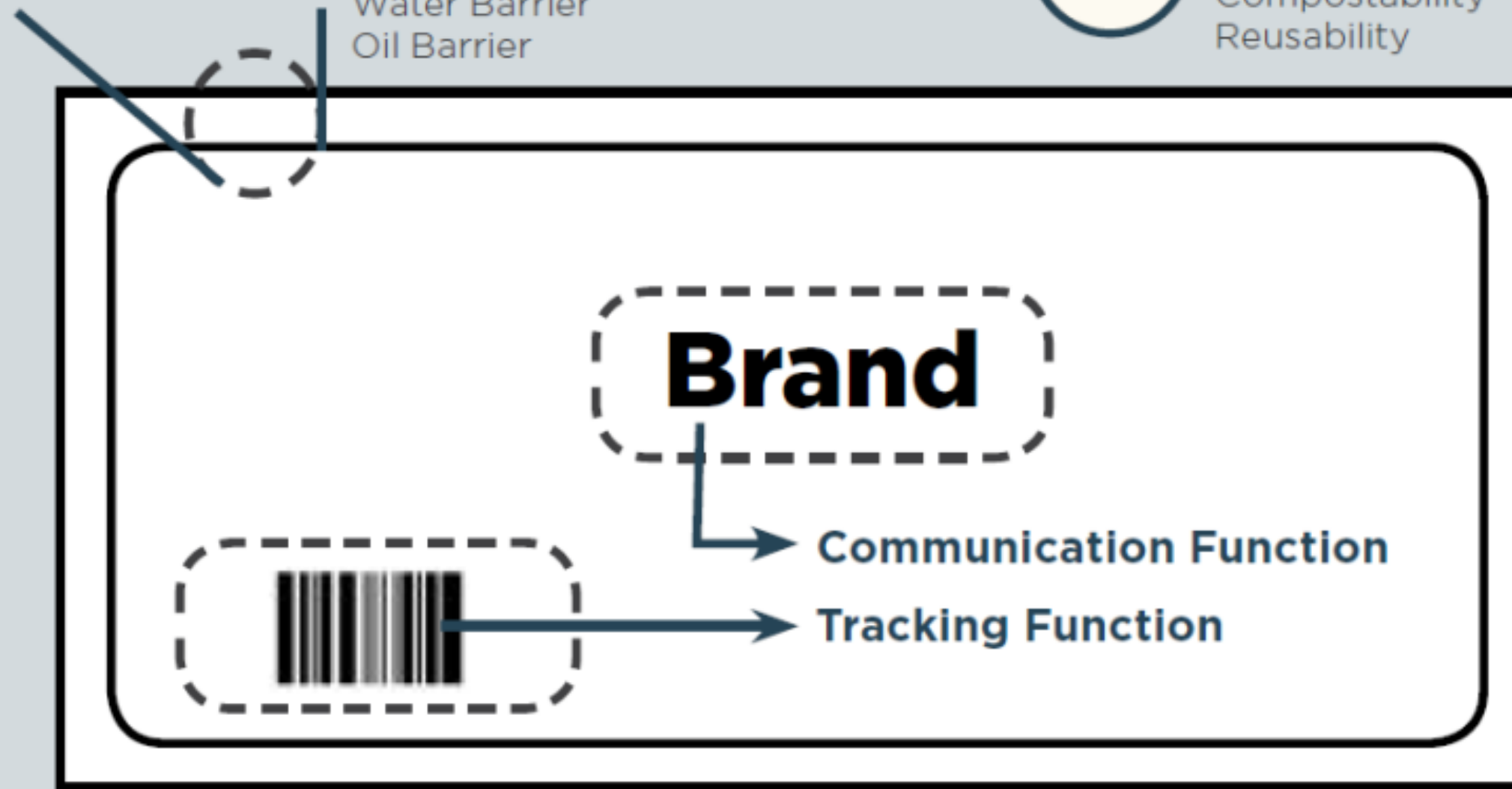
Barrier Functions:

Physical Barrier
UV/Light Barrier
Gas Barrier (O₂, CO₂, C₂H₄, Etc.)
Water Barrier
Oil Barrier



End of life functions:

Recyclability
Compostability
Reusability



MATERIAL CHOICE DRIVES ENVIRONMENTAL IMPACT, COATINGS DRIVE HEALTH IMPACTS



OVER 300 CHEMICALS OF CONCERN IN FOOD PACKAGING

Aluminum
Manganese
Sodium chromate
Potassium dichromate
Bisphenol B
Bisphenol A
Bisphenol S
Diphenolic acid
Bisphenol F
6:2 Fluorotelomer alcohol
8:2 Fluorotelomer alcohol
2-Chlorobuta-1,3-diene

Metal

Perfluorooctanoic acid, ammonium salt
2,3-Epoxypropyl-trimethylammonium chloride
Pentachlorophenol
2,3,4,5-Tetrachlorophenol
anthraquinone
Boric acid
4-Nonylphenol
Ethyleneimine
Methyloxirane
Perfluorobutane sulfonic acid (PFBS)
Perfluoropentane sulfonic acid (PFPeS)
Perfluorohexane sulfonic acid (PFHxS)
Perfluoroheptane sulfonic acid (PFHpS)
Perfluorooctane sulfonic acid (PFOS) (3)
Perfluorobutanoic acid (PFBA)
Perfluoropentanoic acid (PFPeA)
Perfluorohexanoic acid (PFHxA)
Perfluoroheptanoic acid (PFHpA)
Perfluorooctanoic acid (PFOA) (5)
Perfluorononanoic acid (PFNA)

Paper

Vinyl chloride
Sodium perchlorate
Tributyltin oxide (TBTO)
Tributyltin acetate
Dibutyltin (dilaurate)
Dibutyltin dichloride
Antimony trioxide
Silver (nanoparticles)
4-Methyl-m-phenylenediamine
Diphenyl-p-phenylenediamine
Acrylamide
Styrene
4,4'-Methylenedianiline (MDA)
Buta-1,3-diene
Vinyl acetate
Melamine
Bisphenol A diglycidyl ether
Chloroethylene
Isoprene
Chlorinated paraffins (CPs)
1,2-Dichloroethane
Dichloromethane
Styrene oxide
2,3-Epoxypropyl phenyl ether
4-tert-Butylpyrocatechol
4-tert-Butylphenol
p-Cresol
Triphenyl Phosphate

Plastic

Tris(2-Chloroethyl)-phosphate (TCEP)
Dicyclohexyl phthalate
Diphenyl phthalate
Diethyl phthalate (DEP)
Diisobutyl phthalate
Dibutyl phthalate (DBP)
Dihexyl phthalate
Benzyl butyl phthalate
Bis(2-ethylhexyl) phthalate
Diocetyl phthalate
Diisodecyl phthalate
Diisononyl phthalate
Diisononyl phthalate
2-Octyl-(4-dimethyl-amino)benzoic acid
Di(2-ethylhexyl)adipate
4,4'-Methylenebis[2-chloroaniline]
Phenyl salicylate
Benzophenone
Benzophenone-3;
Oxybenzone
4,4'-Dihydroxybenzophenone
1,3-Dihydroxybenzene
2,3-epoxypropyl methacrylate
UV-327

Functional Demands

Less polluting materials

Function without toxics

End of life functions

**INNOVATION
NEED FOR
SAFE FOOD
PACKAGING**

Alternatives and Solutions

Alternative basic materials

Safer functional additives

New processes, technologies, and design

INNOVATION OPPORTUNITIES IN FOOD PACKAGING

ALTERNATIVES TO PETROLEUM BASED PLASTICS



Fiber

Bio-based Plastics

IMPROVED END-OF-LIFE FUNCTIONS



Degradable Plastics

Recycling
Technologies

Reusable
Packaging

SAFER FUNCTIONAL ADDITIVE



Barriers and
Coatings

Shelf Life Extension

Safer Inks and
Smarter Packaging

TRENDS IN BIOBASED PLASTIC PRODUCTION

Company Name	What they Sell	Polymer	End of Life Options
HyO-Cups	Cups	-	Biodegradable
Incredible Foods	Edible food packaing	Agar	Biodegradable
Skipping Rocks Labs	Edible food packaing	Agar	Biodegradable
Evoware	Edible food packaing	Agar	Biodegradable
Loliware	Food Service	Agar	Biodegradable
Paptic	Bags	Cellulose	Composting or recycling with paper
Smart Solve	Bags/Films	Cellulose	Biodegradable, Water soluble
Futamura	Film Supplier	Cellulose	Composting or recycling with paper
Tidal Vision	Coatings	Chitosan	Biodegradable
Gevo	Resin Supplier	PET	Recycled with PET
Braskem	Resin and Chemical Supplier	PET, PE	Recycled with traditional plastics
Mango Materials	Resin Supplier	PHA	Biodegradable
Danimer Scientific	Resin Supplier	PHA	Biodegradable
BioPlastech	Resin Supplier	PHA	Biodegradable
Full Cycle Bioplastics	Resin Supplier	PHA	Biodegradable
Synbra	Insulating Materials	PLA	Composting
Grow Plastics (Coramat)	Food Service and retail	PLA	Compostable
Avani Eco	Food Service	Starch	Biodegradable
BiologiQ	Resin Supplier films and Bags	Starch	Depends on the other polymers
Greencell Foam	Insulating Materials	Starch	Compostable

BIOBASED POLYMERS AND ADDITIVES IN APPAREL



<https://www.safermade.net/textile-report>

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