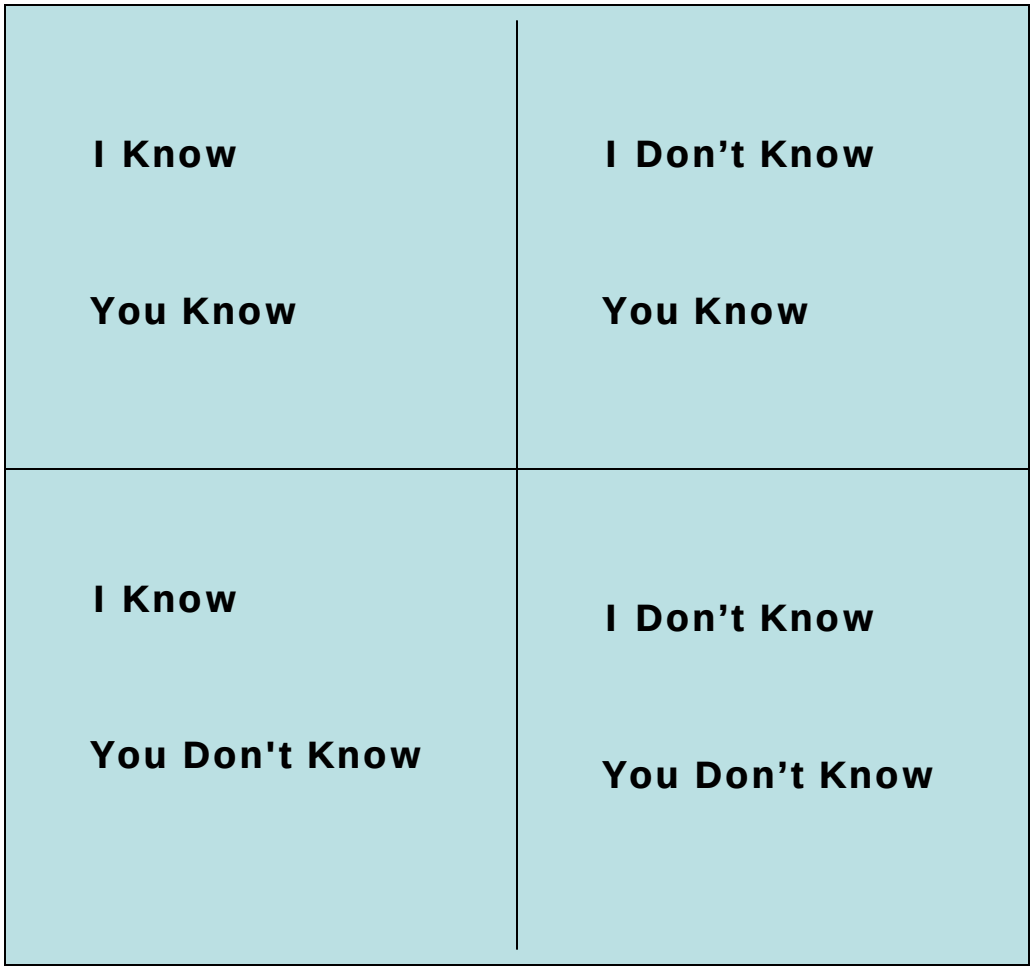

Zero Waste
is the goal.

Tom Wright
(925) 376-0327

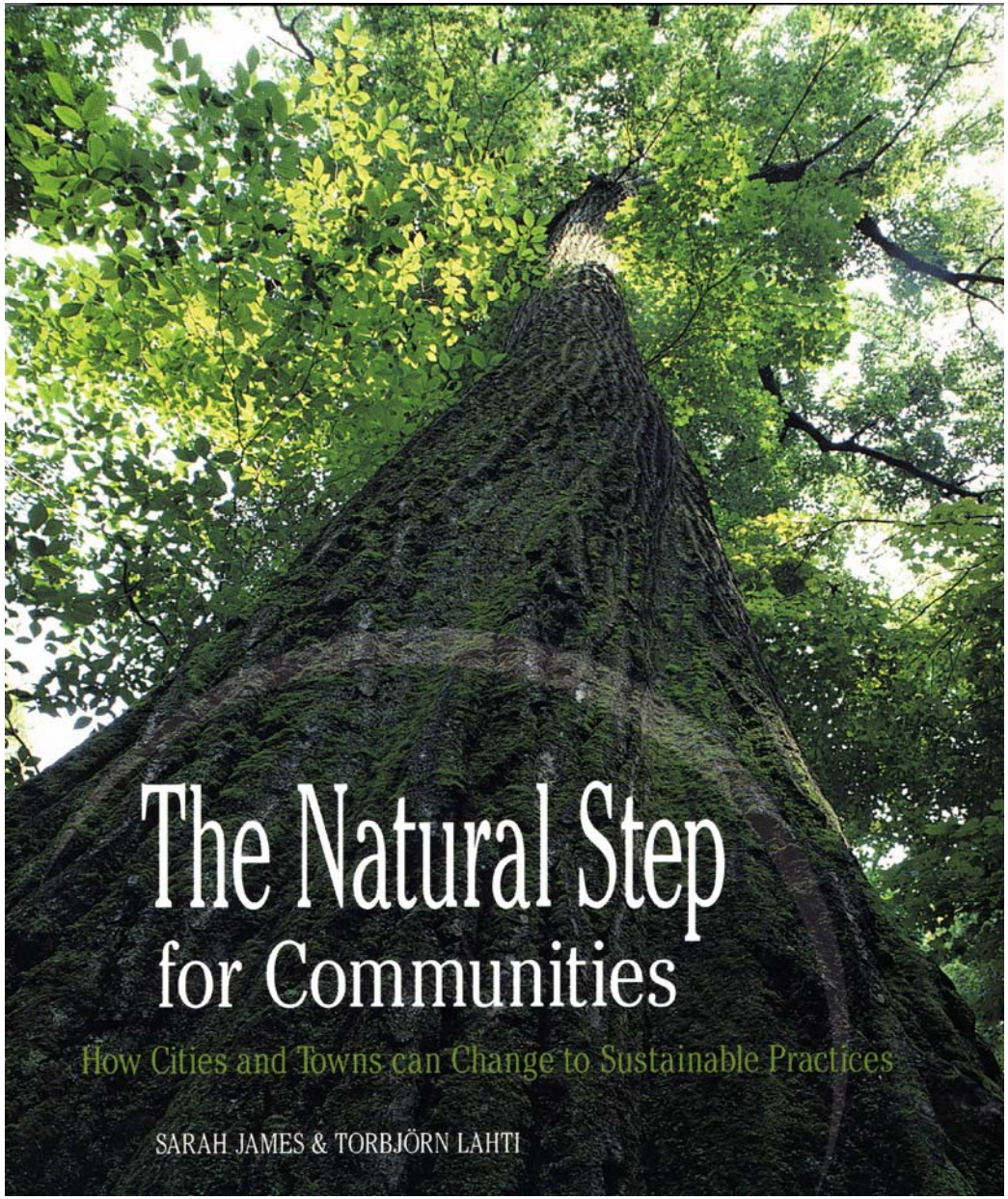
# Green Supply Chain Example

# The Johari Window



# Zero Waste is the Goal.

- Zeri.org:
- Transition to no landfill
- Then no incineration (molecular garbage in the air)
- Then no mining of toxic materials


The Natural Step
for Communities
How Cities and Towns can Change to Sustainable Practices
SARAH JAMES & TORBJÖRN LAHTI

# The Idea of a System

A system is a collection of parts which interact with each other to function as a whole.

# A Green Claim Assumes …

**The earth is a single living system.**

- **Open to energy from the sun**
- **Closed to matter**

"Provocative, and could well provide one viable answer to the wake-up call that Rachel Carson sounded . . . in *Silent Spring*."
—*SAN FRANCISCO CHRONICLE*

# BIOMIMICRY

## Innovation Inspired by Nature

JANINE M. BENYUS

Now a two-hour public television special on
*The Nature of Things* with David Suzuki

# The principles of the science of ecology determine the validity of a green claim.

The author of Biomimicry, Janine Benyus explains ecology:

Nature runs on sunlight.
Nature uses only the energy it needs.
Nature fits form to function.
Nature recycles everything.
Nature rewards cooperation.
Nature banks on diversity.
Nature demands local expertise.
Nature curbs excesses from within.
Nature taps the power of limits.

# Sustainability:
# 2 simple rules to follow

- Live off of current solar income

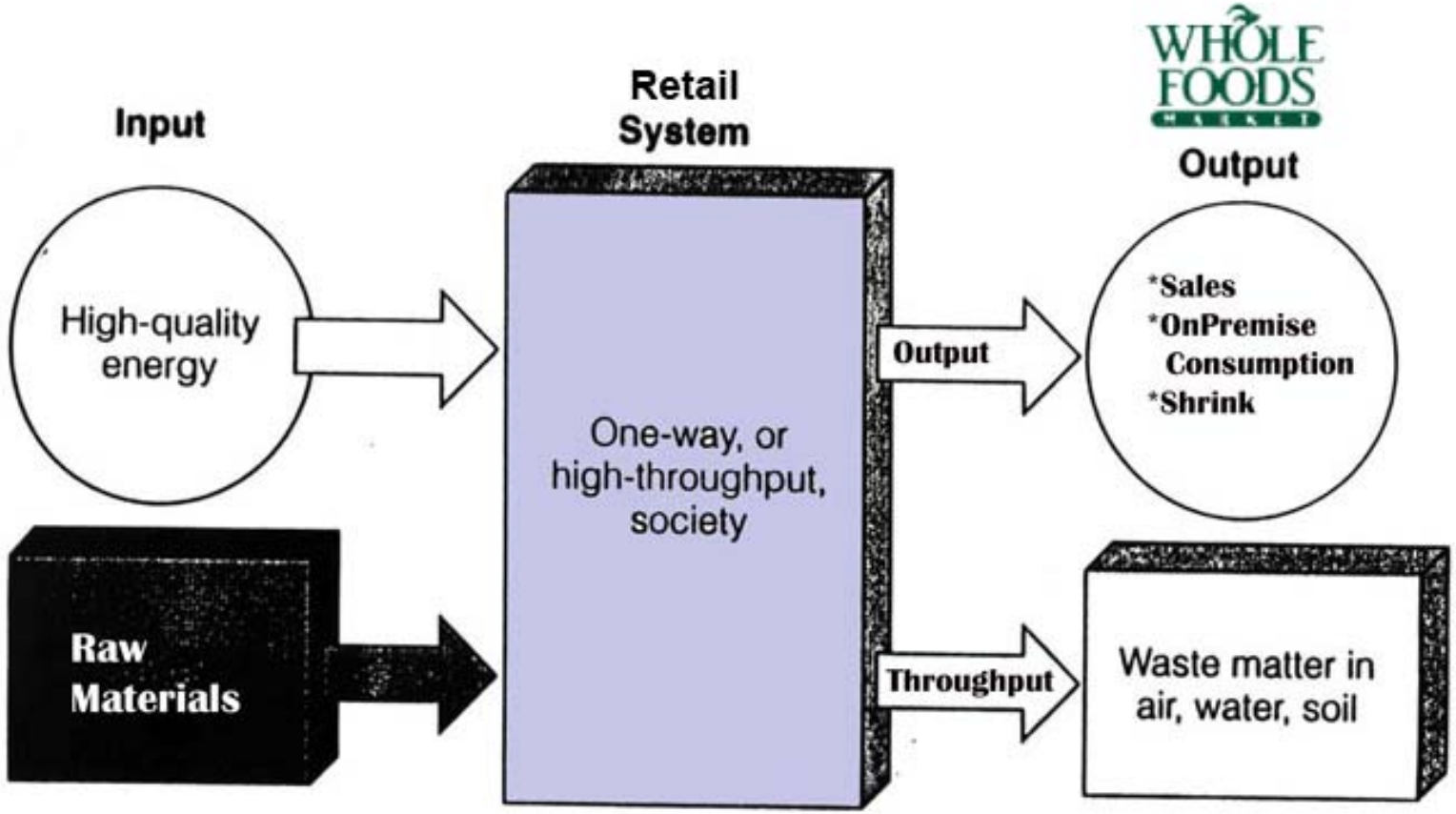
- The cyclic principle: waste = food for something else; there is no bioaccumulation of persistent human-made molecules

# The Cyclic Principle

- There is no “away” : throw away is not an option.
- There’s no “end of life” – just everything is a nutrient in a closed loop system.
- Everything has a “next life”.

# Input Output Throughput

All stores and facilities have energy and material input, output and throughput (often what we call “waste”).




**Waste matter in air, water and soil needs to be food for something!**

# “Sinks” for throughput.
(a term for the destination of a flow.)

- Recycling: it becomes itself again
- Composting: top soil amendment
- Water (includes oceans, rivers, sewers, etc.)
- Landfill
- Air (includes incineration)
- Crust of the earth

# What flows can be measured?

- Are emissions rising?
- Are soils more contaminated?
- Is water more polluted?

**Special Thanks to the**

**Algalita Marine Research Foundation (AMRF)**

**For significant contributions to this summary presentation, and for their stewardship.**

# Recent Headlines

- Great North Pacific Ocean
  Plastic Garbage Patch

- **Some plastics can't be recycled because there is not a market** ( Seattle )

- **Compostable plastic a challenge to compost** (Hawaii)

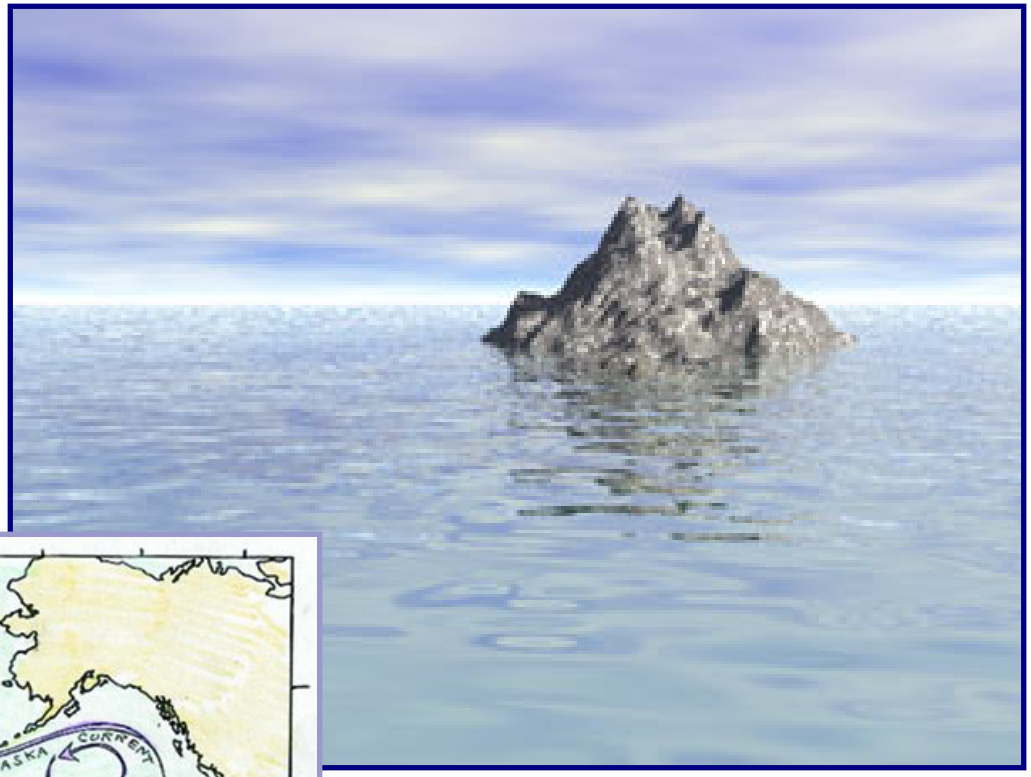
# *Fossil Plastic is Polluting our Ecosphere at an Alarming Rate*

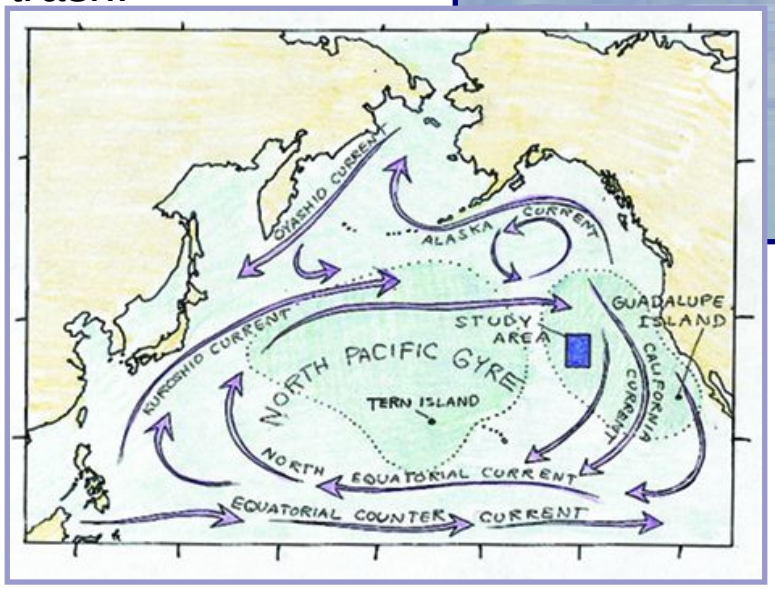
We can't close our eyes anymore and pretend it "goes away".

*It doesn't go away-* "Every piece of fossil plastic ever manufactured still exists!"

# Garbage Island in Pacific Ocean

*An entire "island" composed of trash has been discovered in the Pacific Ocean between California and Hawaiian islands . It is as large as the Central Europe. Fossil plastic objects prevail among the trash.*





# Plastics are Forever

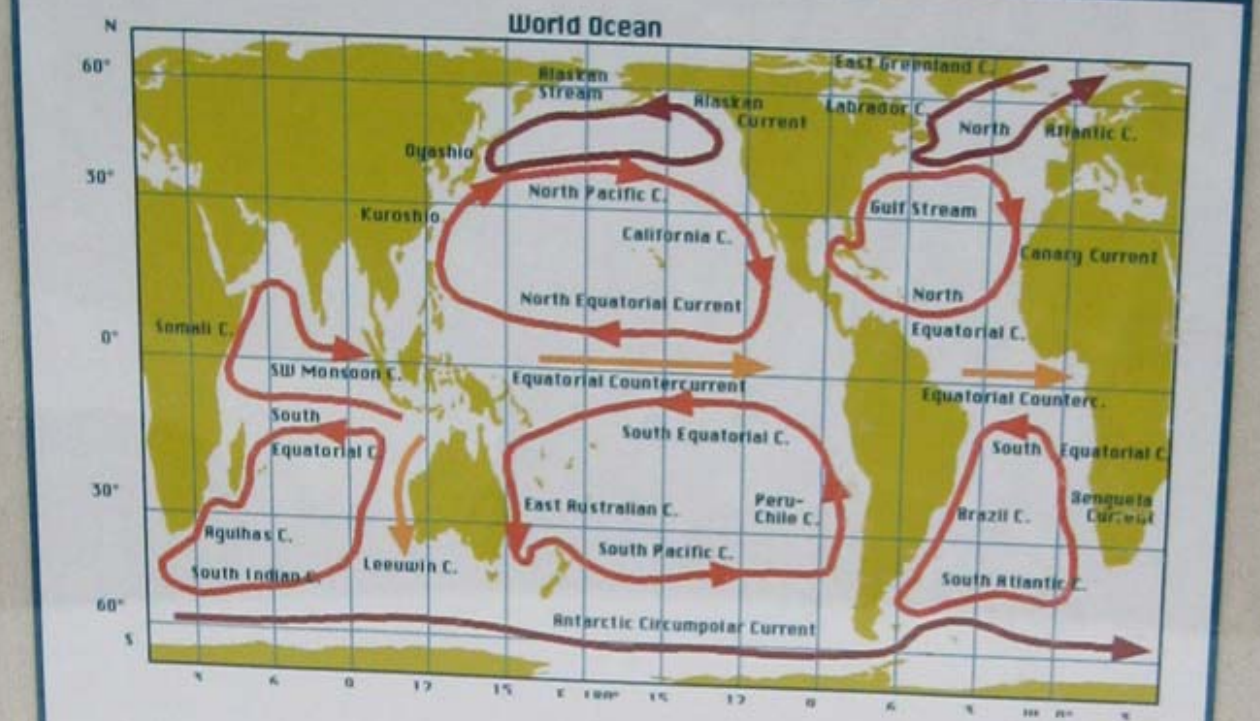
Fossil plastics, like Diamonds are forever.
-Captain Charles Moore (AMRF)

"An estimated 500 billion to 1 trillion bags are used annually worldwide.

100,000 whales, seals, turtles and other marine animals are killed by plastic bags each year worldwide."

(source Planet Ark)

# Plastic Debris on the Move




## A Floating Landfill in our Ocean Gyres

Oceanic gyres are circular ocean currents created by rotating high pressure systems. Nine major oceanic gyres around the world have become accumulation zones for plastic debris, drawing hundreds of tons of plastic into their centers.

***Circular oceanic currents (Gyres) around the world have drawn hundreds of tons of plastics to their centers.***

***From AMRF***

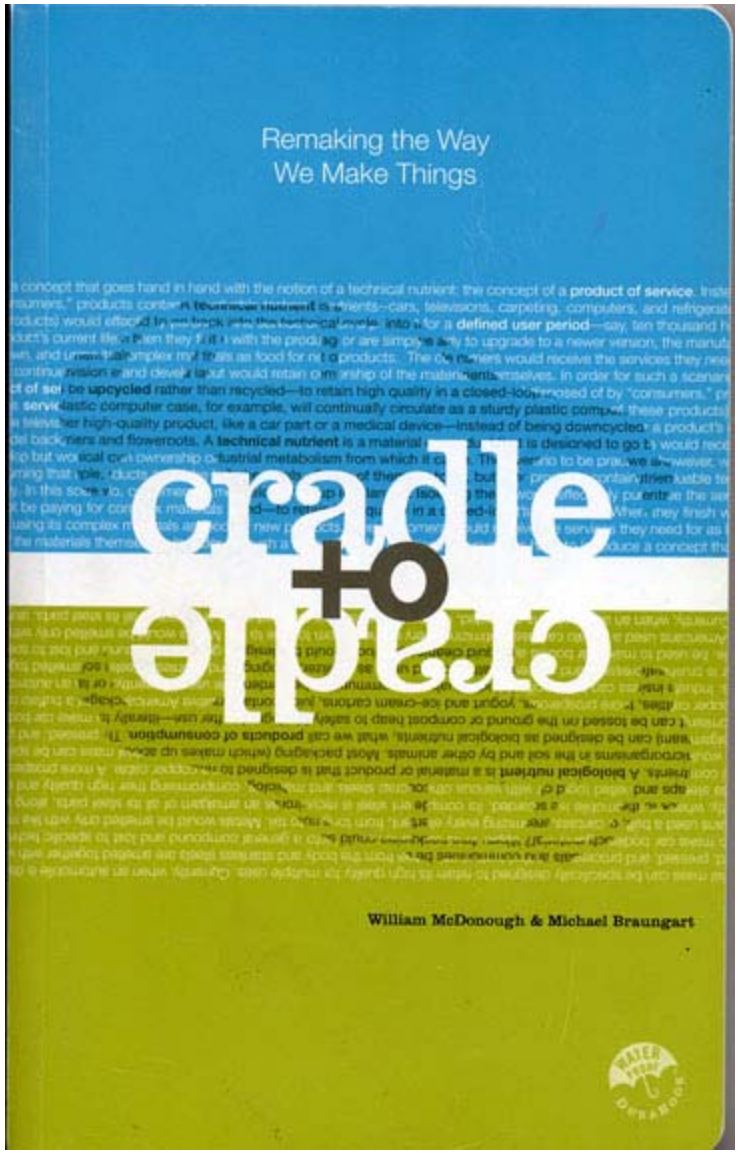
# What is recycling?

- Involves the separation and collection of materials for processing and remanufacturing into new products .

- A material becomes itself again, and again.  (e.g. clear glass)

# Infrastructure

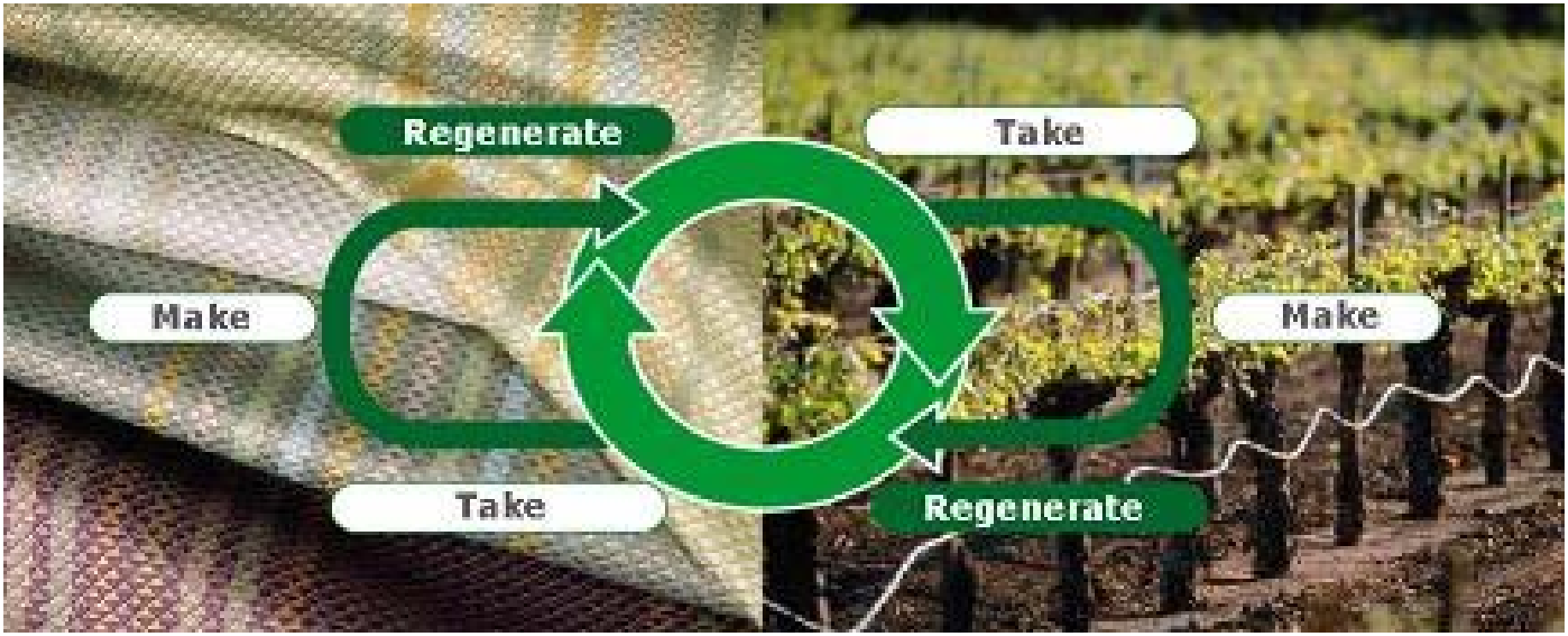
- How many US have curbside for beverage containers:  50% - 60%
- How many states have deposit laws: 18 (and they recycle at 3 times the rest)
- How many industrial scale composters take food wastes: 25 with grinders
- How many cities take food waste compostables at curbside: 50 - 100


Remaking the Way
We Make Things
cradle
to
cradle
William McDonough & Michael Braungart

# Bill McDonough

- “There are two fundamental frameworks for metabolism: biological and technical nutrients.  So we ask a company, ‘Are your materials safe and healthy for human and ecological systems?  Do you have reverse logistics – do we know where this stuff comes from, where it goes, and how to get it back and it onto closed, zero-waste cycles?’  ”

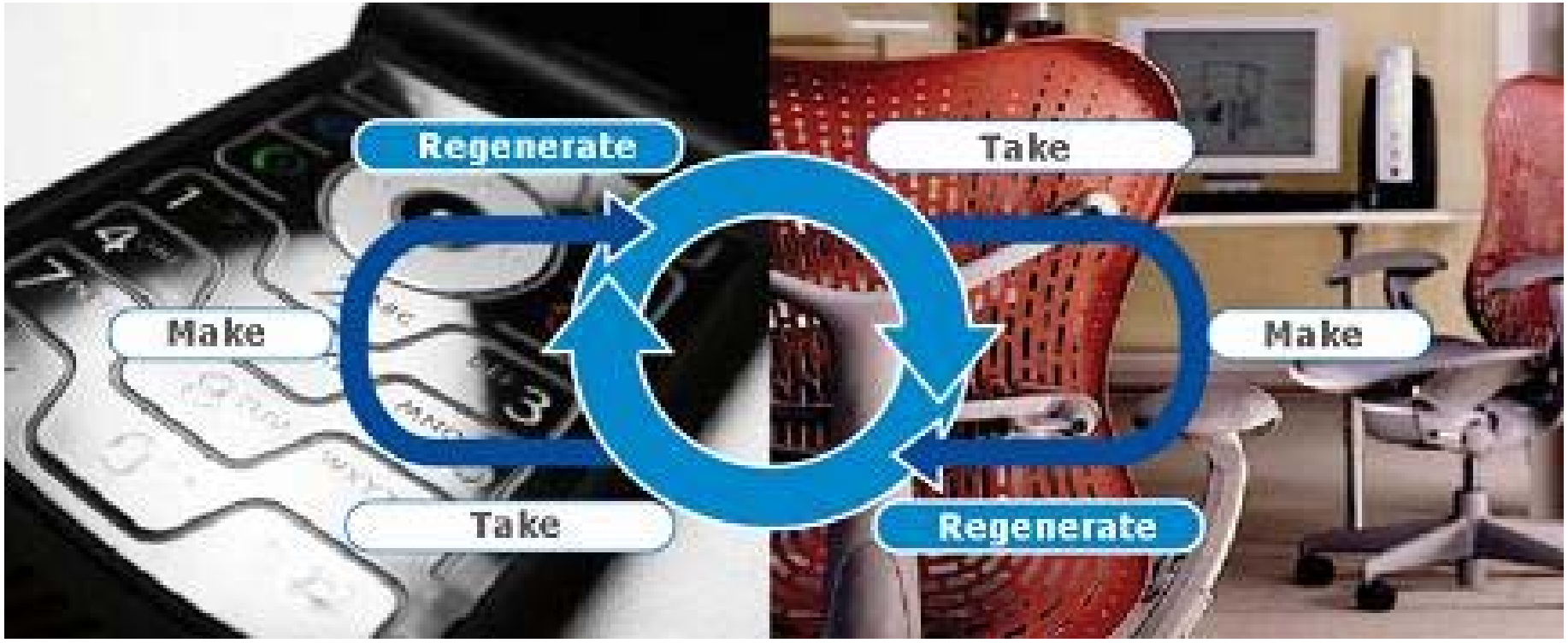
# Biological Nutrients




Cradle to Cradle, William McDonough and Michael Braungart

# Technical Nutrients

For example, plastics and metals




Cradle to Cradle, William McDonough and Michael Braungart

# Bill McDonough

- less bad is not good

# Downcycling

- You say that recycling, as it's currently practiced, is "downcycling." What we call recycling is typically the product losing its quality. Paper gets mixed with other papers, re-chlorinated and contaminated with toxic inks. The fiber length gets shorter, allowing more particles to abrade into the air, where they get into your lungs and nasal passages, and cause irritation. And you end up with gray, fuzzy stuff that doesn't really work for you. That's downcycling.

  -Cradle to Cradle

# Downcycling in one generation

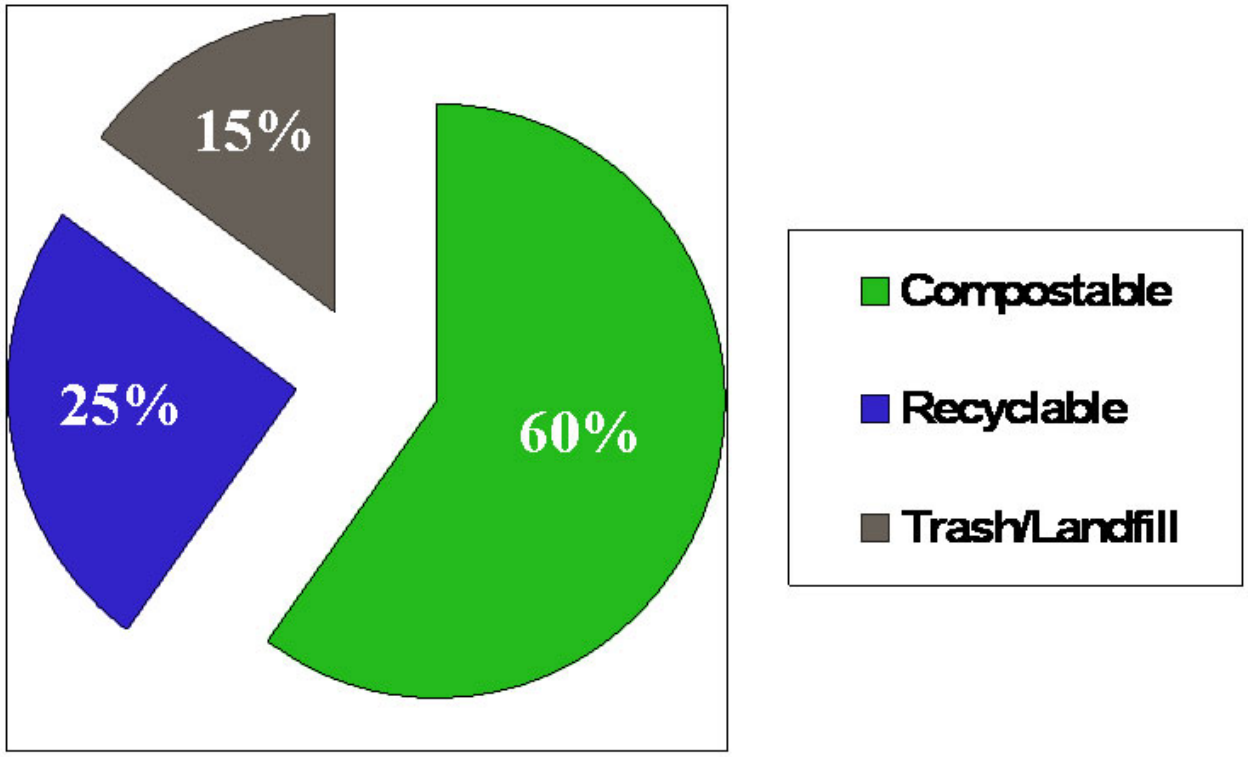
It is worth noting that the concept of materials recycling means returning the material for use in the original product.

The subsequent reuse of material for other products with lower requirements, sometimes termed "**downcycling** " is not long-term recycling.  One more life as something else, then no more recycling.

# 3 basic streams

- Recyclables: #1 and #2 rigid plastics, glass, aluminum, paper ( also cardboard and film plastics).
- Compostables: “green wastes”
- Trash/Landfill: like food soiled petro-plastics.

# 60% Compostables: zero waste initiative



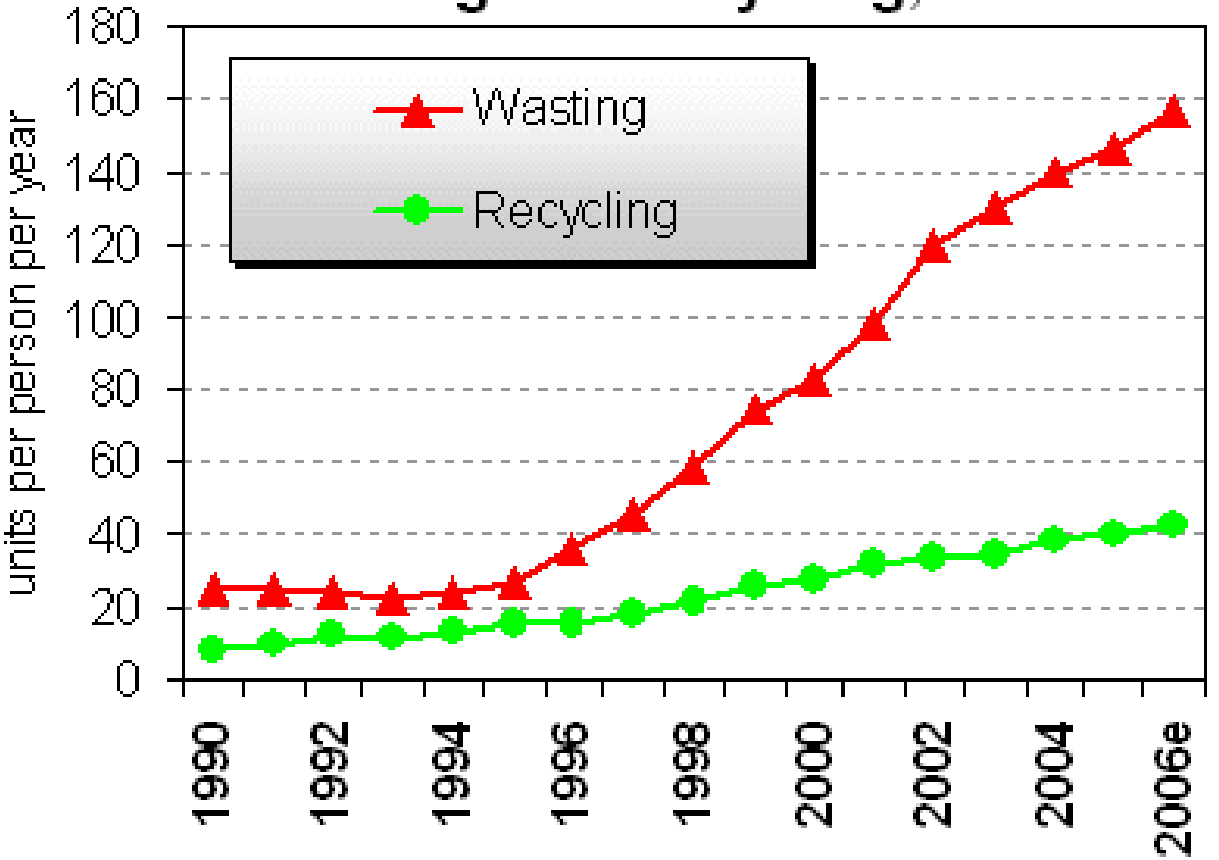
# Supermarket Compost Program

**Compost prepared for agriculture**

**Fruits and vegetables grown in our compost complete the recycling process.**

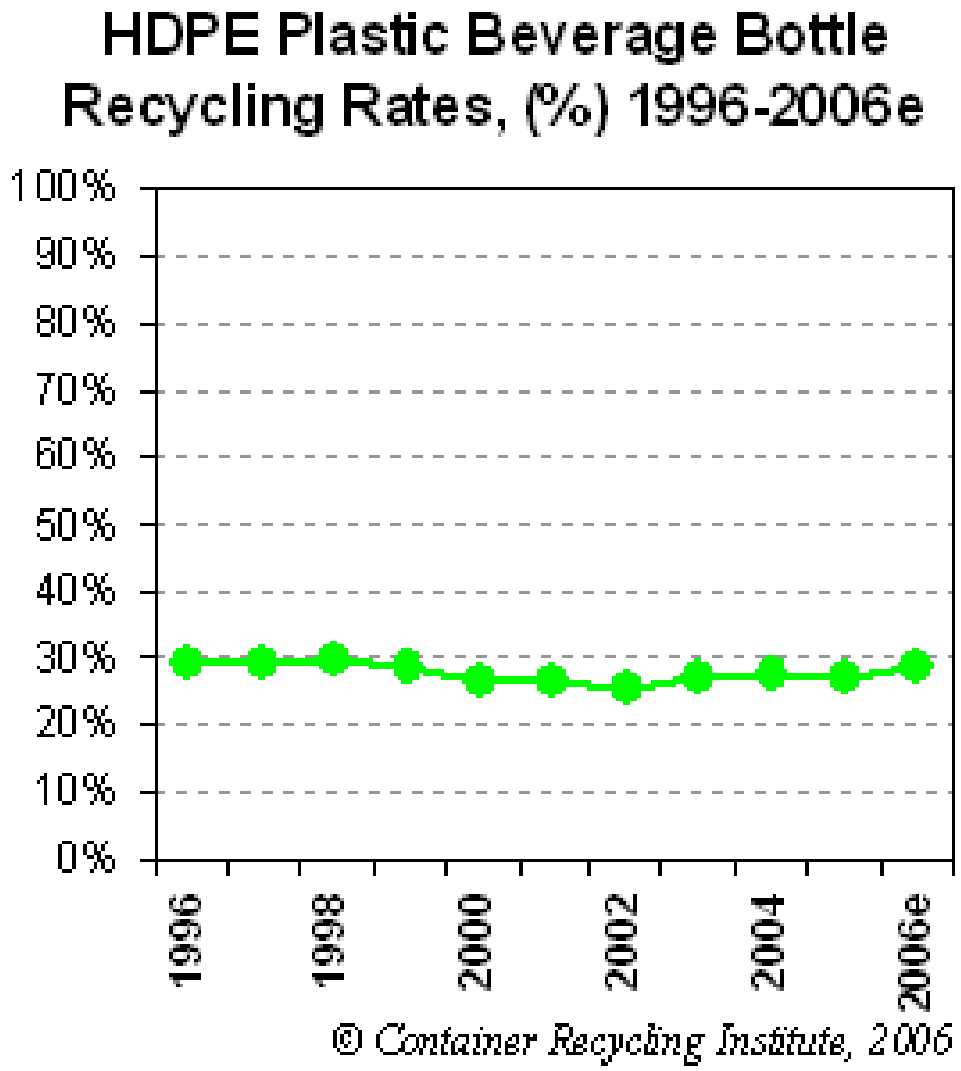
# Single Stream Sign

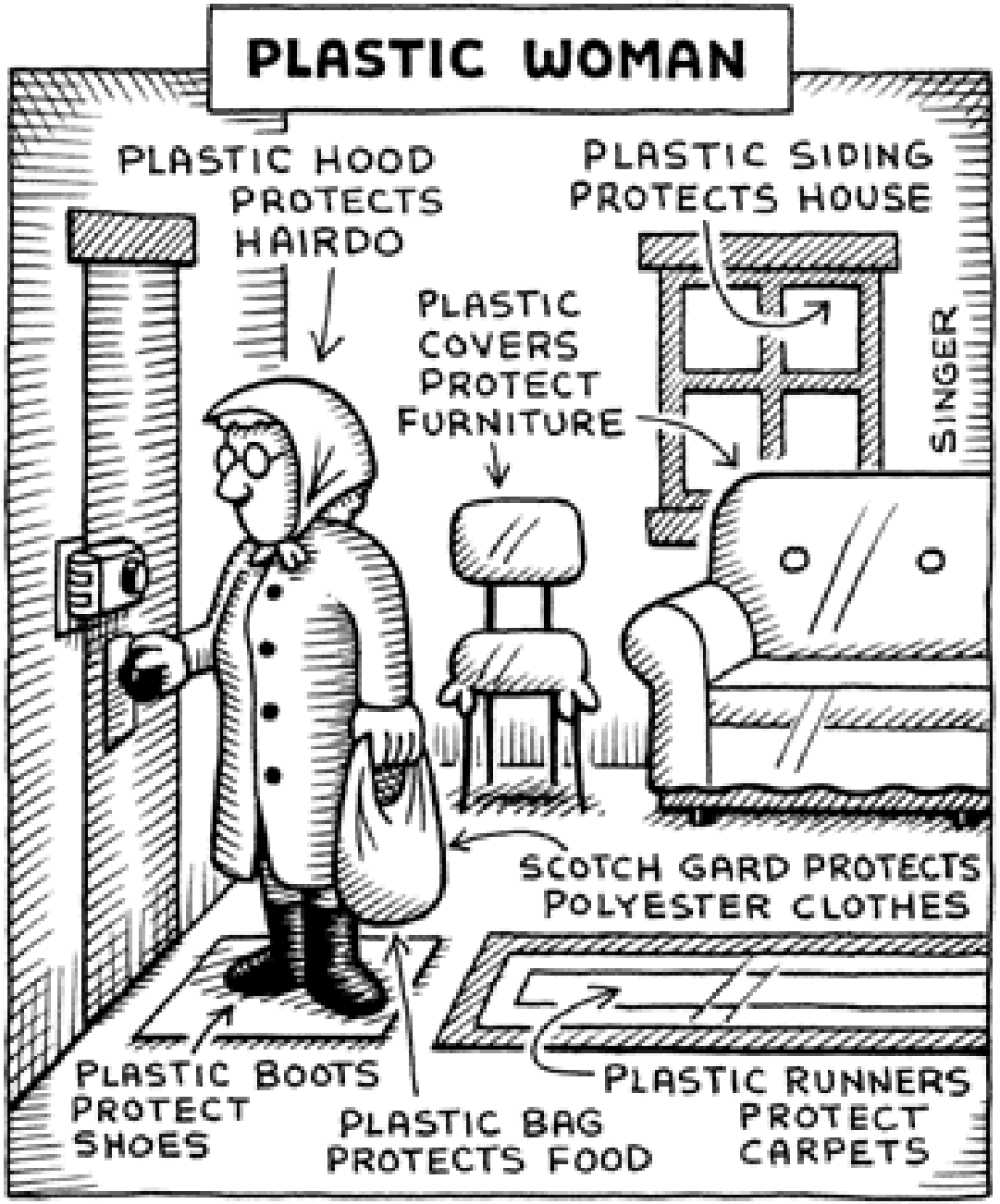
## Per Capita PET Beverage Bottle Wasting and Recycling, 1990-2006




Source: data derived from the American Plastics Council and the National Association of PET Container Resources.

© Container Recycling Institute, 2006


HDPE Plastic Beverage Bottle
Recycling Rates, (%) 1996-2006e
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1996
1998
2000
2002
2004
2006e
© Container Recycling Institute, 2006


PLASTIC WOMAN
PLASTIC HOOD PROTECTS HAIRDO
PLASTIC SIDING PROTECTS HOUSE
PLASTIC COVERS PROTECT FURNITURE
SINGER
SCOTCH GARD PROTECTS POLYESTER CLOTHES
PLASTIC BOOTS PROTECT SHOES
PLASTIC BAG PROTECTS FOOD
PLASTIC RUNNERS PROTECT CARPETS

# Hydrocarbon Plastics – (The Myth of) the Chasing Arrows







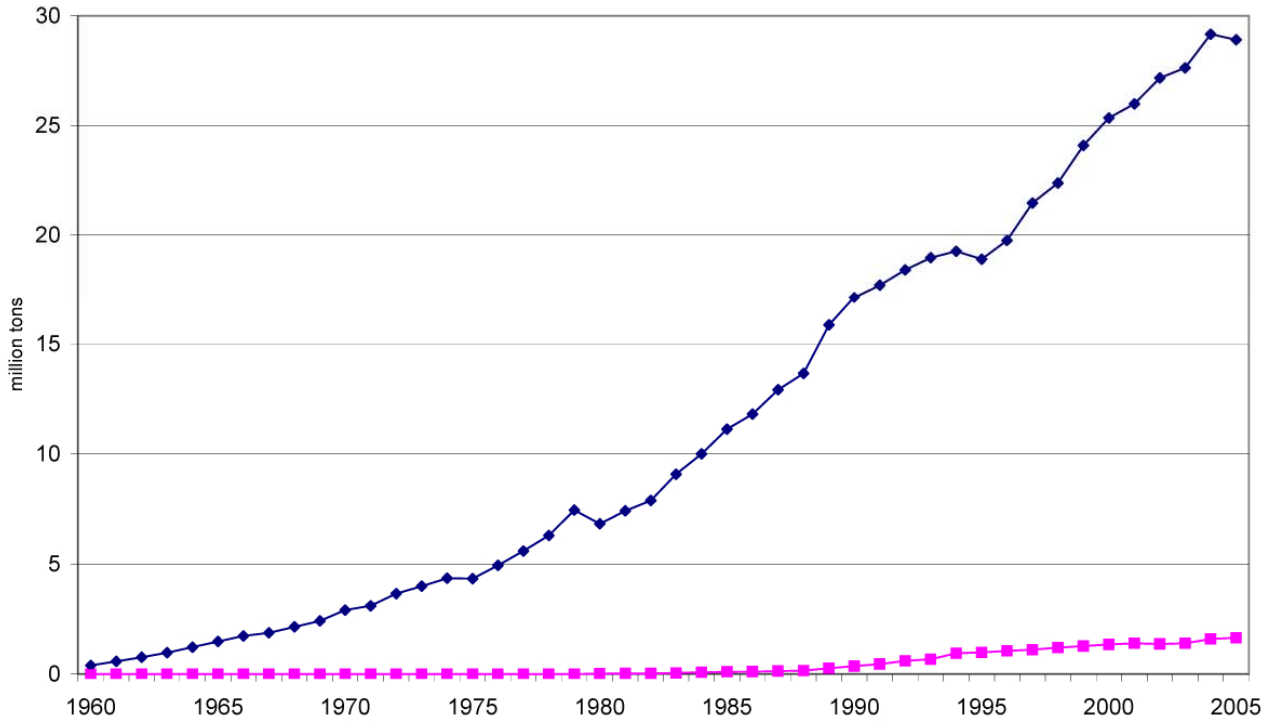
# Recycle Logos

Here's what the numbers represent:

#1 - Polyethylene Terephthalate (PET)
#2 - High Density Polyethylene (HDPE)
#3 - Vinyl (Polyvinyl Chloride or PVC)
#4 - Low Density Polyethylene (LDPE)
#5 - Polypropylene (PP)
#6 - Polystyrene (PS)
#7 - Other (which commonly includes: Polycarbonate, ABS, Nylon, Acrylic or a composite of 2 or more resins)

# Plastics generated and recovered

**Figure 9. Plastics generation and recovery, 1960 to 2005**



# Only 4.2% of Durable Fossil Plastics get recycled.

**Table 7**

**PLASTICS IN PRODUCTS IN MSW, 2005**
**(In thousands of tons, and percent of generation by resin)**

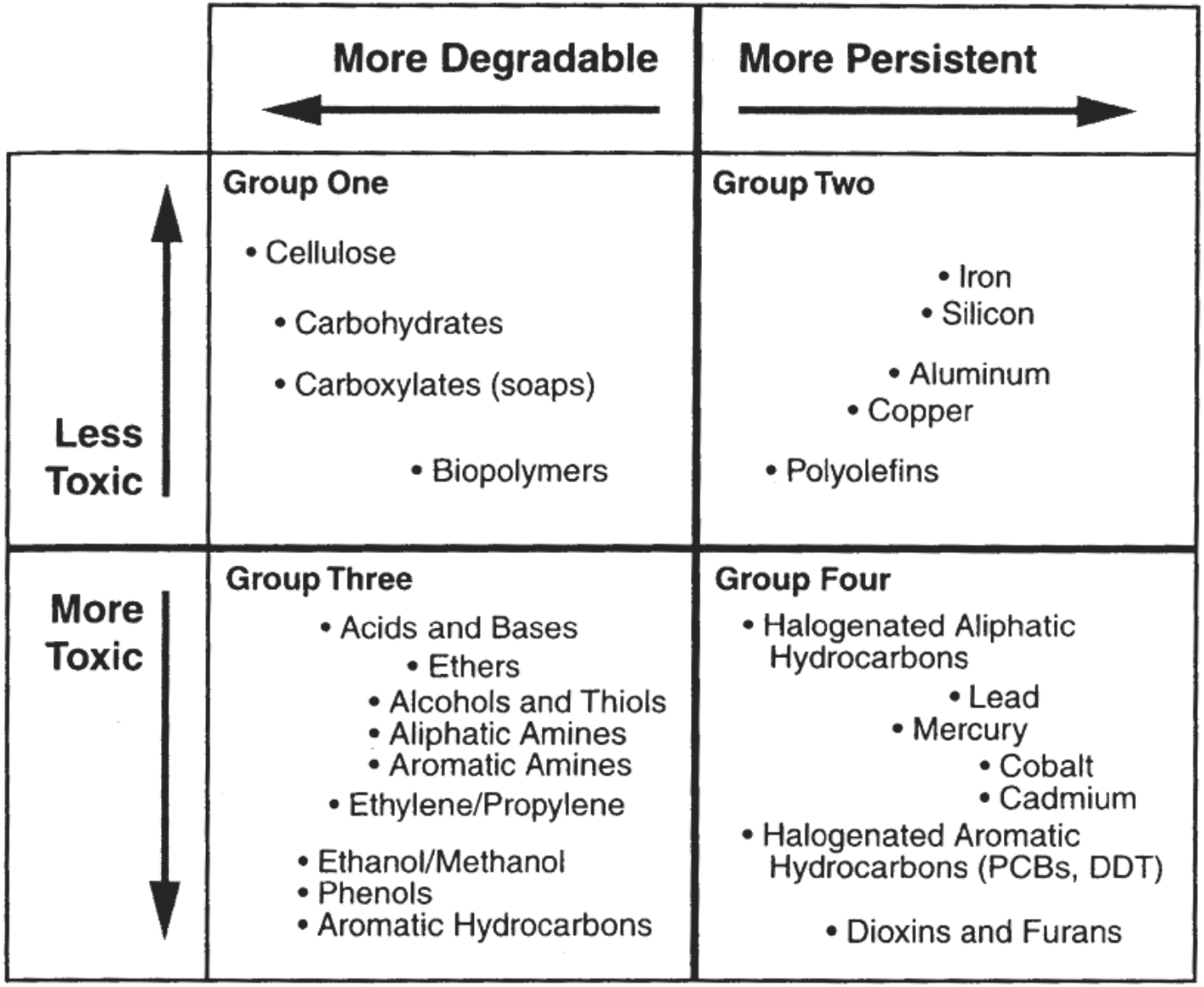
| Product Category | Generation (Thousand tons) | Recovery (Thousand tons) | Recovery (Percent of Gen.) | Discards (Thousand tons) |
|---|---|---|---|---|
| **Durable Goods** | | | | |
| PET | 480 | | | |
| HDPE | 650 | | | |
| PVC | 510 | | | |
| LDPE/LLDPE | 770 | | | |
| PP | 1,370 | | | |
| PS | 730 | | | |
| Other resins | 4,200 | | | |
| ***Total Plastics in Durable Goods*** | 8,710 | 370 | 4.2% | 8,340 |

# All trash generated

**Figure 10. Generation of materials in MSW, 1960 to 2005**

# Moving Materials Towards Sustainability

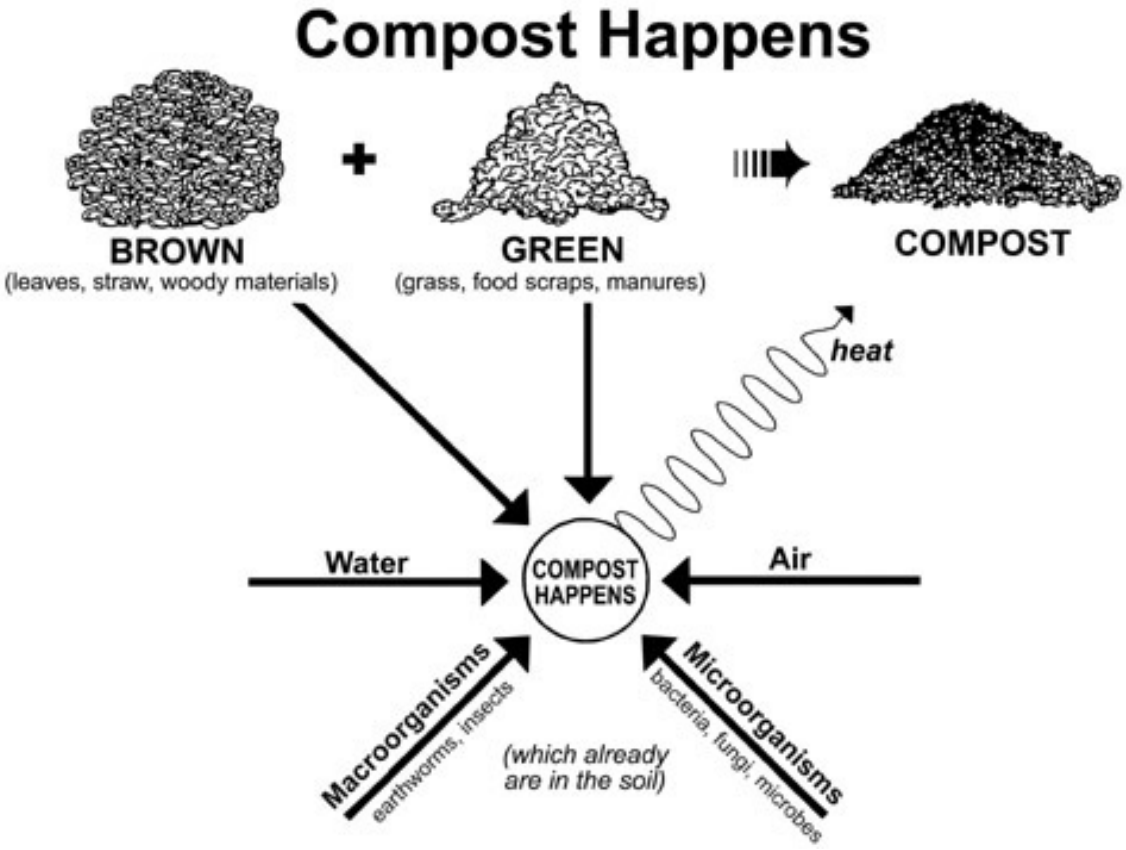
The following matrix describes a way to think about all the materials on earth. They range from very toxic and very persistent, to non-toxic and compostable. Sustainability implies making group four obsolete, and making group one the primary operating realm.

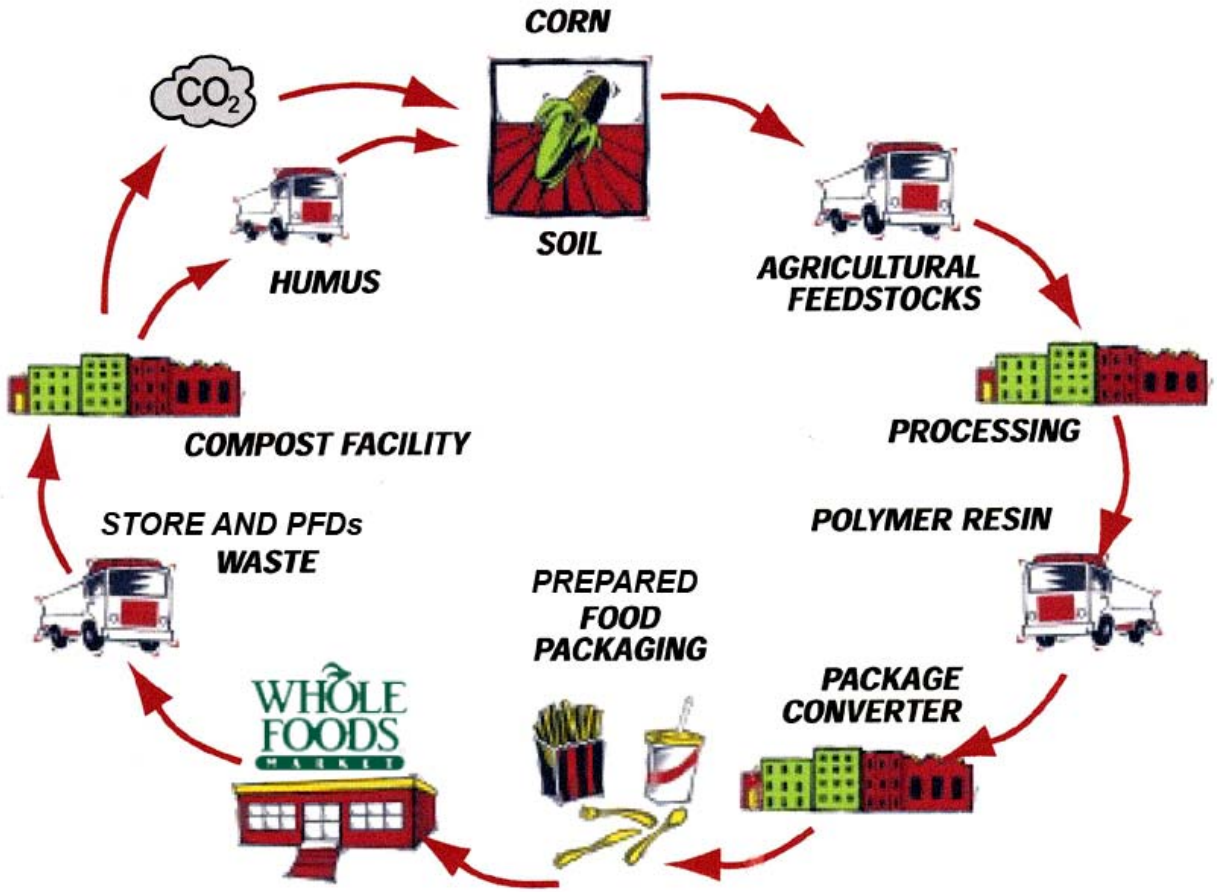

More Degradable
More Persistent
Group One
• Cellulose
• Carbohydrates
• Carboxylates (soaps)
• Biopolymers
Group Two
• Iron
• Silicon
• Aluminum
• Copper
• Polyolefins
Less Toxic
More Toxic
Group Three
• Acids and Bases
• Ethers
• Alcohols and Thiols
• Aliphatic Amines
• Aromatic Amines
• Ethylene/Propylene
• Ethanol/Methanol
• Phenols
• Aromatic Hydrocarbons
Group Four
• Halogenated Aliphatic Hydrocarbons
• Lead
• Mercury
• Cobalt
• Cadmium
• Halogenated Aromatic Hydrocarbons (PCBs, DDT)
• Dioxins and Furans

# What is a biopolymer and why does it have a closed loop?

- The source for the polymer is a green cell.  The main difference between biopolymers and conventional hydrocarbon polymers is that, due to their physical and chemical structure, biopolymers can be broken down by microorganisms, i.e. fungi and bacteria. . .they compost and become part of the soil agaim.

# Food wastes blend with yard wastes.






# The Green Cell Packaging Cycle

This is an example of moving towards group one.

# Redesign

Rethink

Reduce

Reuse

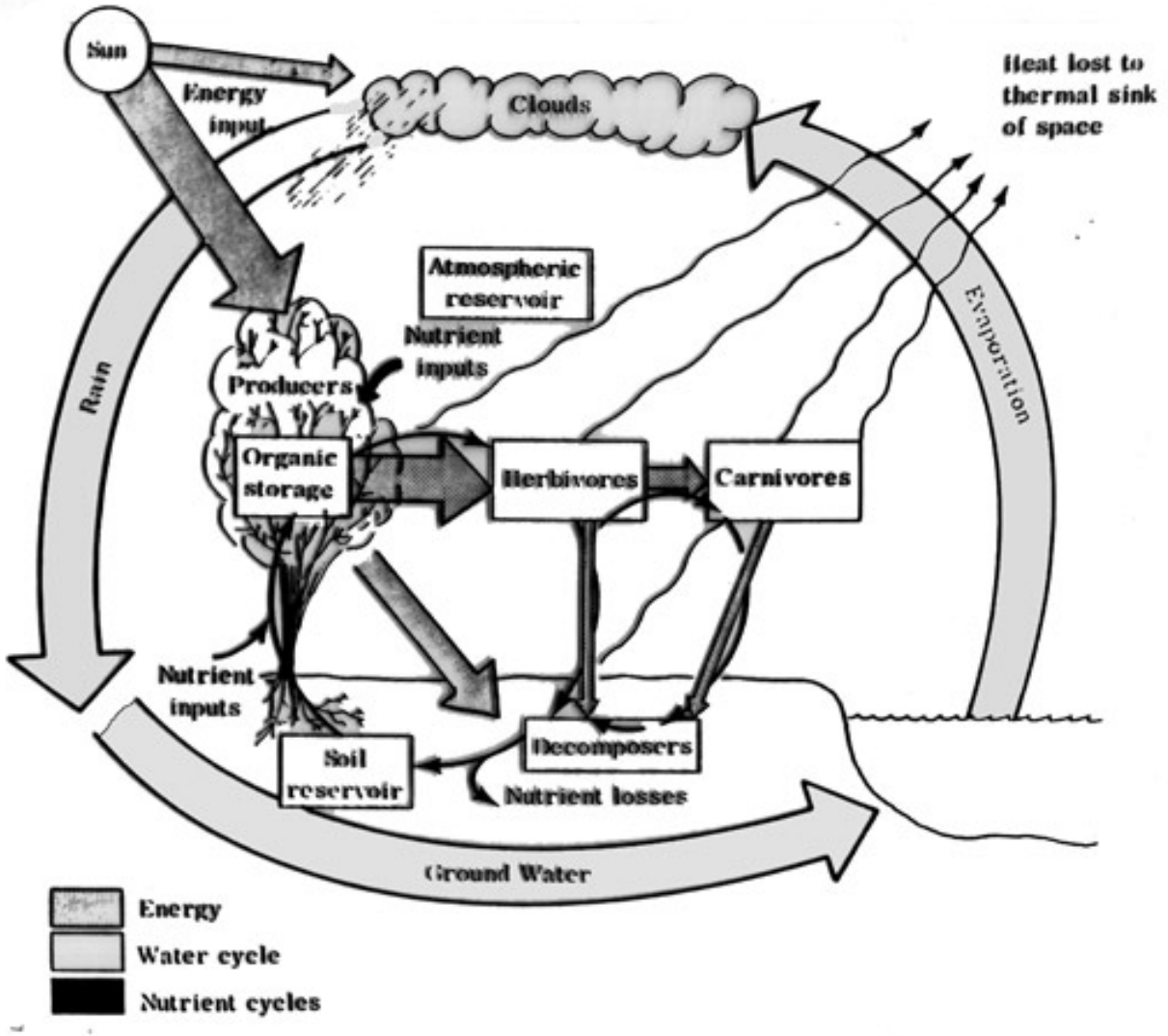
Recycle

# Anticipatory Design

- “Significant competitive advantage lies with those organizations and individuals who anticipate well in turbulent times.”

  -- Peter Drucker

The simple idea is to redesign commerce so that it mimics these ecological cycles.




**A model showing the flow of energy, the cycling of water, and the association of biogeochemical cycles with both**

# Major change:  A Paradigm Shift

- Industrial, linear >> informed-ecological, cyclic
- Ancient sunlight >> current sunlight
- Scarce resources >> regenerative resources
- Disposable >> reusable, recyclable and/or compostable
- Chemical Agriculture >> Organic Agriculture's Principles
- Reactive to the past >> anticipate the future needs
- Short term results >> long term planning
- "Me" generation>>"We" re-generation

# The Restoration Economy: Green Collar job growth

- Local farming, gardening, landscaping
- Daylighting, indoor air quality
- Passive solar design, natural ventilation
- Energy efficiency, renewable energy
- Water conservation, xeriscaping
- Site preservation, construction waste minimization
- New ‘green’ materials: cradle-to-cradle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MAJOR
RAMIFICATIONS
AHEAD

# Trimtab Factors

- Industrial Subsidies head to zero
- Green accounting replaces GNP etc.
- Account for carbon, water, nitrogen, phosphorous, and oxygen cycles

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Tom Wright
Sustainable Bizness Practices

925-376-0327

Green Mission Project
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