



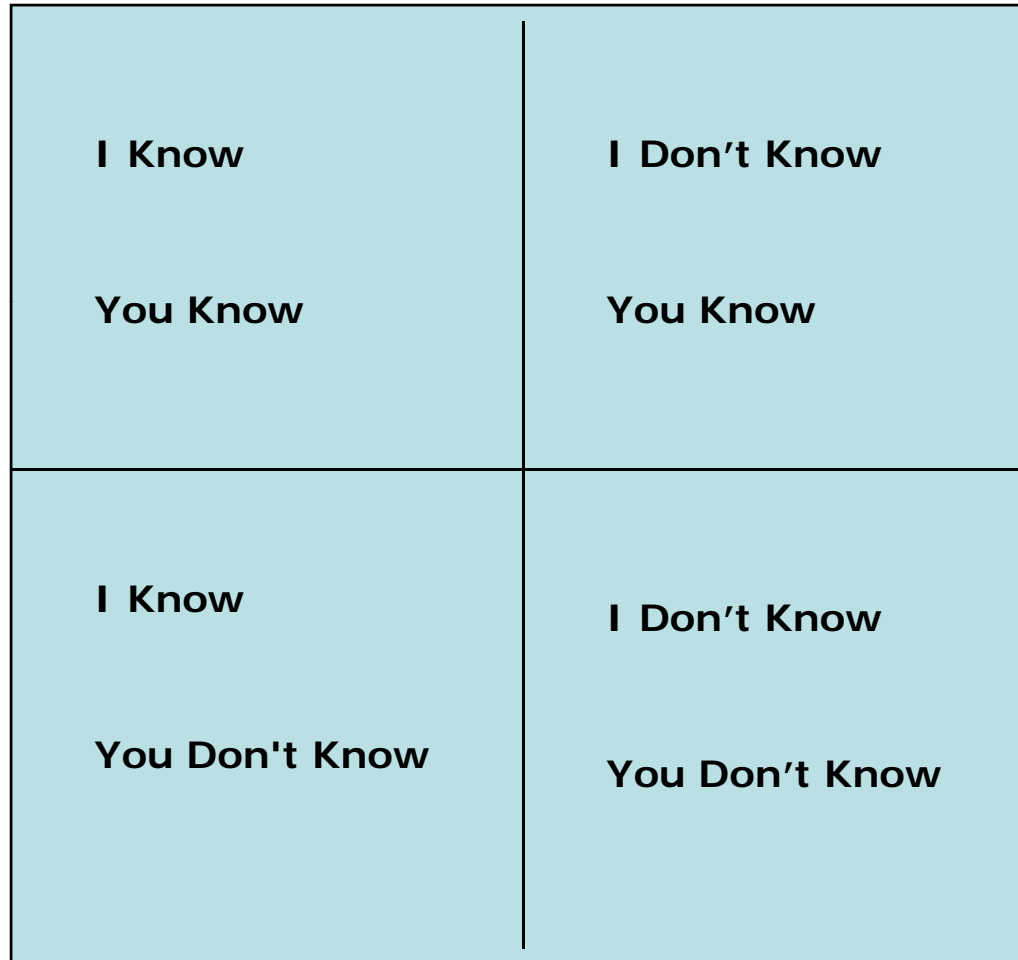
Zero Waste
is the goal.

Tom Wright
(925) 376-0327

Green Supply Chain Example

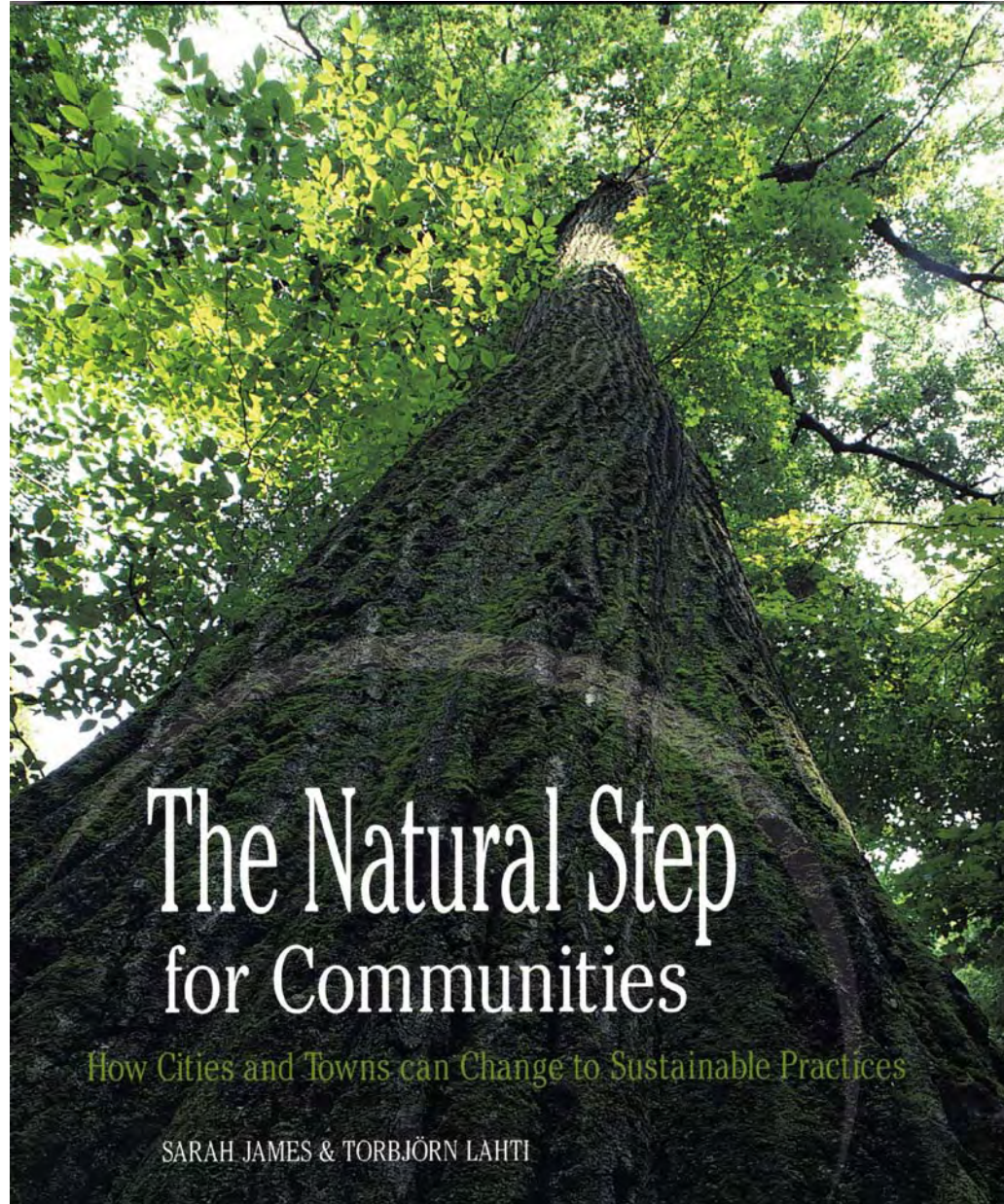


The Johari Window



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

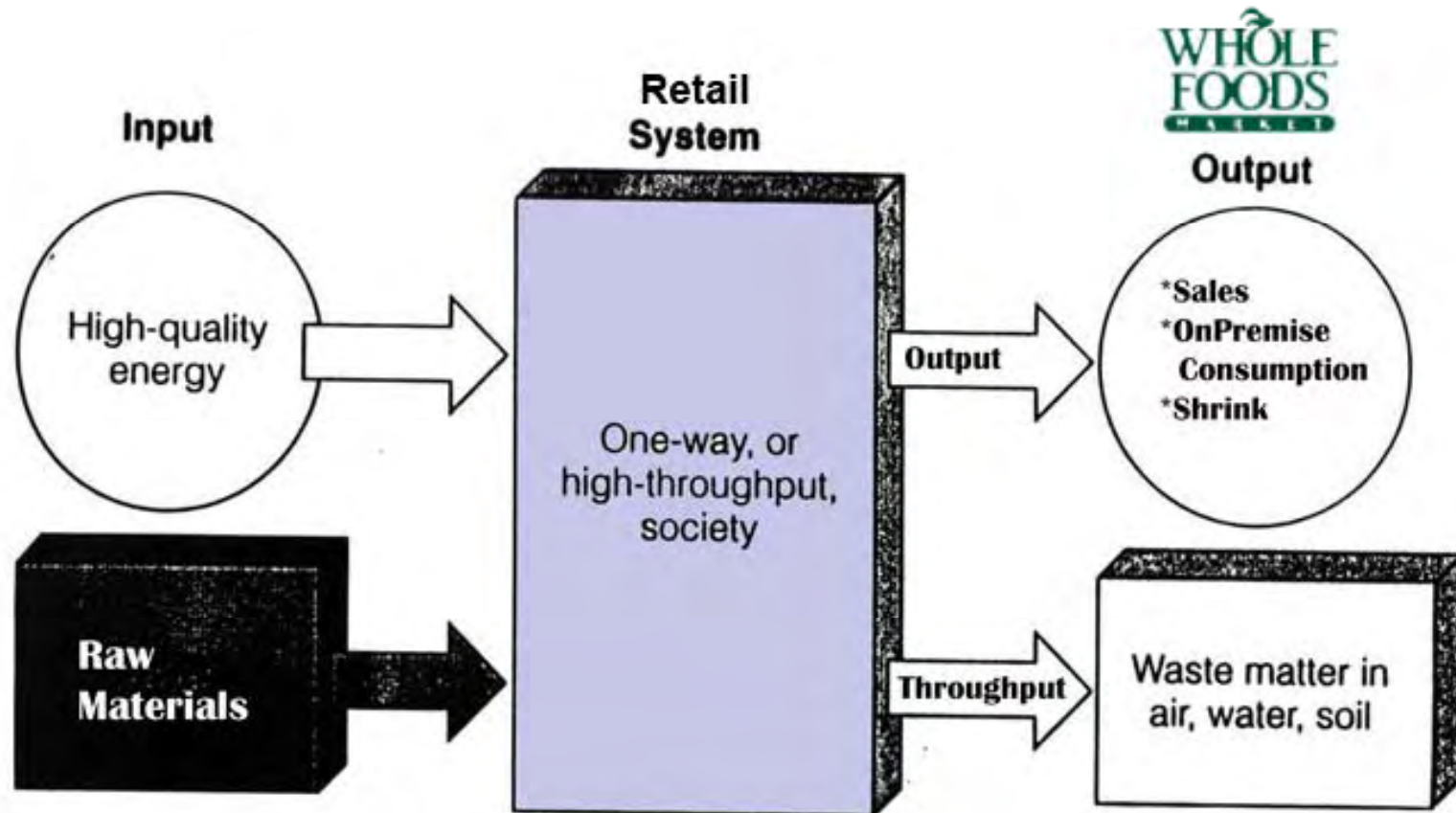


The Cyclic Principle

- 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”).



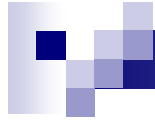
Waste matter in air, water and soil needs to be food for something!



“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

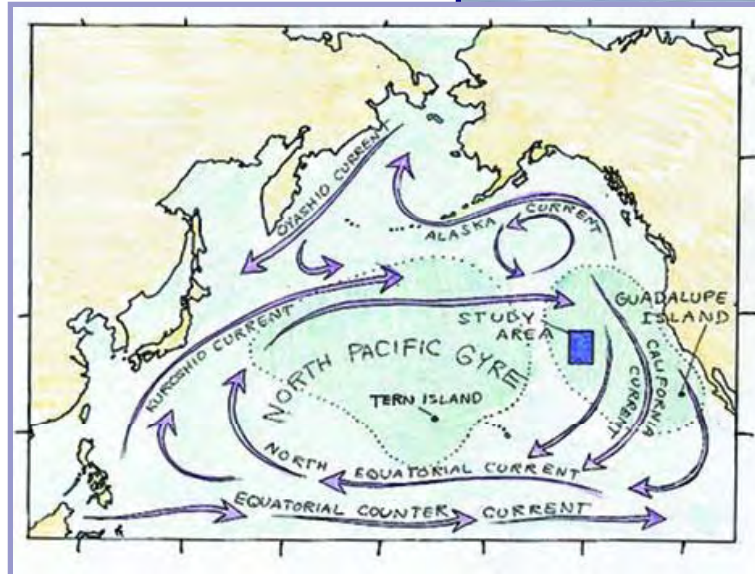
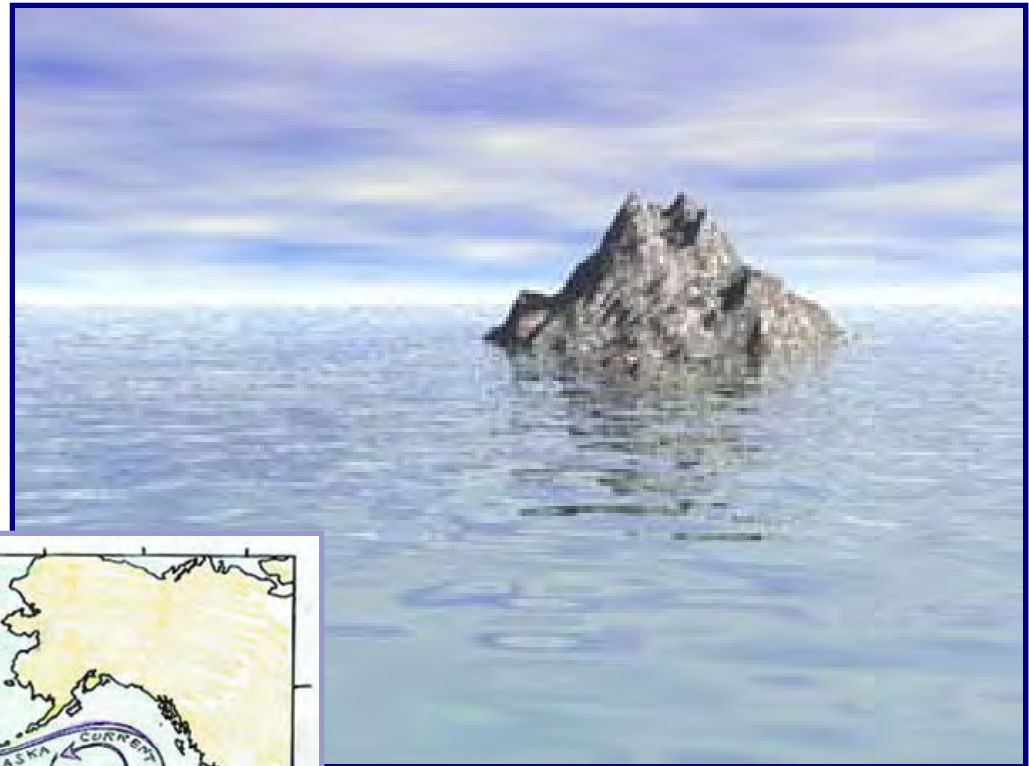


We can't close our eyes anymore and pretend it "goes away".

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)

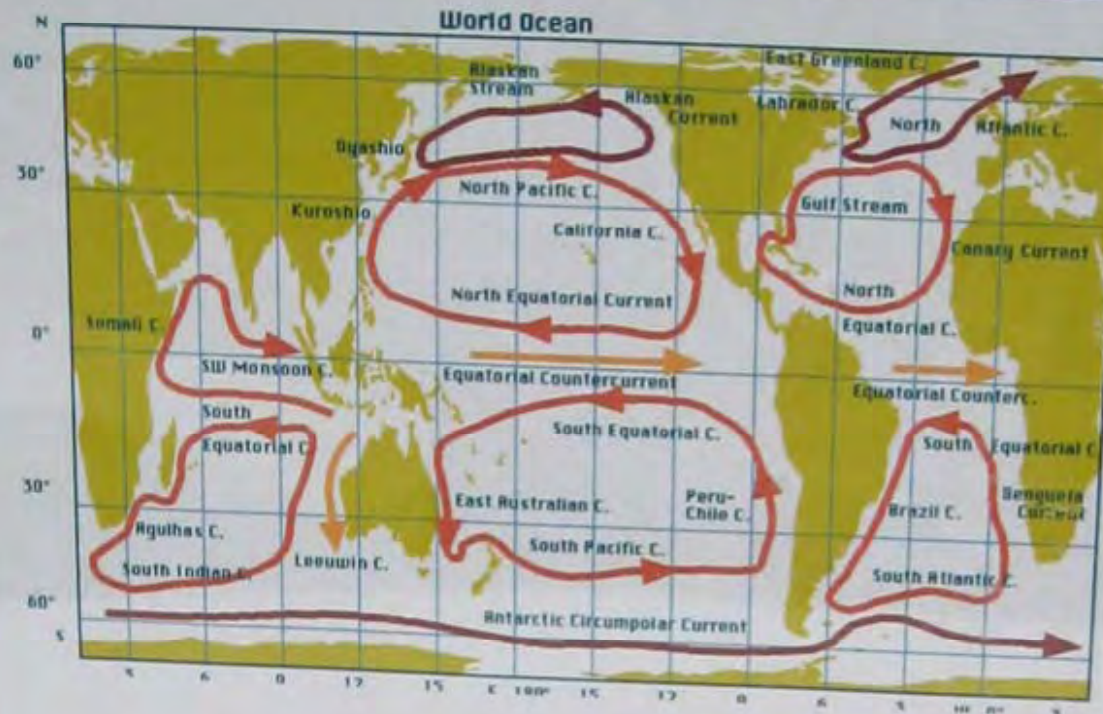
“An estimated 500 billion to 1 trillion bags are used annually worldwide.

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

A concept that goes hand in hand with the notion of a technical nutrient: the concept of a **product of service**. In this "business" products come with a **technical nutrient**—a built-in ability to be repaired, upgraded, or replaced for a **defined user period**—say, ten thousand hours of use. If a product fails, the user can call the manufacturer for a replacement or simply return it to the manufacturer for a replacement. The manufacturer would receive the service, they need to be able to repair and develop a product that would retain ownership of the materials themselves. In order for such a scenario to be successful, the product must be designed to be repaired, upgraded, or replaced. In order for such a scenario to be successful, the product must be designed to be repaired, upgraded, or replaced. In order for such a scenario to be successful, the product must be designed to be repaired, upgraded, or replaced.

cradle to cradle

William McDonough & Michael Braungart

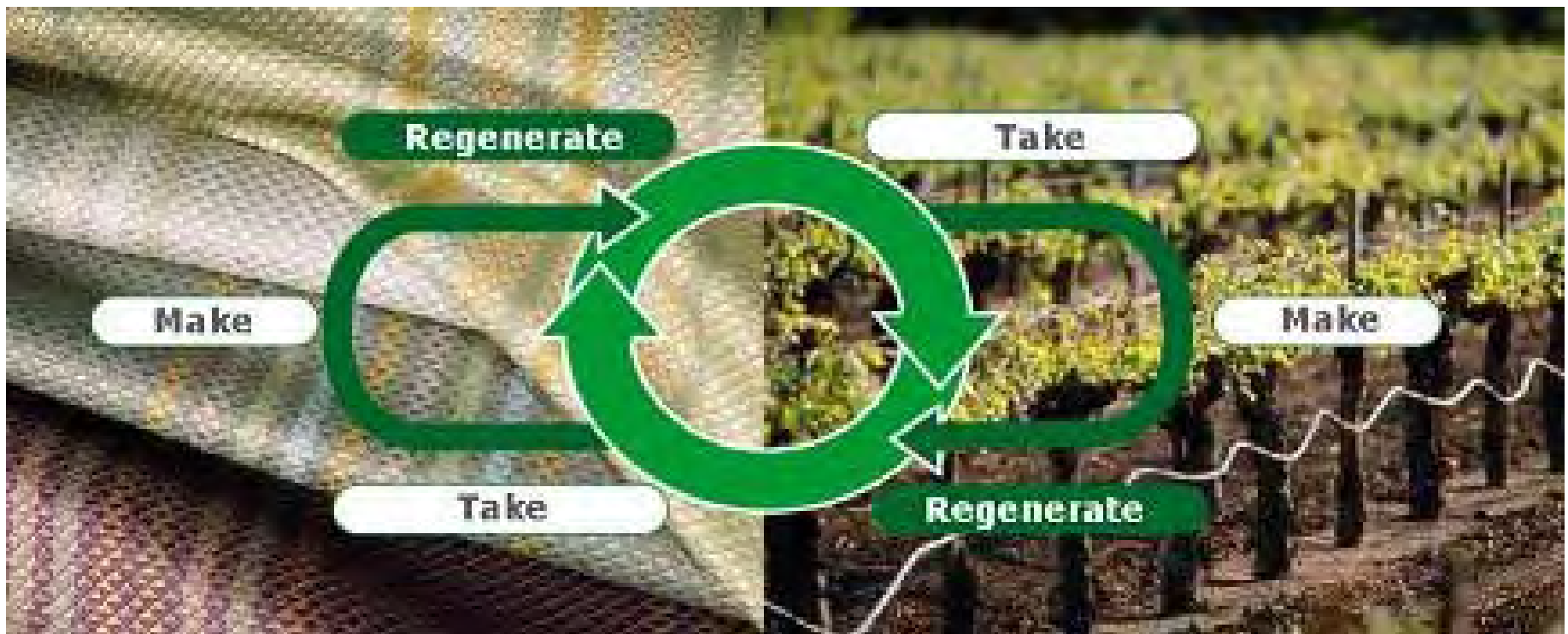




Bill McDonough

- “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?’ ”

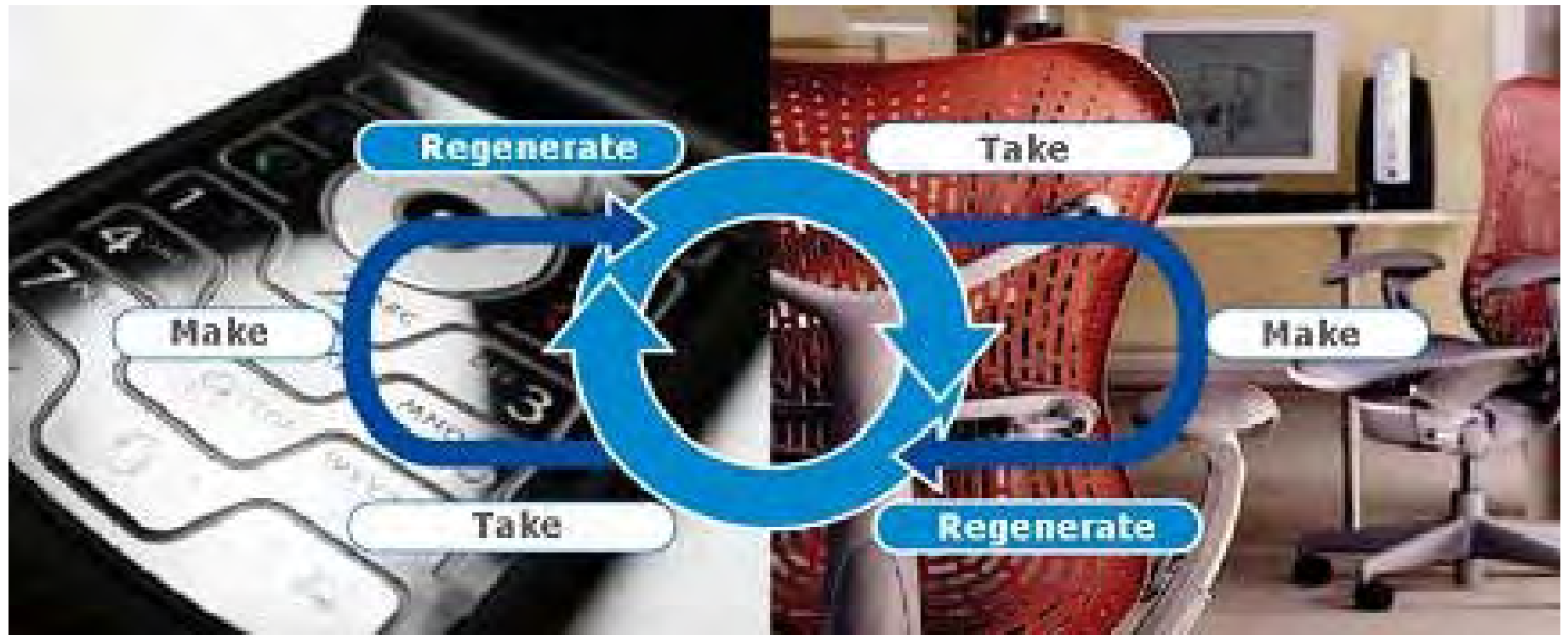
Biological Nutrients



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.

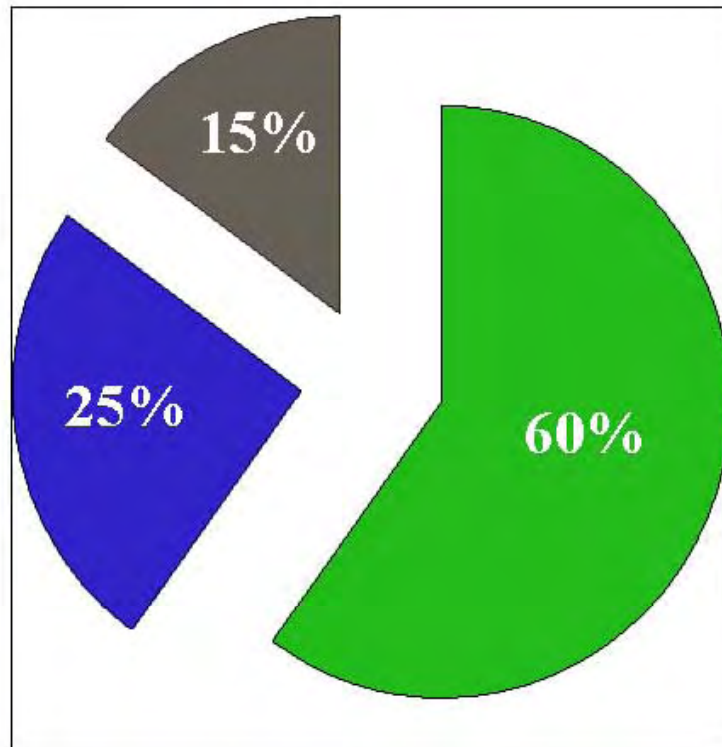
The subsequent reuse of material for other products with lower requirements, sometimes termed "**downcycling**" is not long-term recycling. One more life as something else, then no more recycling.



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

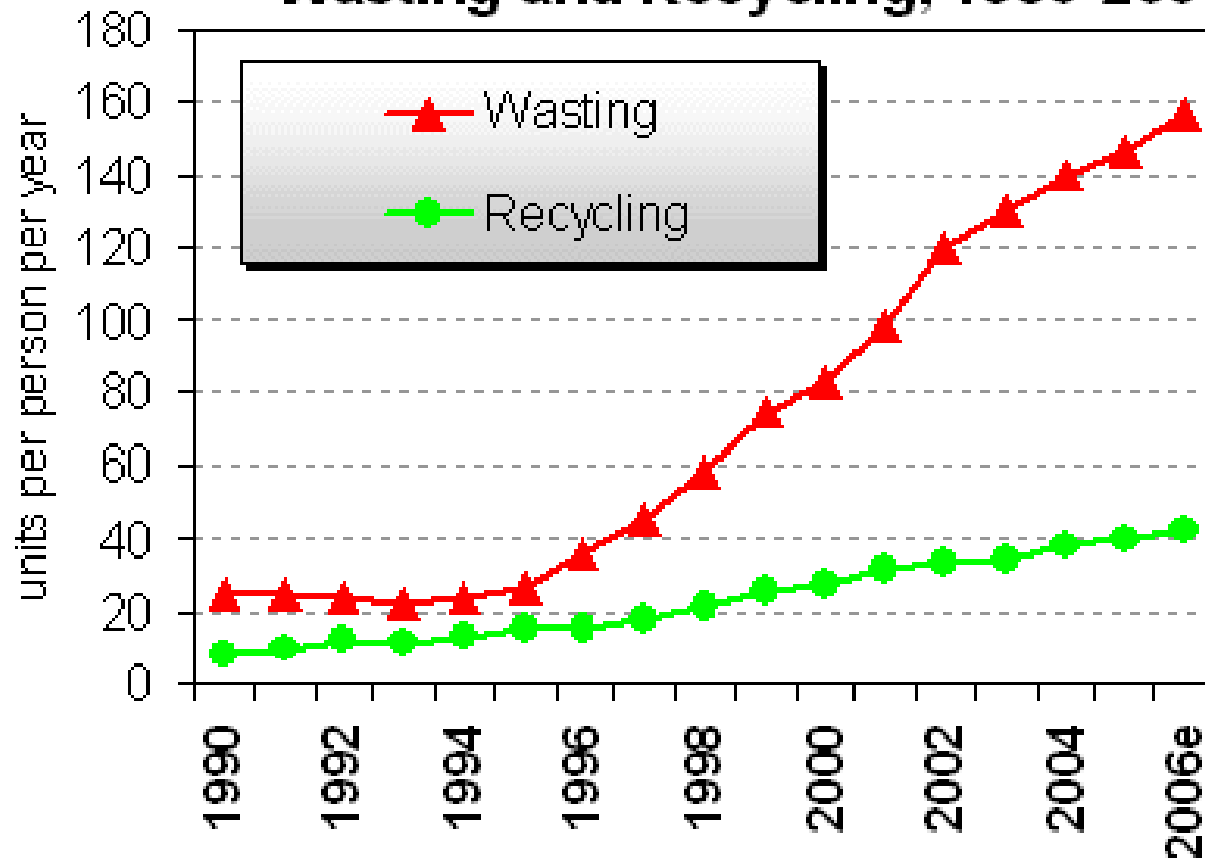


Fruits and vegetables grown in our compost complete the recycling process.

Single Stream Sign



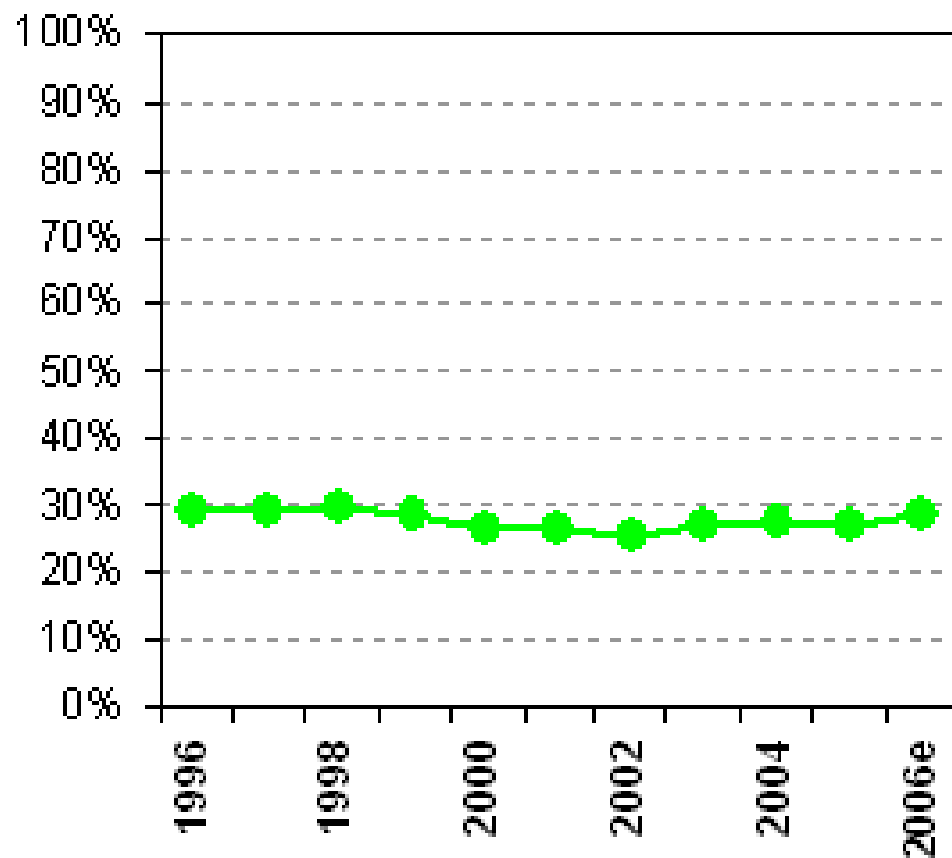
Per Capita PET Beverage Bottle Wasting and Recycling, 1990-2006



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

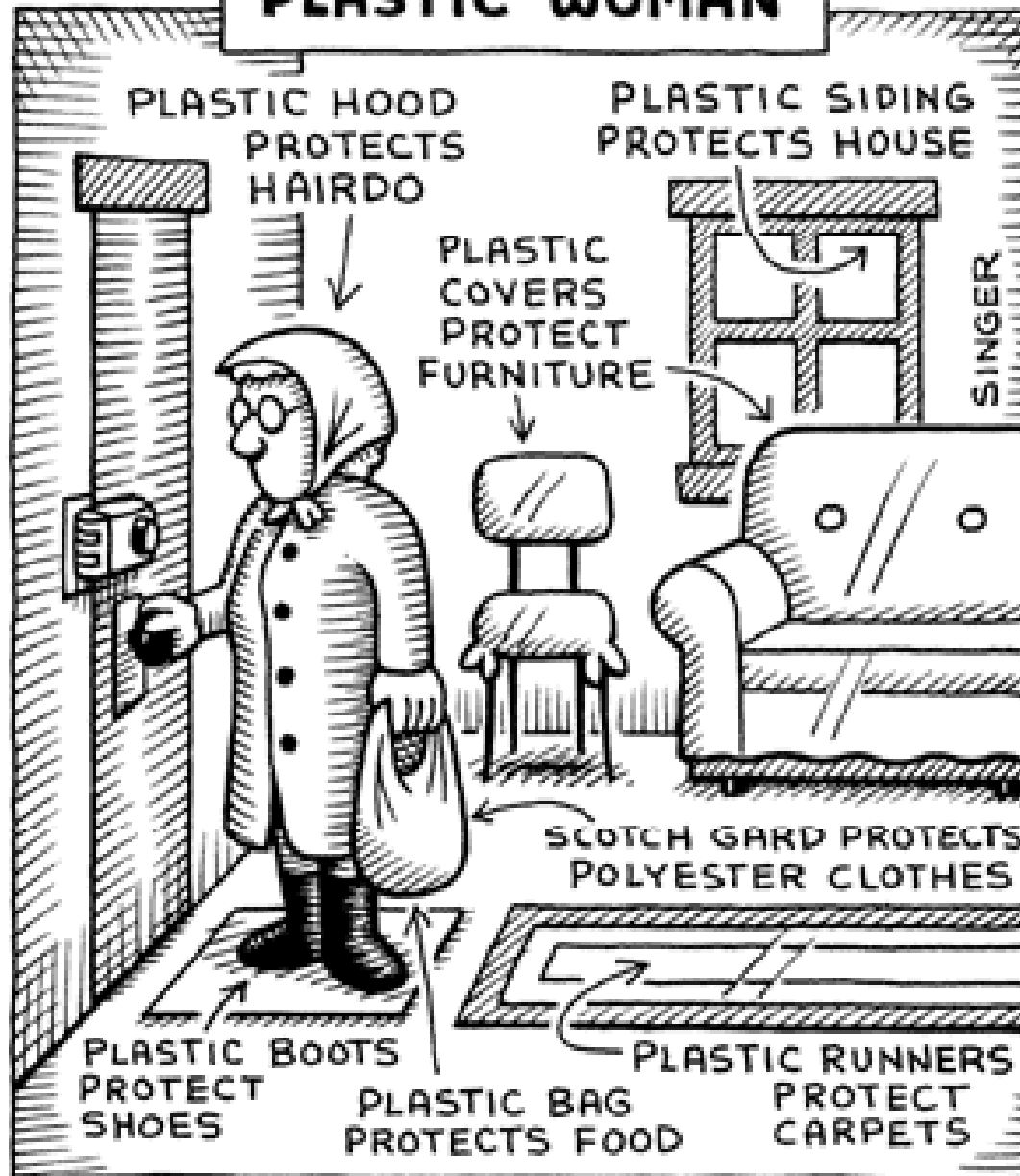


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NO EXIT

© Andy Singer

PLASTIC WOMAN



Hydrocarbon Plastics – (The Myth of) the Chasing Arrows



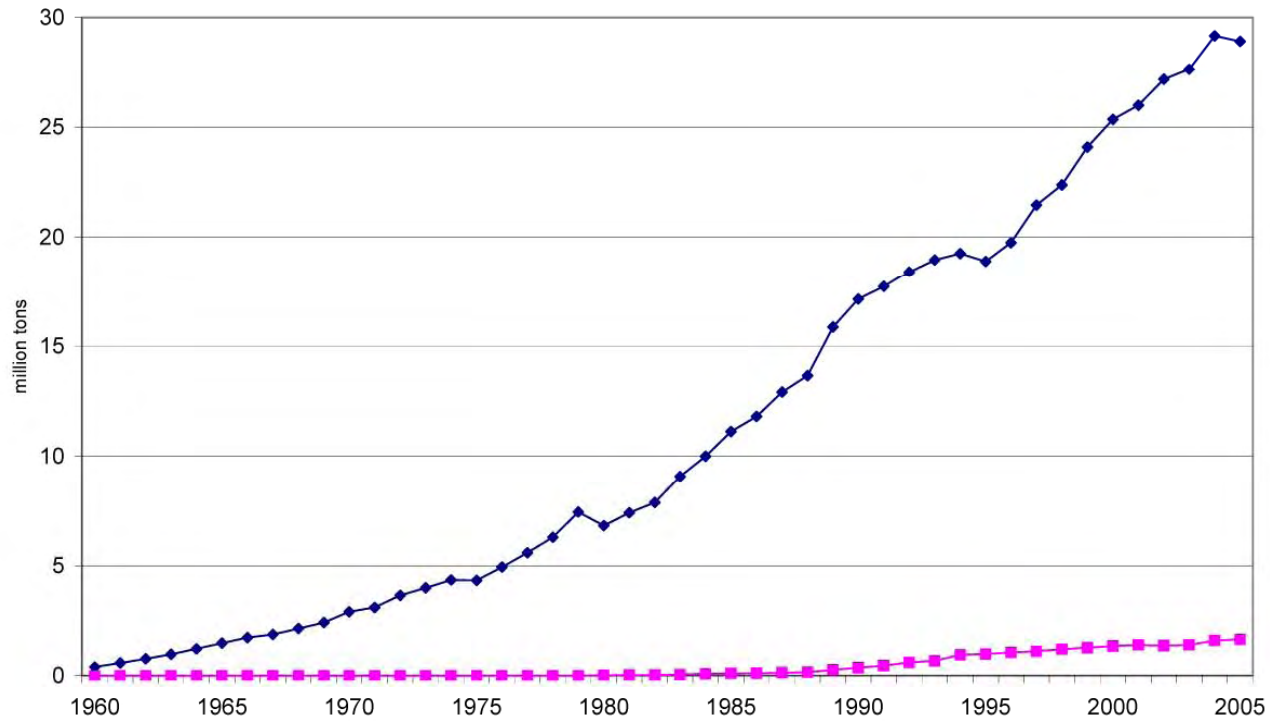
Recycle Logos

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.

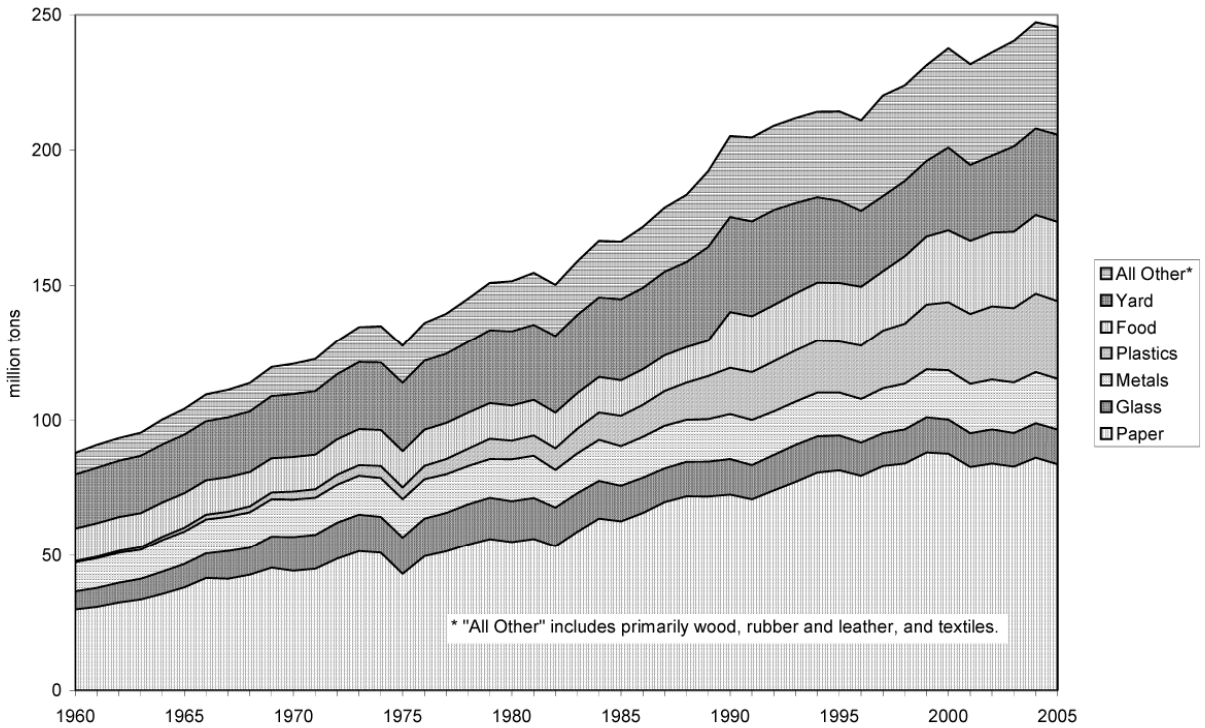
Table 7

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

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

All trash generated





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





Moving Materials Towards Sustainability

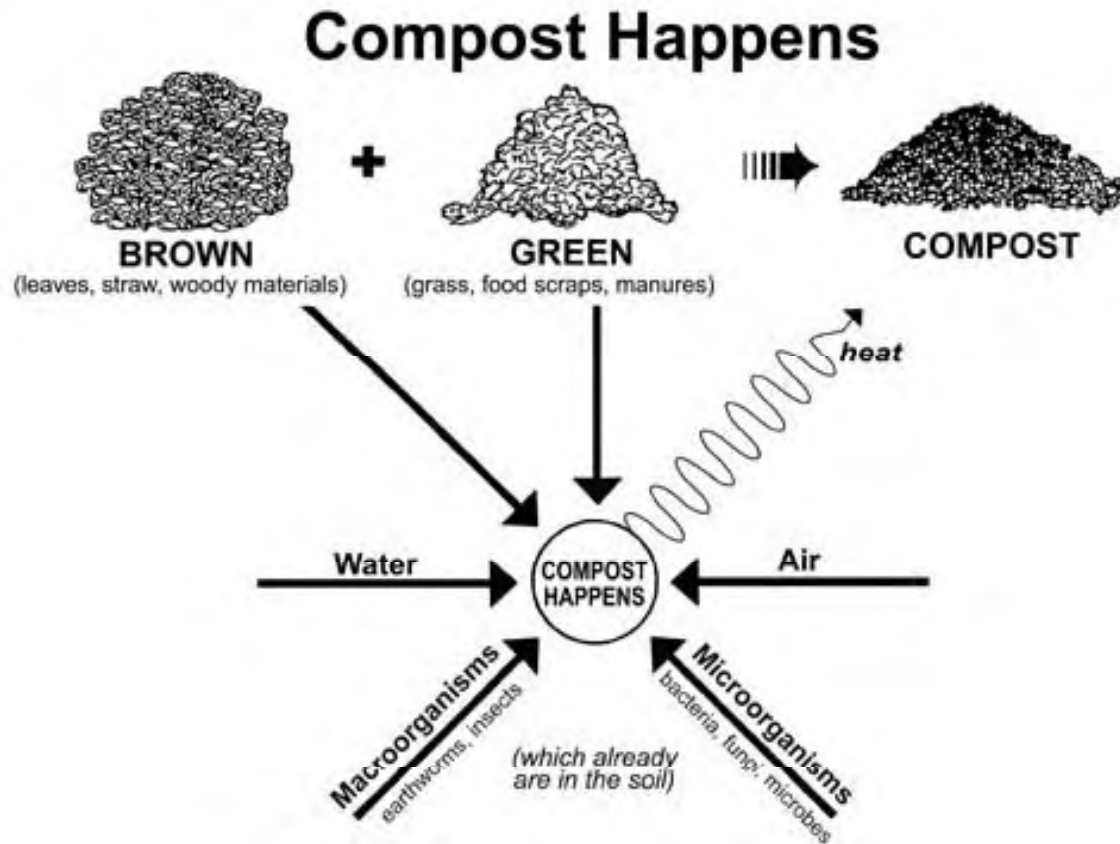
The following matrix describes a way to think about all the materials on earth. They range from very toxic and very persistent, to non-toxic and compostable. Sustainability implies making group four obsolete, and making group one the primary operating realm.

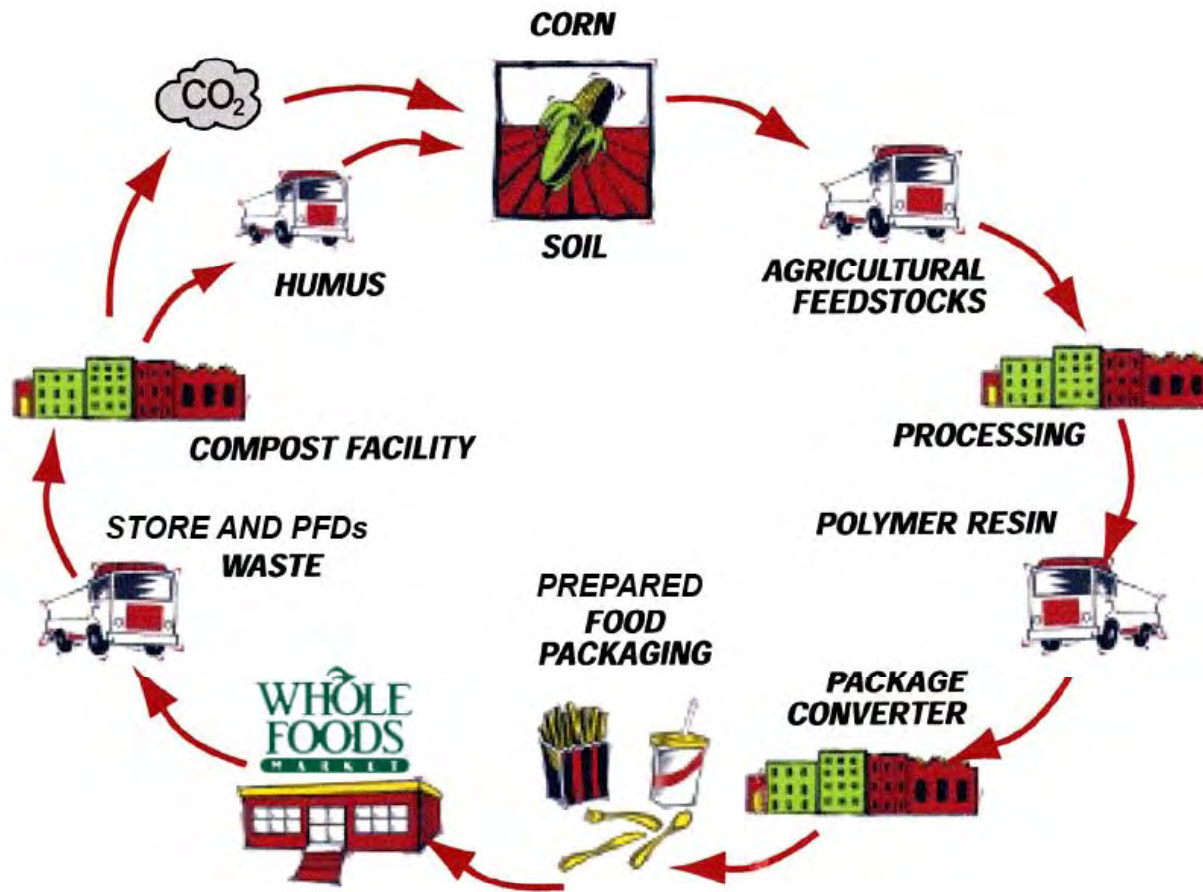
	More Degradable 	More Persistent 
Less Toxic 	Group One <ul style="list-style-type: none"> • Cellulose • Carbohydrates • Carboxylates (soaps) • Biopolymers 	Group Two <ul style="list-style-type: none"> • Iron • Silicon • Aluminum • Copper • Polyolefins
More Toxic 	Group Three <ul style="list-style-type: none"> • Acids and Bases • Ethers • Alcohols and Thiols • Aliphatic Amines • Aromatic Amines • Ethylene/Propylene • Ethanol/Methanol • Phenols • Aromatic Hydrocarbons 	Group Four <ul style="list-style-type: none"> • 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 again.

Food wastes blend with yard wastes.





The Green Cell Packaging Cycle
 This is an example of moving towards group one.



Redesign

Rethink

Reduce

Reuse

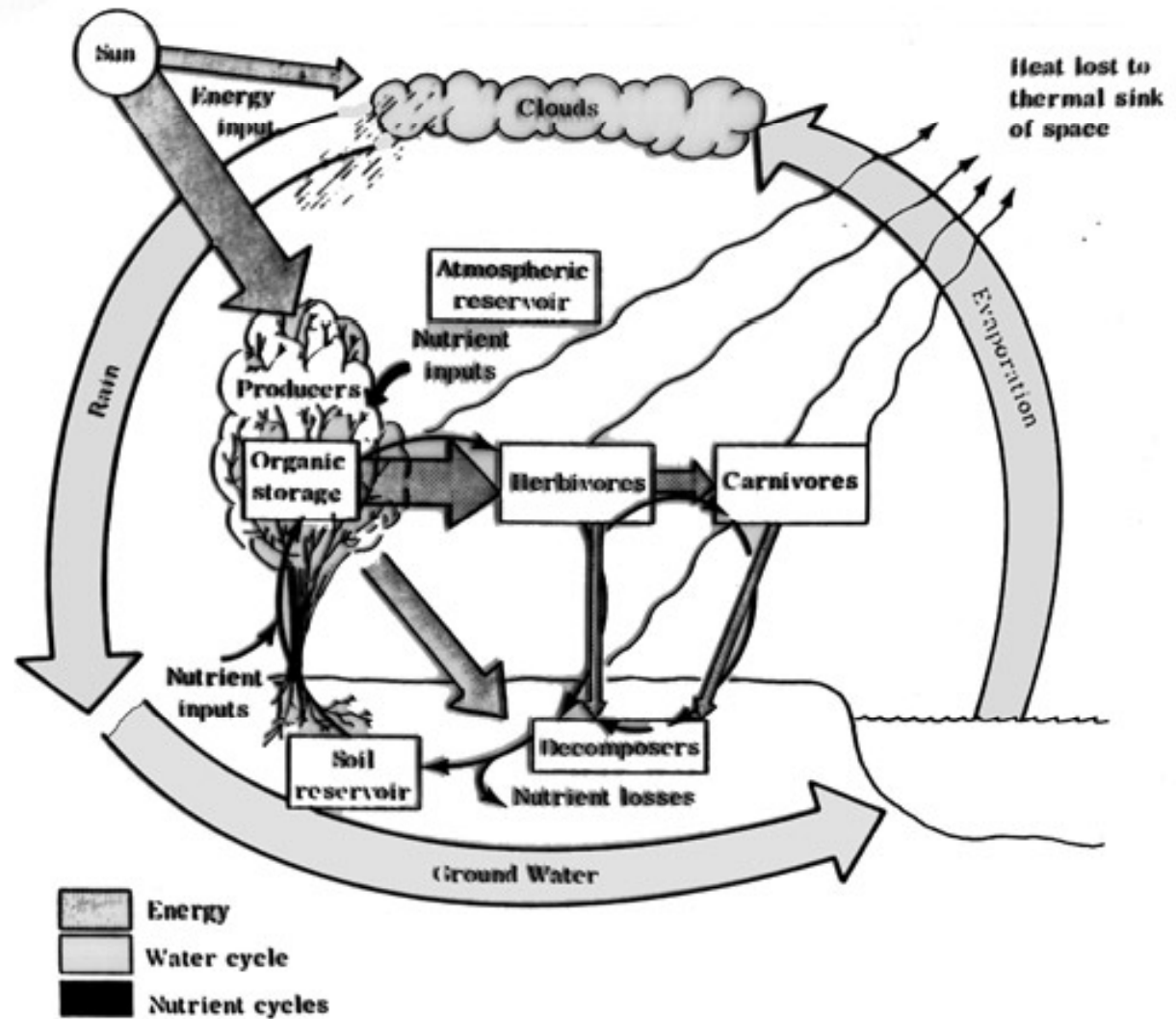
Recycle

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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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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Sustainable Business Practices

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