



Zero Waste
is the goal.

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Afternoon Agenda, speakers

- Tim Greiner, Pure Strategies
- Tom Wright, SustainableBusiness.com
- Chad Smith, Earthbound Farms
- Greg Cumberlandford, Gaia Herbs
- David Levine, Green Harvest Technologies

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



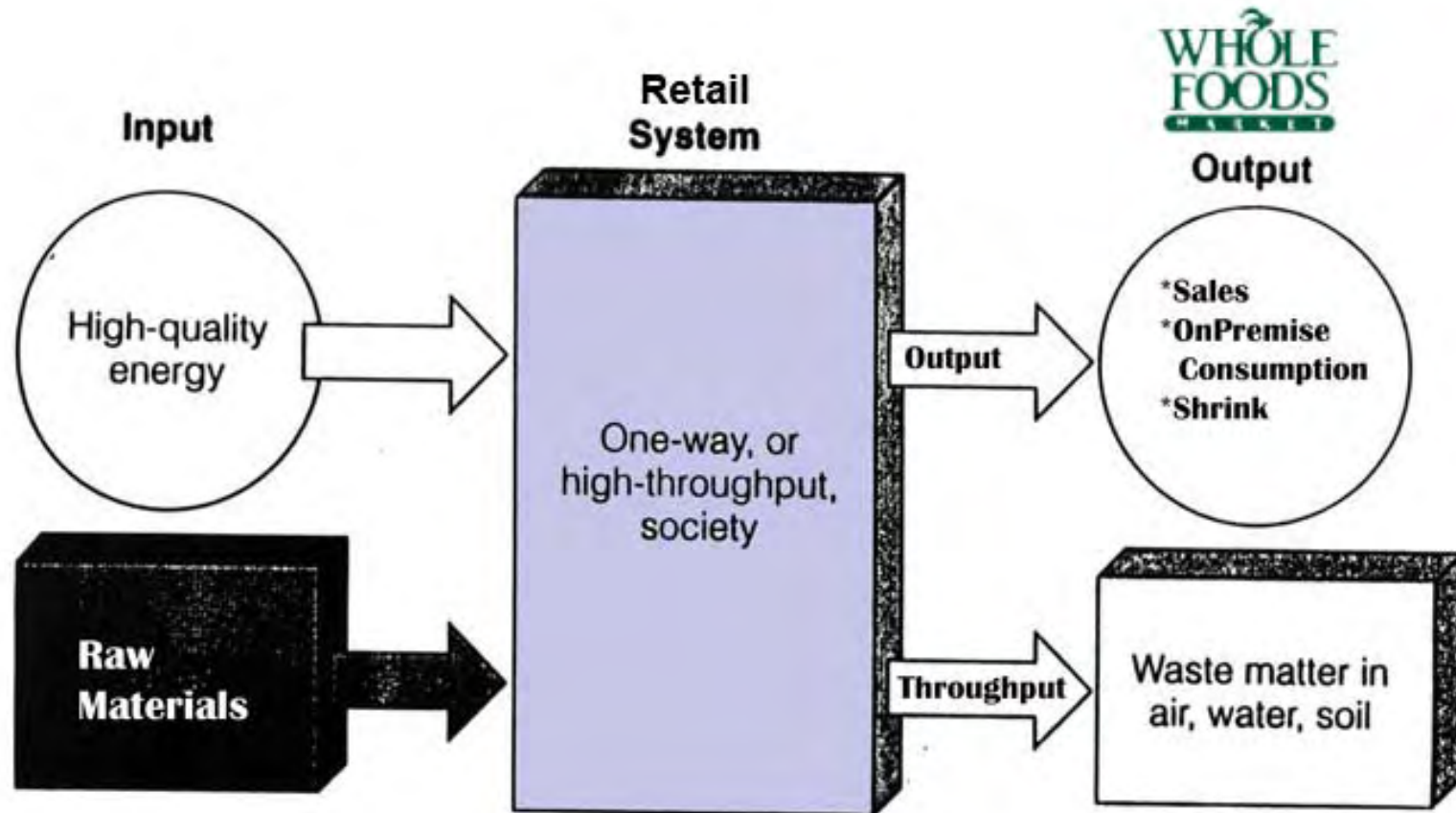
Sustainability:

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

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!



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 a "business" products contain a **technical nutrient** in which data, selections, computing, computers, and refrigerated products would afford in the product life cycle. Instead of a **defined user period**—say, ten thousand hours—the user's current life span on the product is the product, or are simply able to upgrade to a newer version, the manufacturer, and a **service** rather than a product. The **business** would receive the services they need, and the **product** would retain ownership of the materials themselves. In order for such a scenario to be **upcycled** rather than recycled—to retain high quality in a closed-loop composed of by "consumers," the **service** must be high-quality product, like a car part or a medical device—instead of being downcycled into a product of lower quality. A **technical nutrient** is a material that is designed to go to work, to be used, to be recycled, to be broken down, and to be re-used. In the context of a **product of service**, the **technical nutrient** is the **product** that is used, and the **product** is the **service** that is provided. When they finish using a complex material, the **product** is broken down into its **technical nutrient** and the **service** they need for use is provided. This is a concept that

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?’ ”

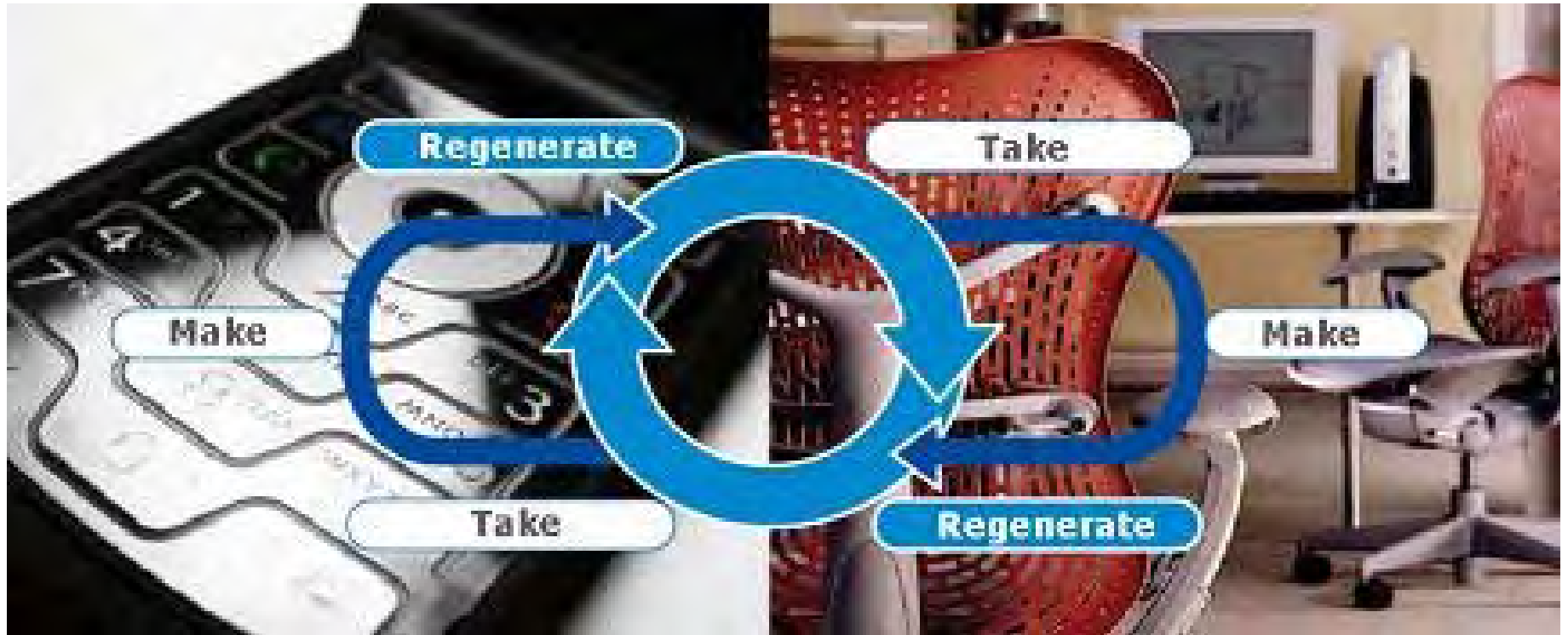
Biological Nutrients



Cradle to Cradle, William McDonough and Michael Braungart

Technical Nutrients

For example, plastics and metals

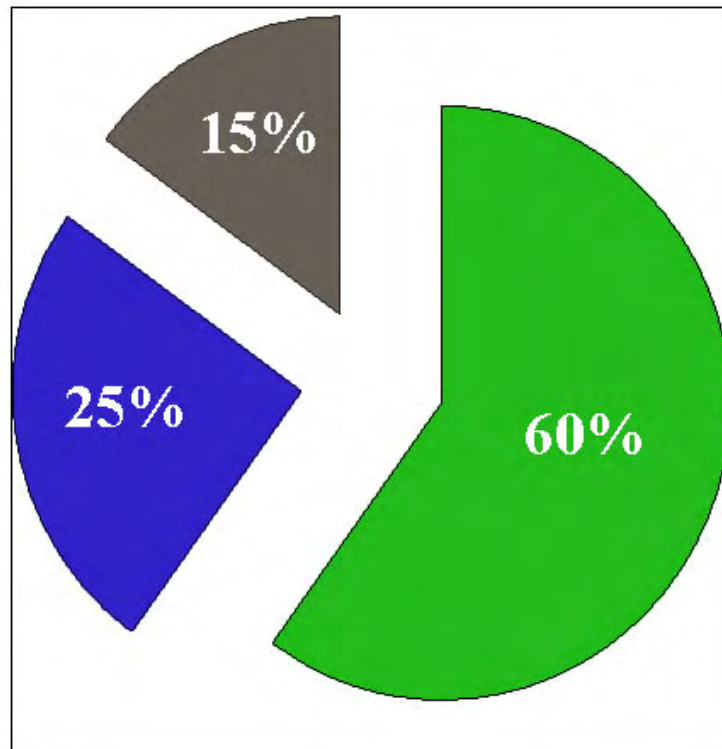


Cradle to Cradle, William McDonough and Michael Braungart

W HOLE Trash Audit 21 Hour Sample



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





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

Fossil Plastic is Polluting our Ecosphere at an Alarming Rate

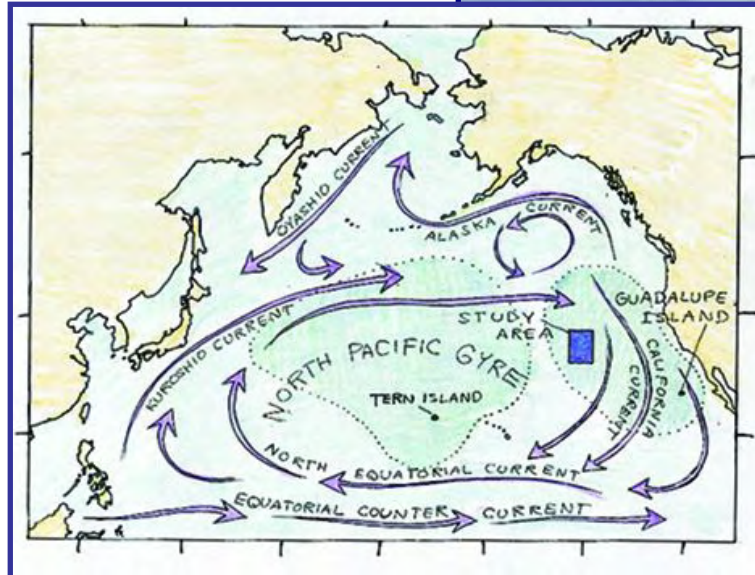
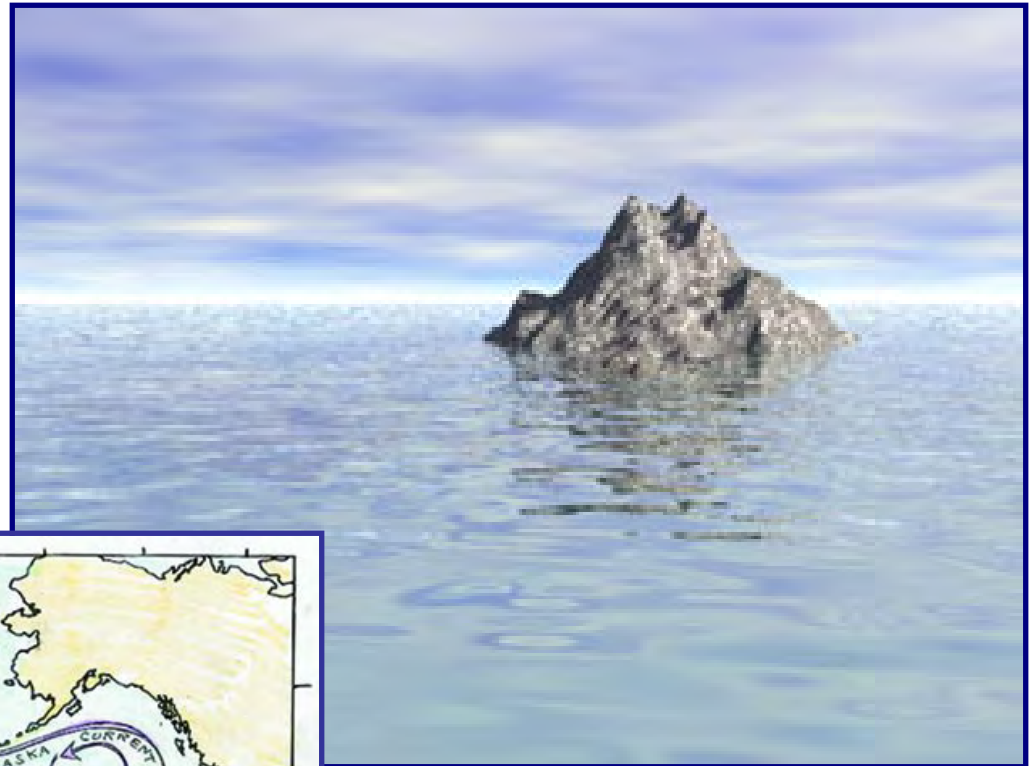


We can't close our eyes anymore and pretend it "goes away".

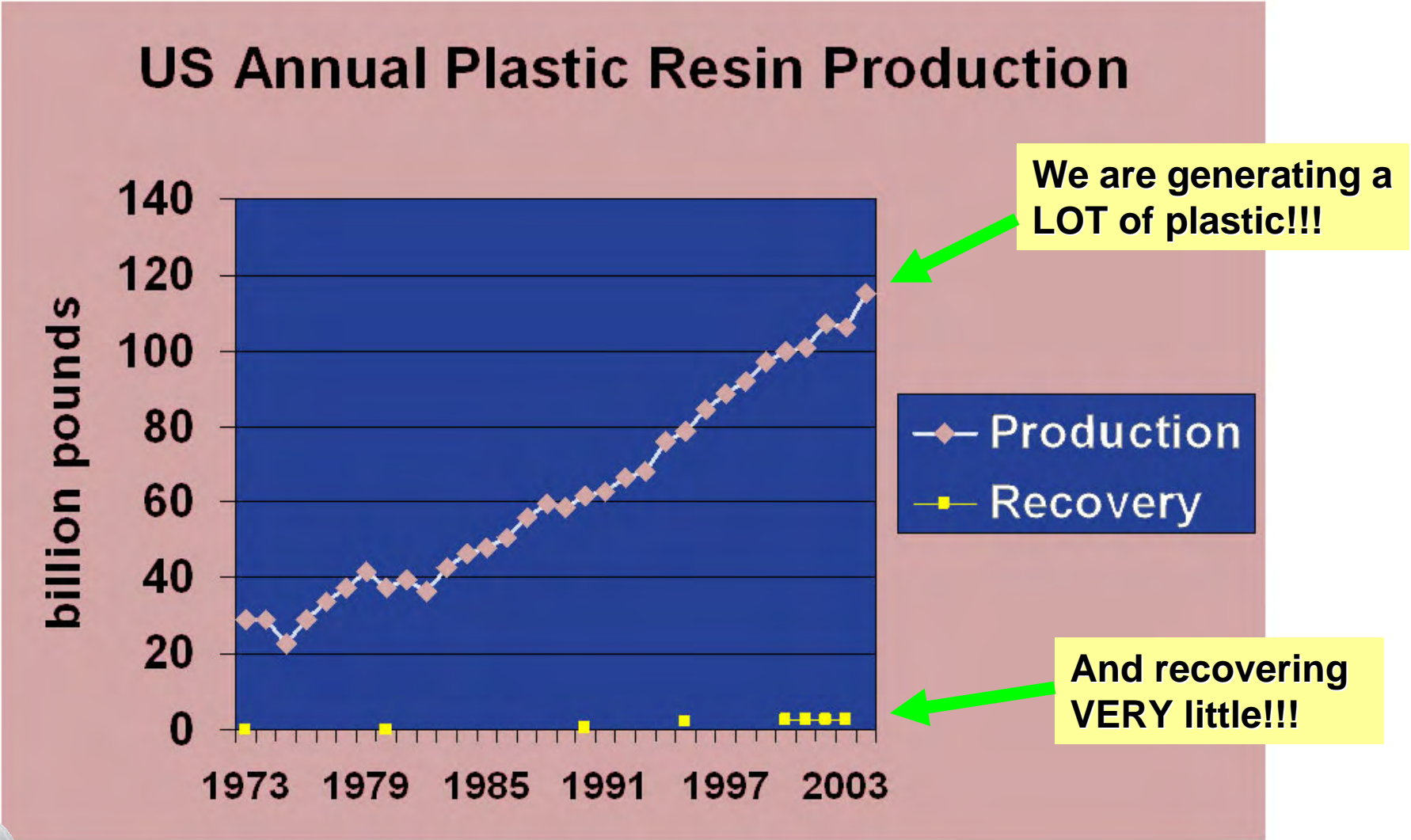
It doesn't go away-
"Every piece of fossil plastic ever manufactured still exists!"

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.



Virgin Plastic Production is Still on the Rise



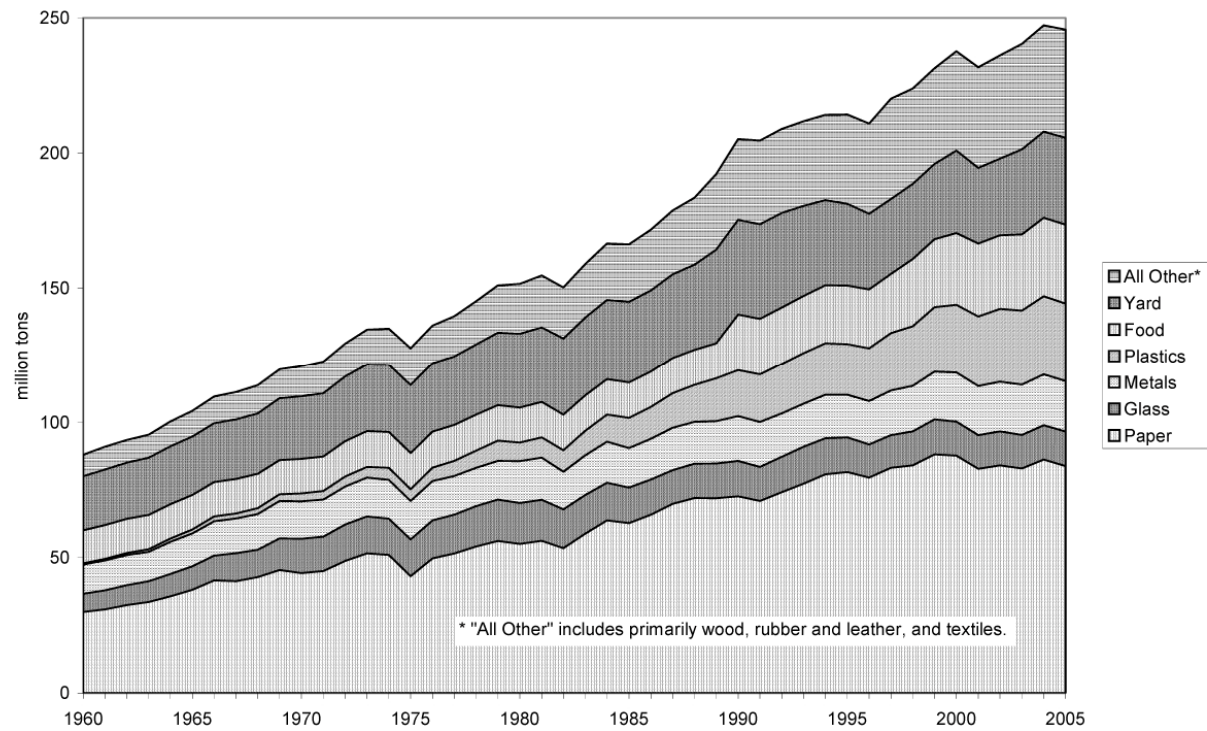
(APC, 2004)

Hydrocarbon Plastics – (The Myth of) the Chasing Arrows



All trash generated

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



Do we really need Fossil Plastics?



Only if they **REALLY** recycle.

A ZeroWaste Alliance:

<http://container-recycling.org/zbcwaste/links.htm>



How would we navigate to zero waste?



What are Green Plastics?

We learned:

Fossil plastics are 100% **HYDROCARBON** polymers that **DON'T** biodegrade in many lifetimes.

Green plastics contain **CARBOHYDRATE** polymers that **can be designed** to biodegrade.

It is now technologically possible to make plastics using green cells rather than fossil fuels.



Sources of Biopolymers for Green Plastics

Cellulose (Ag
and forest
wastes)

Wood

Cotton

Corn

Wheat

Soy

Tapioca

Potatoes

Etcetera



Zero Waste Mission- USDA Ag Service

Commodity



Product

Cheese, juice, ethanol, flour, vegetable oils, biodiesel, eggs, textiles



“Waste”

Whey, pulp, glycerol, feathers, peel, sugar beet fiber



Biobased Packaging

Biopolymers, PLA, PHA, composites, films, coatings, monomers

Common polymers designed to recycle, not compost.

- PE (polyethylene) can be derived from a green cell; sugar cane being used by Braskem in Brazil.
- PP (#5, polypropylene) from biobased source being designed for use in Mazdas

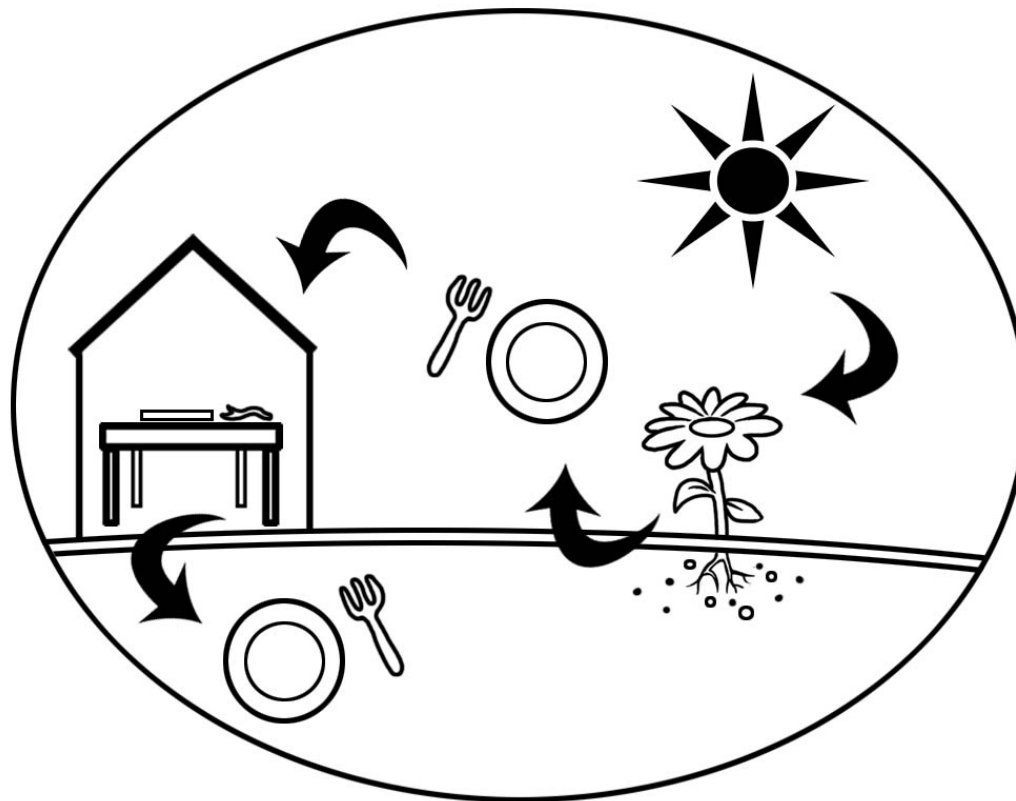
Green Plastics

- Biopolymer(s) +
 - Plasticizer(s) +
 - Other additives
- = BIOplastic

SOME bioplastics are certified compostable (ASTM 6400). Yet that does not mean marine biodegradability.





To Stop Accumulation of Waste We Must Focus on Two Principles

1. Live off current solar income
2. There is no waste (**waste is food for something else**).



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

PLA is a molecule, not a brand. (**P**oly**l**actic **a**cid or **P**oly**l**actide)

- PHA, & PHB are also molecules.
- Green cell based “bioplastics”
- Also synthetic and biobased hybrids that refer to themselves as “green”
- Certified compostable: BPI, DinCertco, etc.
- Goal: non-GMO crop source

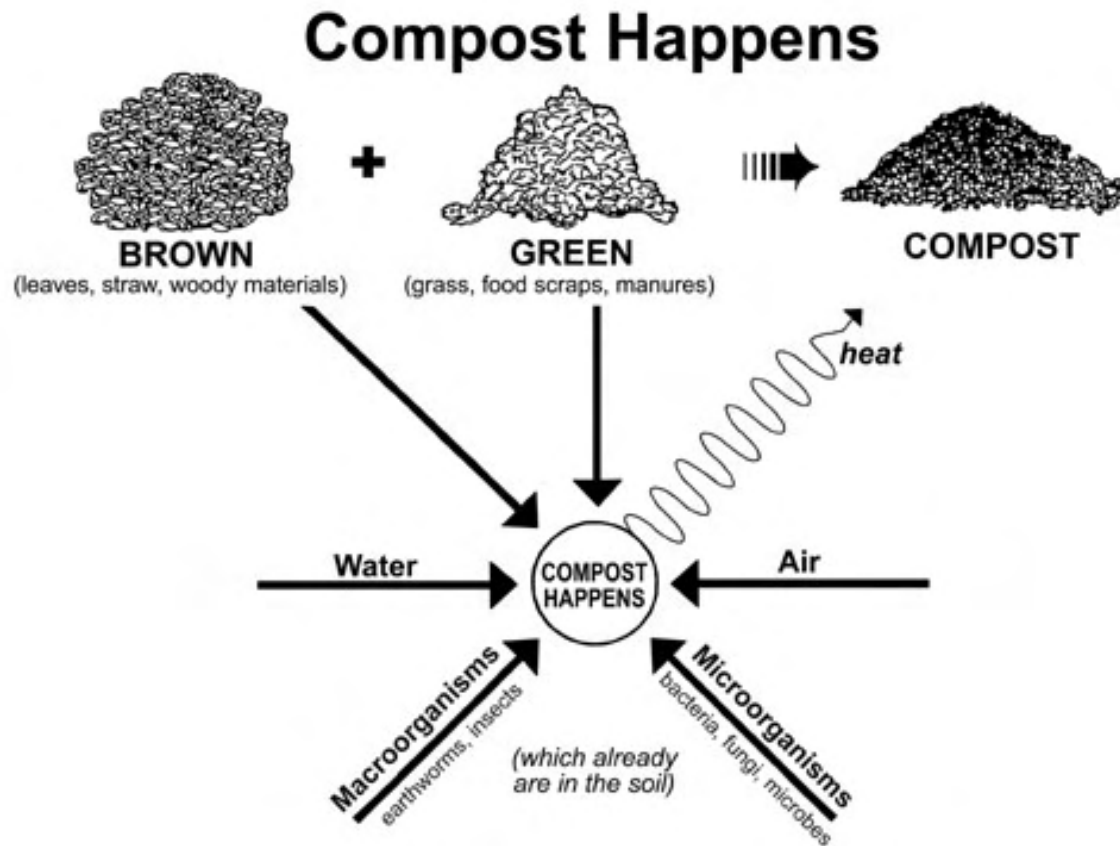
It deserves it's own identity
and number.



What is industrial-scale composting?

- Large-scale facilities designed to process organic “wastes” into stable, humified and re-usable products which can be used in landscaping, horticulture and agriculture and a number of specialized applications
- Controlled decomposition of organic “wastes” with minimum impact on air, soil and water quality
- Hot composting process –achieve pasteurization of materials (>55°C)
- Key infrastructure to recycle organic “wastes” into re-usable products, and to reduce our dependence on landfilling
- Facilities designed to process organic materials on a regional basis from municipal, commercial / industrial and construction / demolition sources

Food wastes blend with yard wastes.



So What is the Answer?

Changing Views, Taking Action

Problem:

Plastic Accumulation Worldwide

**Plastic doesn't biodegrade.
Beaches around the world are
inundated with fossil plastic
debris.**

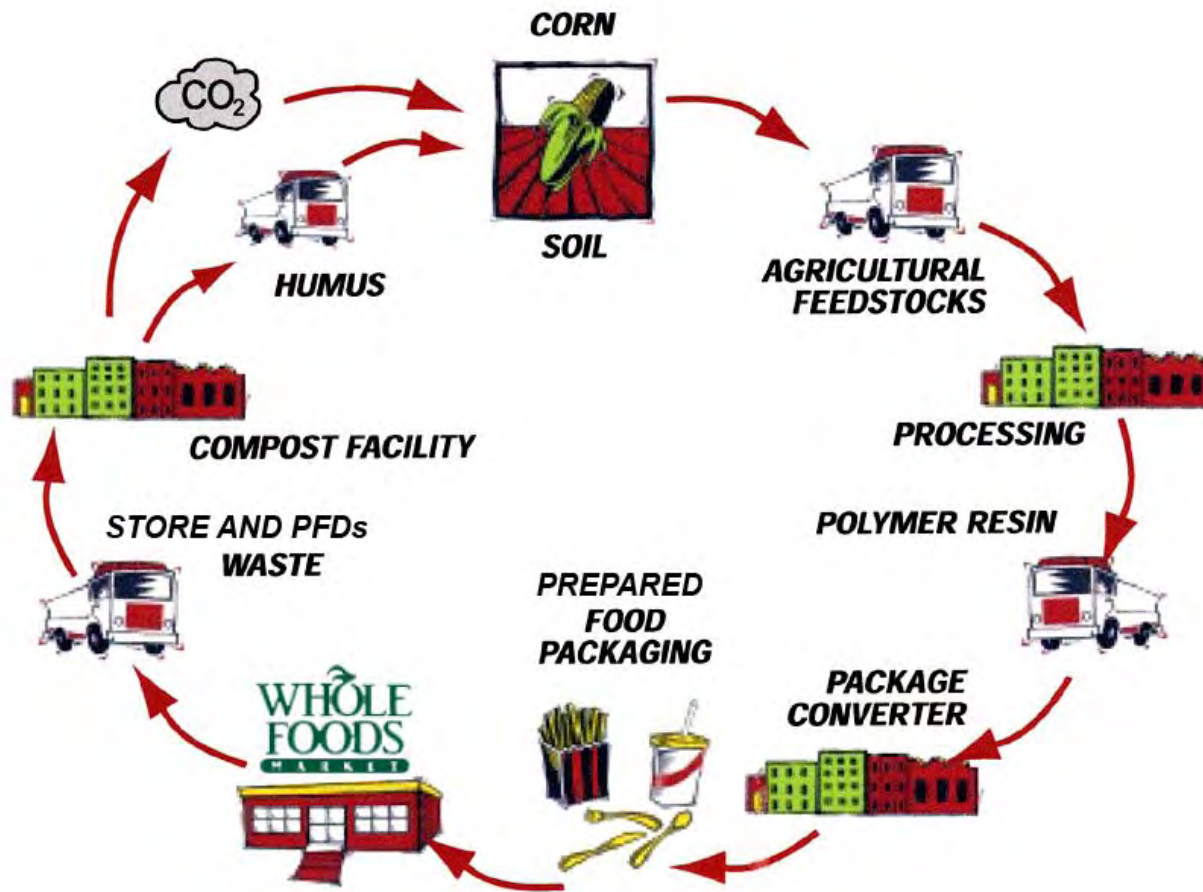


Solution:

Change How We Think About Plastic

**If civilization is to survive
healthily and indefinitely on this
planet, then we must change the
way we create, consume, and
discard plastic.**

We pack our lunch in a bag that will
be around long after we're gone.



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

Producers of Green Plastics

The list is growing. For information on compostable green plastics and 3rd party certifiers go to:

US: Biodegradable Plastics Institute

<http://www.bpiworld.org/BPI-Public/Approved.html>

European Union: DIN Certco Certification

<http://www.din-certco.de/index.php?lang=en>

Brussels: Vincotte International nv/sa

<http://www.aib-vincotte.com>

Japan: Biodegradable Plastics Society of Japan

http://www.bpsweb.net/02_english/03_new_e/what_g/what.htm

Green Products Now Available



cellulose films



We all have the choice.





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Responsible Inquiry

- In your group select a problem in the lifecycle of biobased materials that if solved would aid us in making it more sustainable.
- Try to design a solution using Aggregated Demand /Materials Pooling or another collaborative strategy.