Climate Change and the Circular Economy: How Green Chemistry Connects

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Sally Edwards, moderator

Panelists: John Ortiz, HP Inc.

Arlan Peters, Novozymes North America

Jon Smieja, Steelcase

GREEN CHEMISTRY & COMMERCE COUNCIL

Business Mainstreaming Green Chemistry

Why isn’t green chemistry mentioned more often as a strategy for addressing global climate change?

Why isn’t green chemistry more central to discussions about implementing a circular economy?

SETAC International Workshop - 2013

How will global climate change influence the environmental impacts of chemicals and other stressors and the way we assess and manage them in the environment?

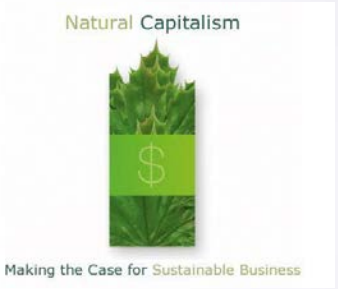
Circular Economy

- A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, ***eliminates the use of toxic chemicals***, which impair reuse and return to the biosphere, and aims for the elimination of waste through the superior design of materials, products, systems and business models.

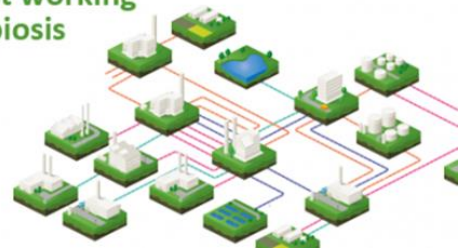
- *Ellen MacArthur Foundation, 2014*

Forerunners to the circular economy

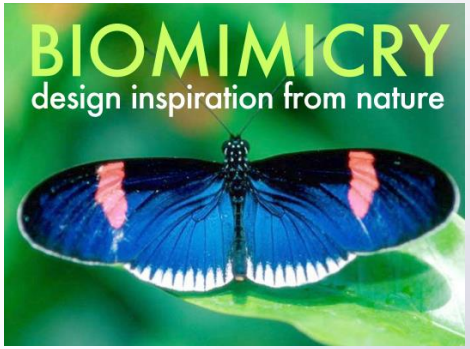
ZEROWASTE



Kalundborg Symbiosis
The world's first working industrial symbiosis



cradle to cradle®



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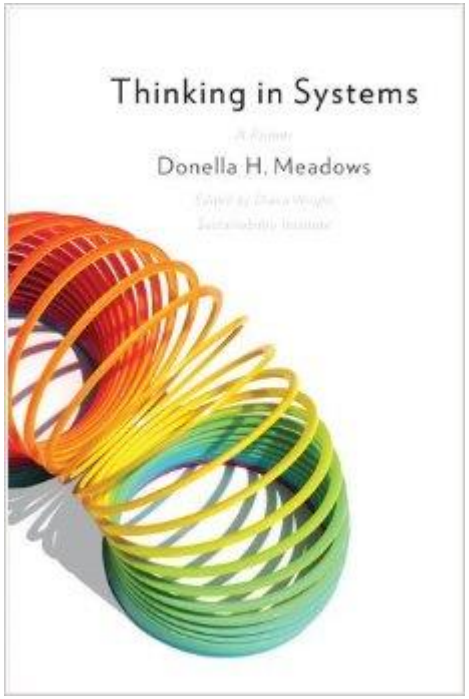
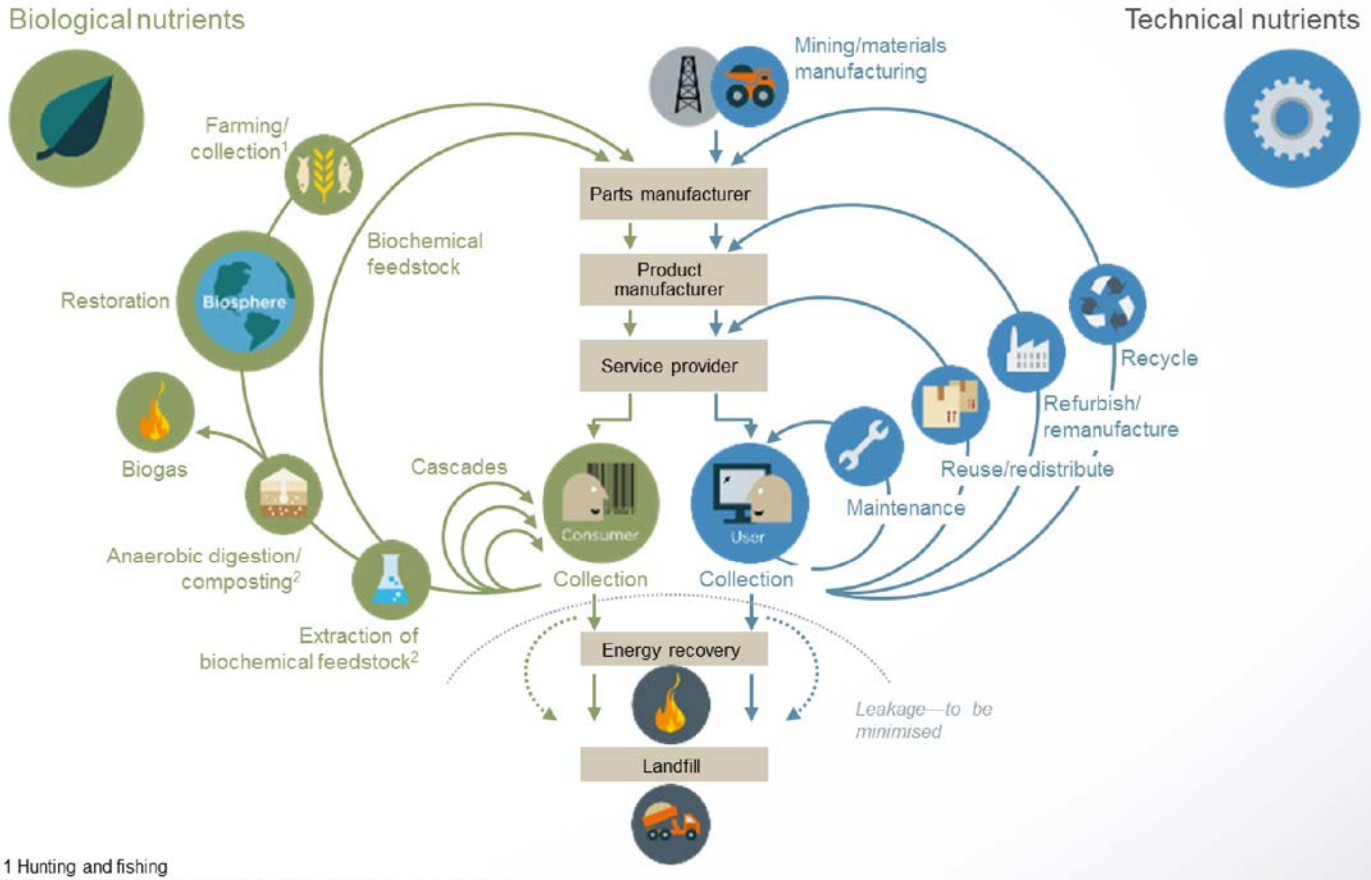
Principles of a circular economy



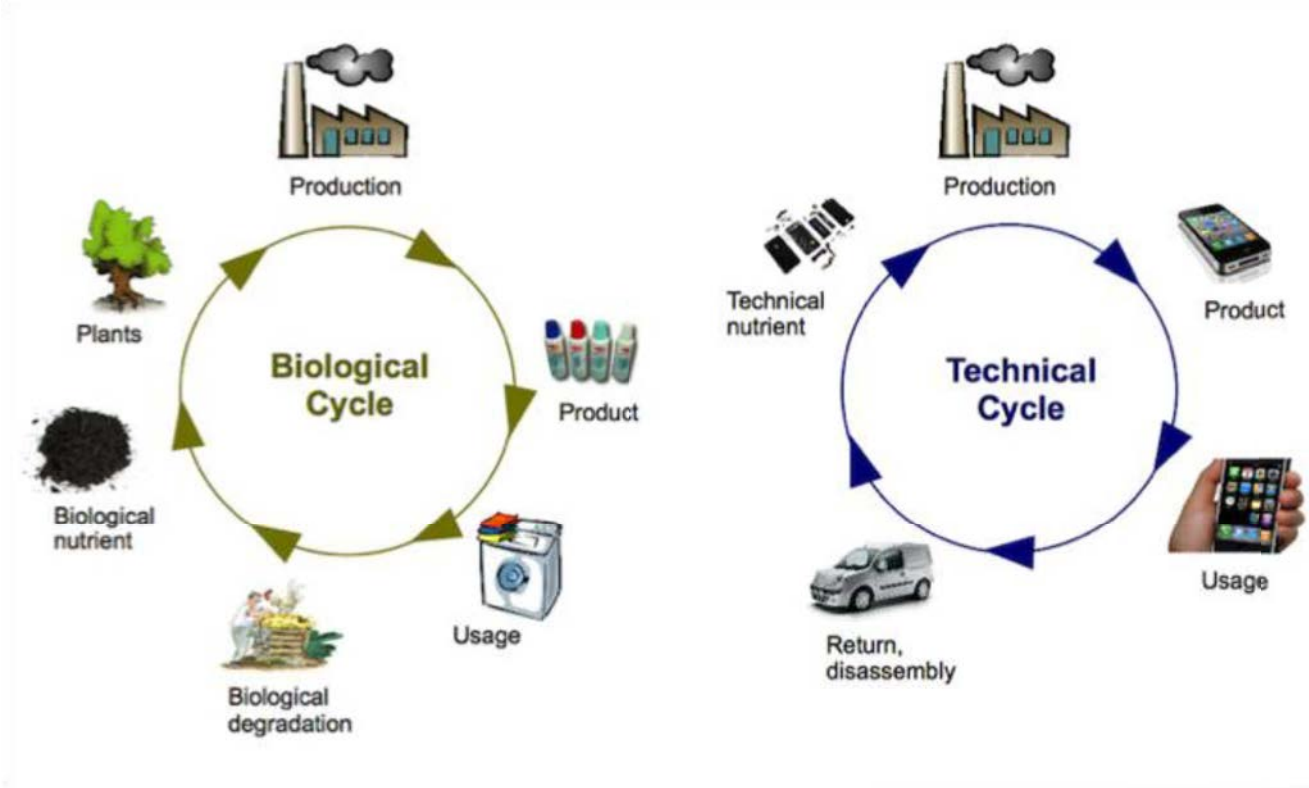
An industrial system that is restorative by design



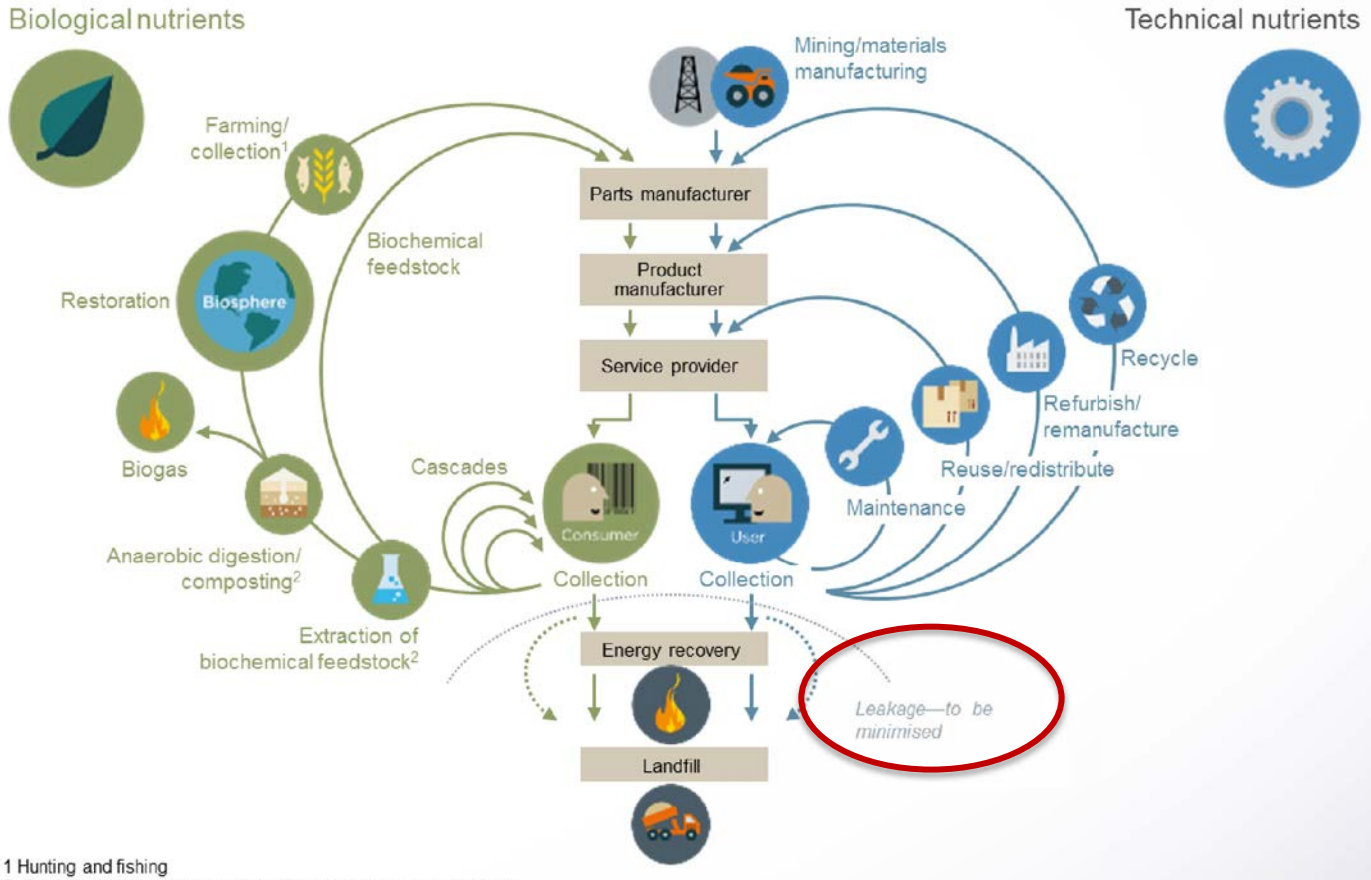
1 Hunting and fishing
2 Can take both postharvest and postconsumer waste as an input

Source: Ellen MacArthur Foundation circular economy team drawing from Braungart & McDonough and Cradle to Cradle (C2C)

Biological and technical nutrients



An industrial system that is restorative by design?



1 Hunting and fishing
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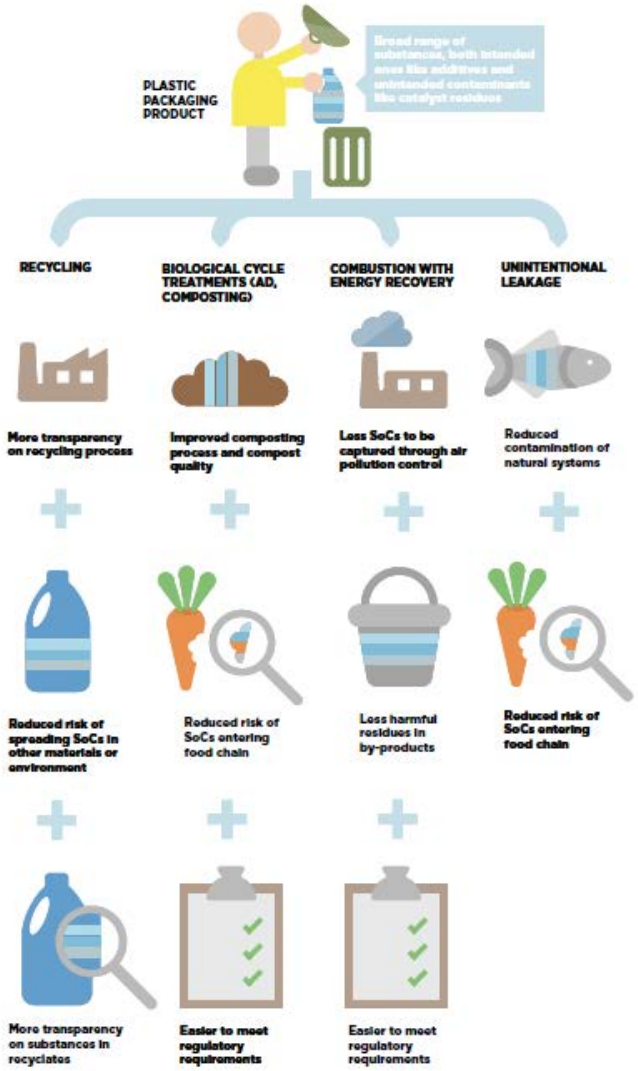
Building blocks of the circular economy

Skills in circular design and production	Material choice optimized for circularity Design to last More modularization/ standardization Easier disassembly Production process efficiency
New business models	Usage based Products as service
Skills in building cascades/ reverse cycles	Collection systems: User-friendly, cost-effective, quality-preserving Treatment/extraction technology: optimize volume and quality
Enablers to improve cross-cycle/cross-sector performance	Collaboration, investment, regulation, education

FIGURE 18: DESIGNING PLASTICS WITHOUT SUBSTANCES OF CONCERN HELPS ENABLE SAFE AND EFFECTIVE AFTER-USE PATHWAYS



Source: Project MainStream analysis, expert interviews

EU Policy Discussions

November 2015: The European Parliament adopted a resolution: *'EU Commission should not authorise the recycling of plastics that contain the banned PVC softener DEHP because it poses a reproductive toxicity threat to exposed workers."*

April 2016: EU approves use of recycled plastics containing DEHP, stating the measure was needed to reduce the amount of waste material.

Policies for a “clean” circular economy

- Phase out chemicals of very high concern in products
- Implement faster assessment of chemicals of high concern and alternatives
- Improve information flow on hazardous materials in products
- Do not promote recycling of persistent organic pollutants that endangers high quality recycling and allows ongoing exposure

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