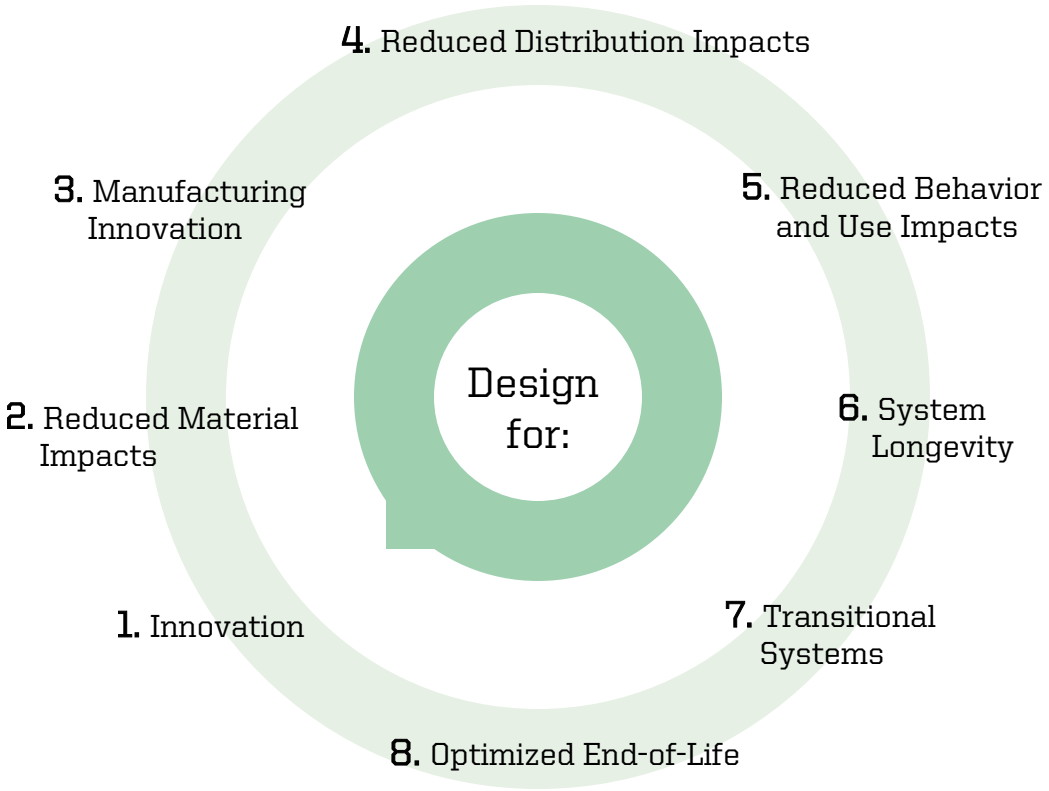
Ecodesign Strategy Wheel

The Okala Ecodesign Strategy Wheel



Ecodesign strategies help designers and system developers imagine new opportunities.

The Okala Ecodesign Strategy Wheel[1] organizes the strategies according to the phases of the lifecycle.

It serves as a powerful brainstorming tool to explore areas of product development that have not yet been considered.

1. Modified from the Ecodesign Strategy Wheel, J. Brezet and C. Van Hemel, *Ecodesign, a Promising approach to Sustainable Production and Consumption,* UNEP, 1997

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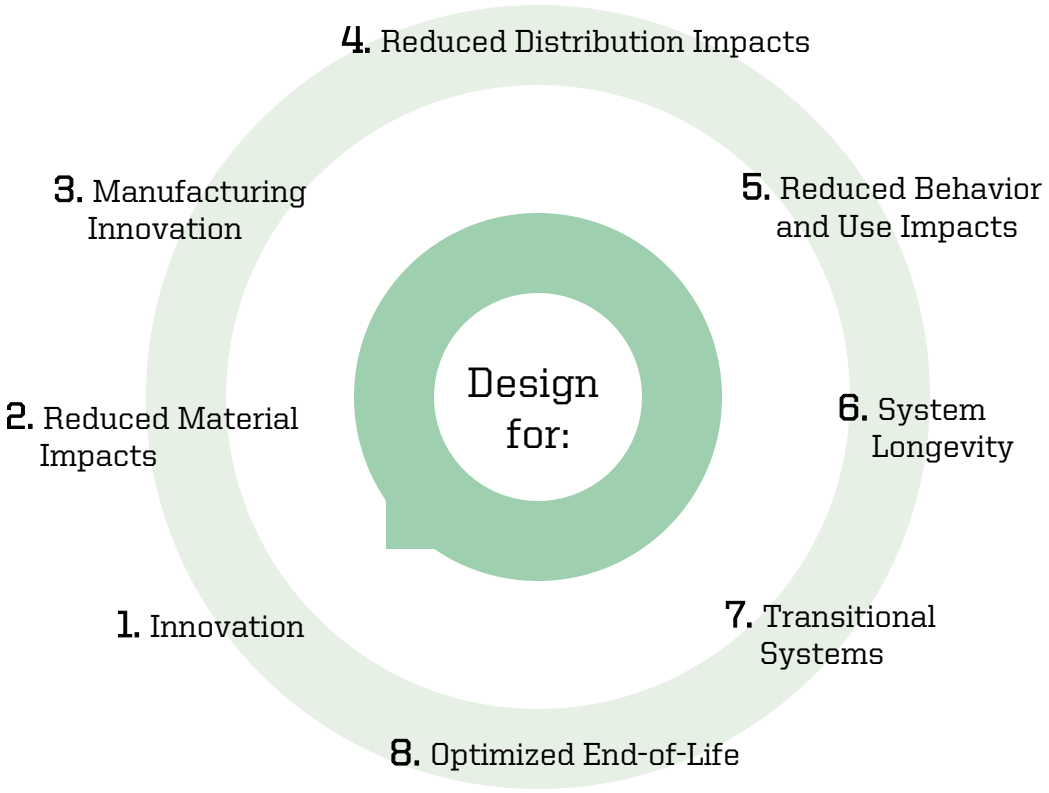
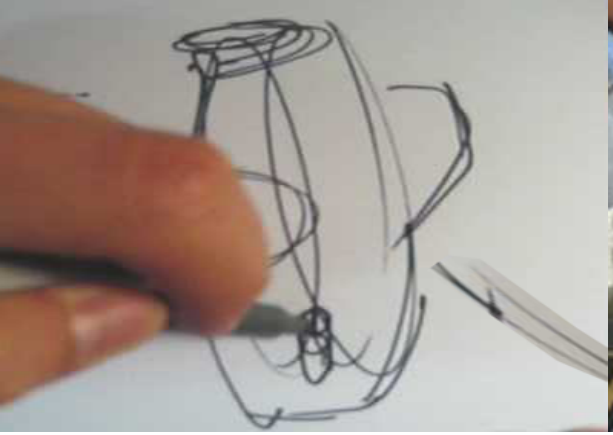


The beginning of the cycle references the creative inception of the product: design for innovation.

Continuing clockwise, design decisions such as material choices, manufacturing and distribution, behavior patterns, length of system life, intermediate configurations and end of life occur sequentially.

Depending on the context, each ecodesign strategy can be applied more or less successfully. They are not universally beneficial in all situations.

We next explore each of these strategy categories in detail.



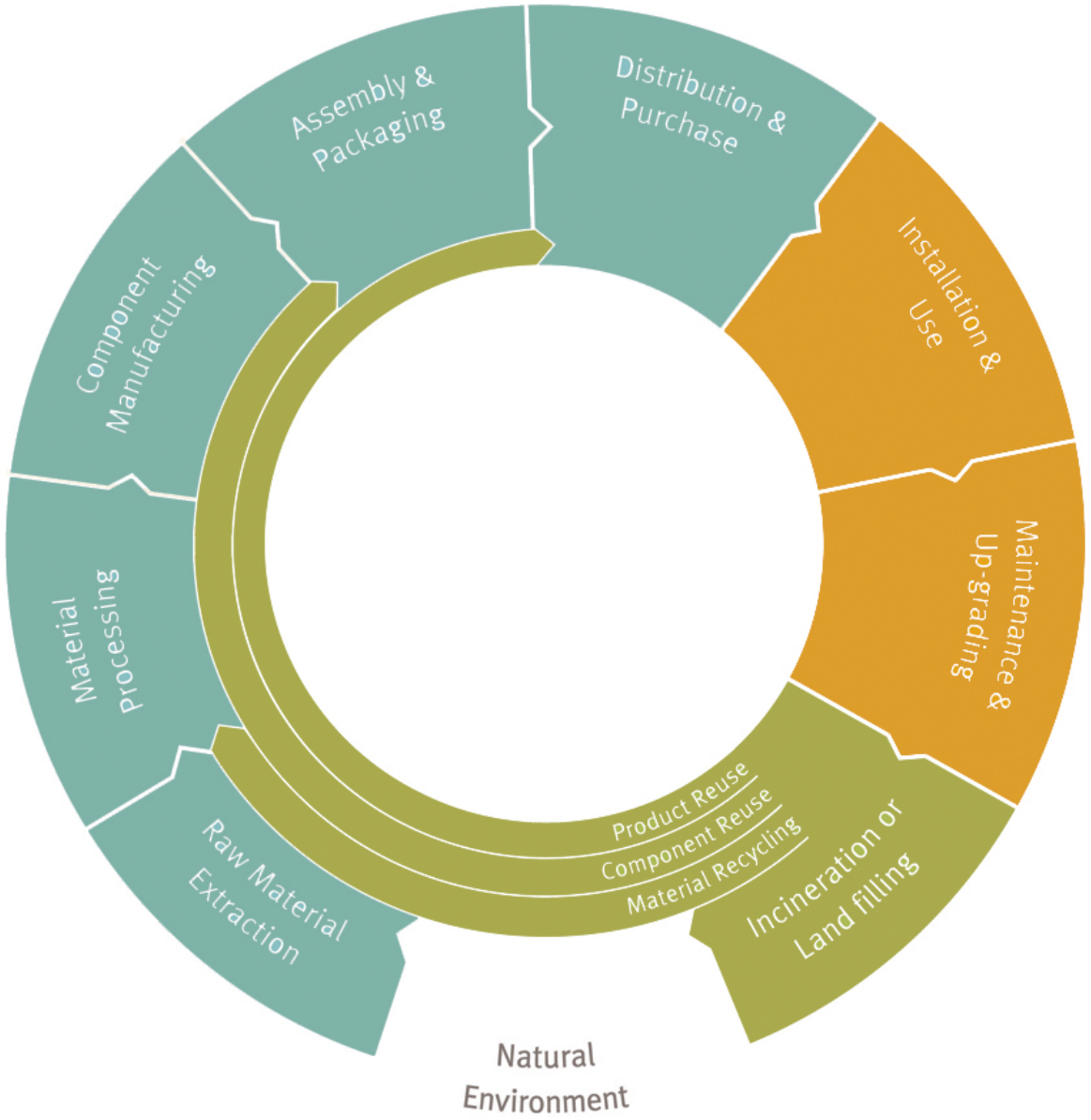
Life Cycle Design

Ecodesign requires thinking about the entire product life-cycle. All steps in the design, manufacture, distribution, use, disposal or re-use of a product result in environmental impacts.

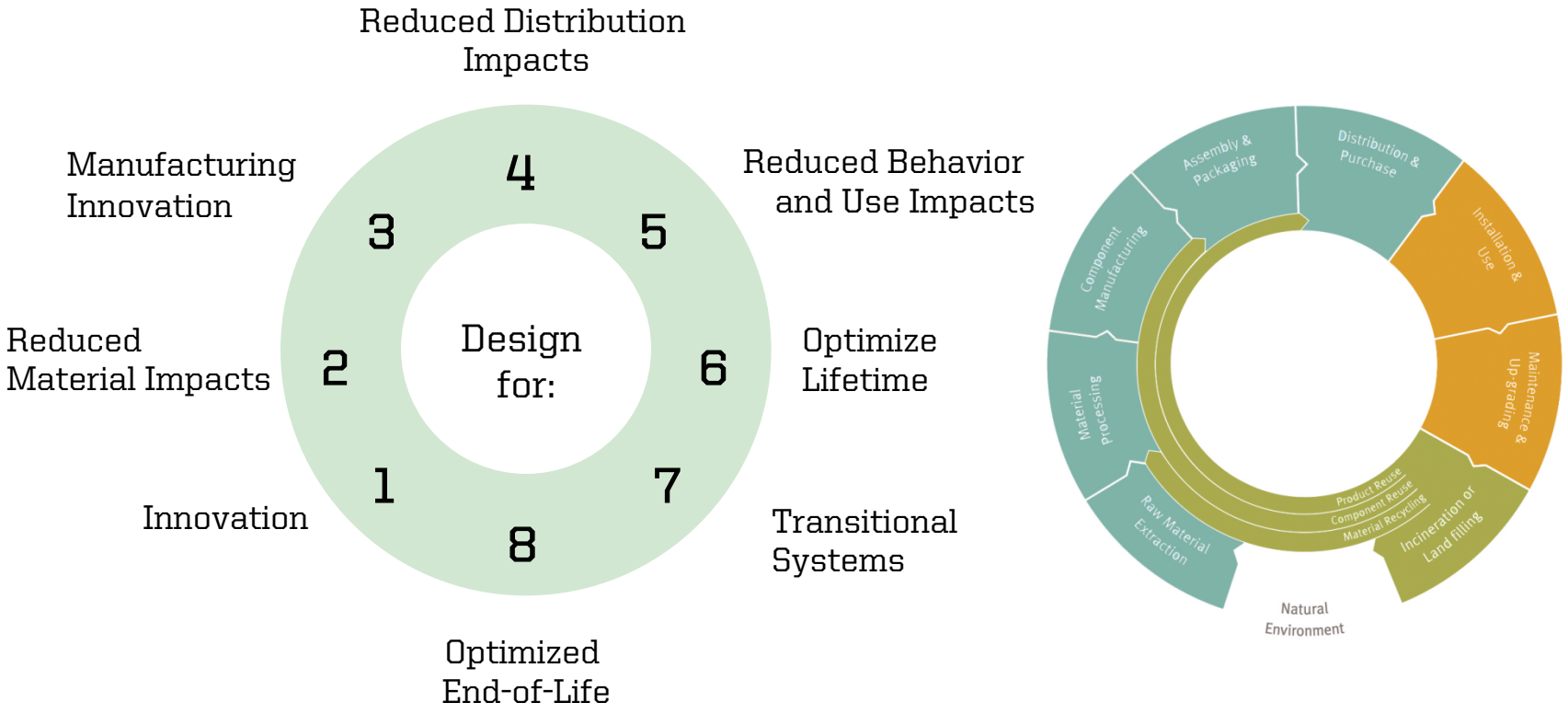

Phases in a product's life cycle

Raw material extraction	Wood from forest, oil from well, metal ore from mine, etc.
Material processing	Wood to paper, oil to plastic, ores to metal alloys, etc.
Component manufacturing	Paper printed, plastic molded, alloys into circuitry, etc.
Assembly & packaging	Product is assembled and packaged with documentation.
Distribution & purchase	Product is distributed and purchased.
Installation & use	Energy and additional materials may be used.
Maintenance & upgrading	Product cleaned, parts replaced or upgraded.
Transport (among all phases)	Via train, truck, car, automobile, sea vessel or airplane.
Reuse, recycling or composting	Product or component reuse or material recycling.
Incineration or landfilling	Product or components are burned or buried in landfill.

Product life cycle phases



Okala Ecodesign Strategy Wheel*



* Modified from the Ecodesign Strategy Wheel, J. Brezet and C. Van Hemel, 1997

Okala Ecodesign Strategy Wheel

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Design for:

1. Innovation

- Rethink how to provide the benefit
- Design flexibility for technological changes
- Provide product as service
- Serve needs provided by associated products
- Share among multiple users
- Design to mimic biological systems
- Use living organisms in product
- Create opportunity for local supply chains

2. Reduced Material Impacts

- Avoid materials that damage human or ecological health
- Avoid materials that deplete natural resources
- Minimize the quantity of materials
- Use recycled or reclaimed materials
- Use renewable resources
- Use materials from reliable certifiers
- Use waste byproducts

3. Manufacturing Innovation

- Minimize manufacturing waste
- Design for production quality control
- Minimize energy use in production
- Use carbon neutral energy sources
- Minimize number of production steps
- Minimize the number of parts /materials
- Seek to eliminate toxic emissions

4. Reduced Distribution Impacts

- Reduce product and packaging weight
- Reduce product and packaging volume
- Develop reusable packaging systems
- Use lowest-impact transport system
- Source local materials and production

5. Reduced Behavior and Use Impacts

- Design to encourage low-consumption behavior
- Reduce energy during use
- Reduce material consumption during use
- Reduce water consumption during use
- Seek to eliminate toxic emissions during use
- Design for carbon-neutral or renewable energy

6. System Longevity

- Design for durability
- Foster emotional connection to product
- Design for maintenance and easy repair
- Design for reuse and exchange of products
- Create timeless aesthetic appeal

7. Transitional systems

- Design upgradable products
- Design for second life with different function
- Provide for reuse of components

8. Optimized End-of-Life

- Design for fast manual or automated disassembly
- Design recycling business model
- Use recyclable non-toxic materials
- Provide ability to biodegrade
- Integrate methods for used product collection
- Design for safe disposal

Download a free copy of the **Okala Ecodesign Strategy App** at: **www.okala.net**

Okala Ecodesign Strategy Wheel

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J. Brezet and C. Van Hemel, 1997

Category

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Ecodesign Strategy (in a category)

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1. Design for Innovation

- Rethink how to provide the benefit
- Design flexibility for technological changes
- Provide product as service
- **Serve needs provided by associated products**

  Use a systems approach, consider how to effectively integrate associated products.
- Share among multiple users
- Design to mimic biological systems
- Use living organisms in product
- Create opportunity for a local supply chain

Consolidate functions
The Swiss Army Knife provides a retractable blade, screwdriver, bottle opener, and many other useful tools in a pocket-sized format.

Caution: Designers are often asked to add unnecessary features to a design.
Excellent design avoids unnecessary functions.

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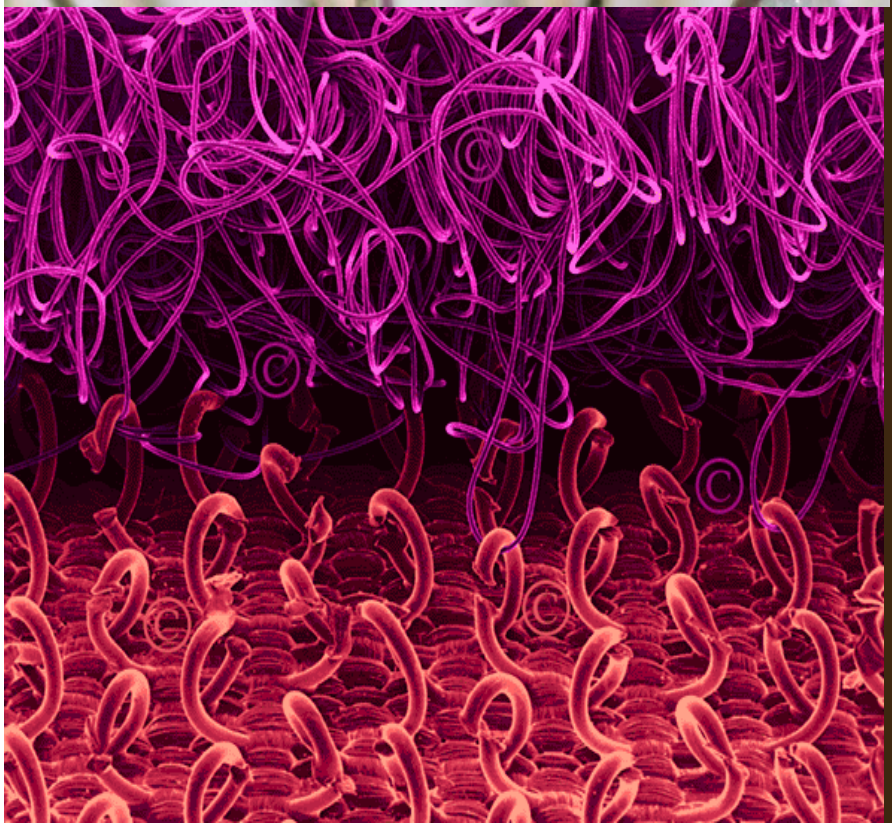

Biomimicry

Biomimicry applies a physical principle from an organism to the design of a product.

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- **Create opportunity for a local supply chain**

Recycled Aluminum Products
If there is a smelter in your region, there is an opportunity to design recycled aluminum products from a local source.

2. Design for Reduced Material Impacts

- **Avoid materials that damage human or ecological health**
- Avoid materials that deplete natural resources
- Minimize the quantity of materials
- Use recycled or reclaimed materials
- Use renewable resources
- Use materials from reliable certifiers
- Use waste byproducts

Lithium batteries

Rechargeable Lithium batteries are much less toxic than Lead or Cadmium batteries.

2. Design for Reduced Material Impacts

- Avoid materials that damage human or ecological health
- Avoid materials that deplete natural resources
- **Minimize the quantity of materials**
- Use recycled or reclaimed materials
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NYX backpacker cot
Terra Strenua Outfitters

This collapsible backpacker cot uses little material to minimize weight.

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- Minimize the quantity of materials
- **Use recycled or reclaimed materials**
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Transit chair
by Atelier Boris Bally

Fabricated from redundant roadside signs, these chairs are available as a flat pack self-assembly kit.

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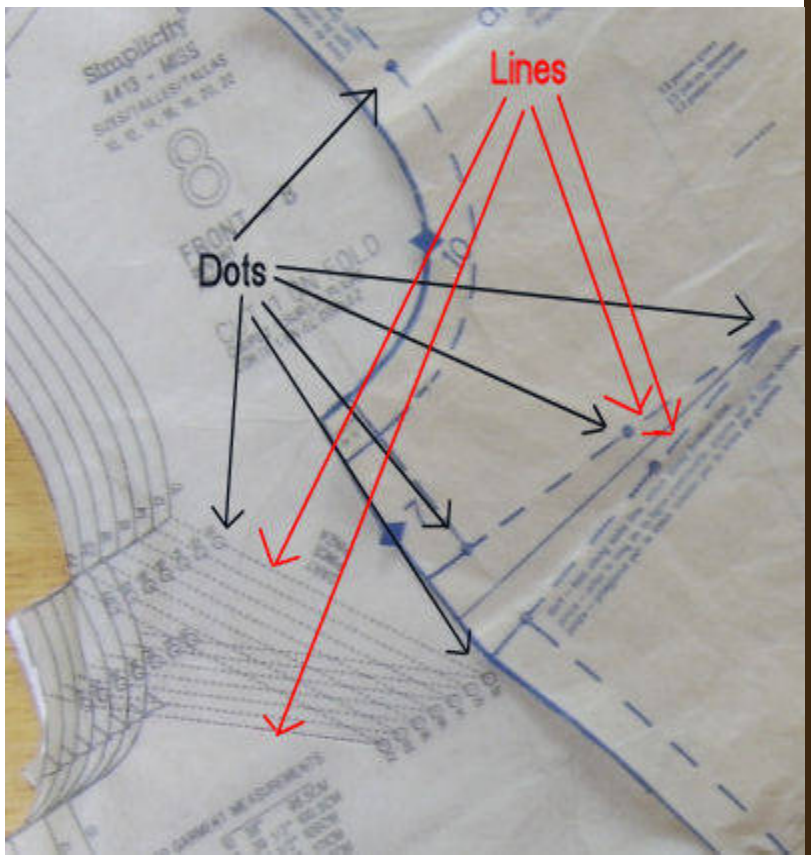
- Use waste byproducts

Carabanchel 16
by Foreign Architects Office

Bamboo grows quickly and delivers large quantities per area-year. Bamboo panels on this building in Madrid allow inhabitants to control air and light flow.

3. Manufacturing Innovation

- **Minimize manufacturing waste**
- Design for production quality control
- Minimize energy use in production
- Use carbon neutral energy sources
- Minimize number of production steps
- Minimize the number of parts /materials
- Seek to eliminate toxic emissions



Minimize Manufacturing Waste

Careful planning can limit factory waste and reduce material and disposal impacts.

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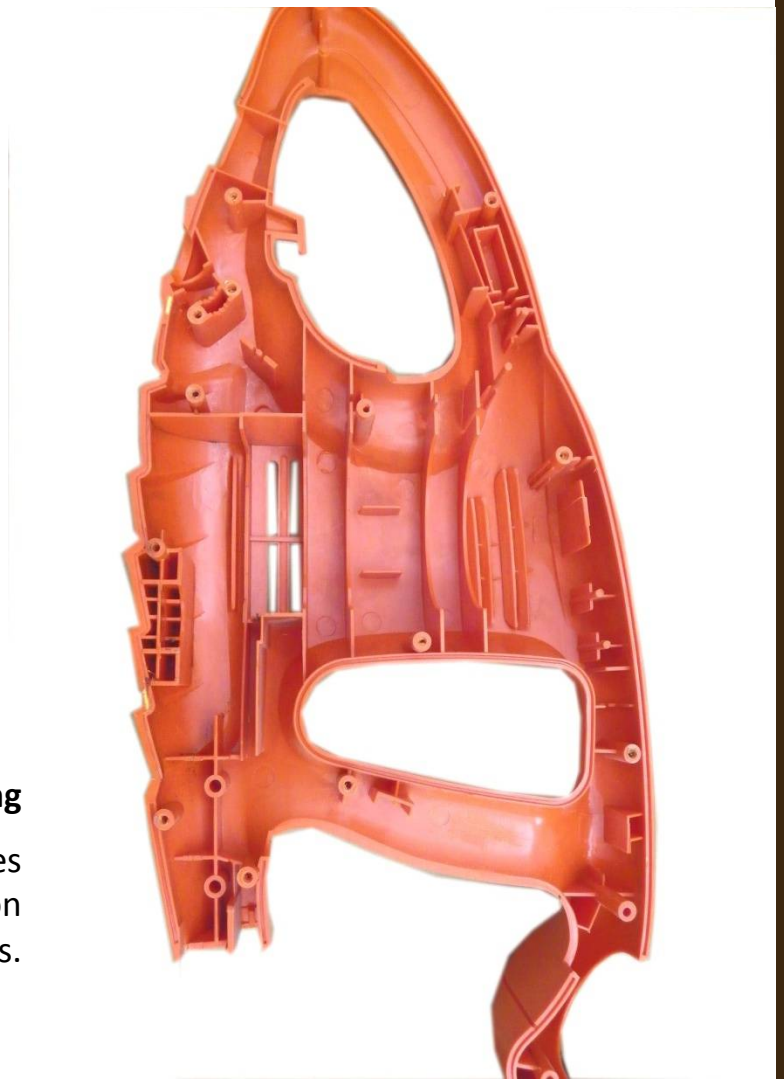

Injection molded housing

One part that integrates fasteners, connectors, and provides all external protection for a product (such as this injection molded part) eliminates extra parts and production steps.

4. Reduced Distribution Impacts

- **Reduce product and packaging weight**
- Reduce product and packaging volume
- Develop reusable packaging systems
- Use lowest-impact transport system
- Source local materials and production

Air box

This securely sealed inflatable polyethylene bag works for multiple shipping applications.

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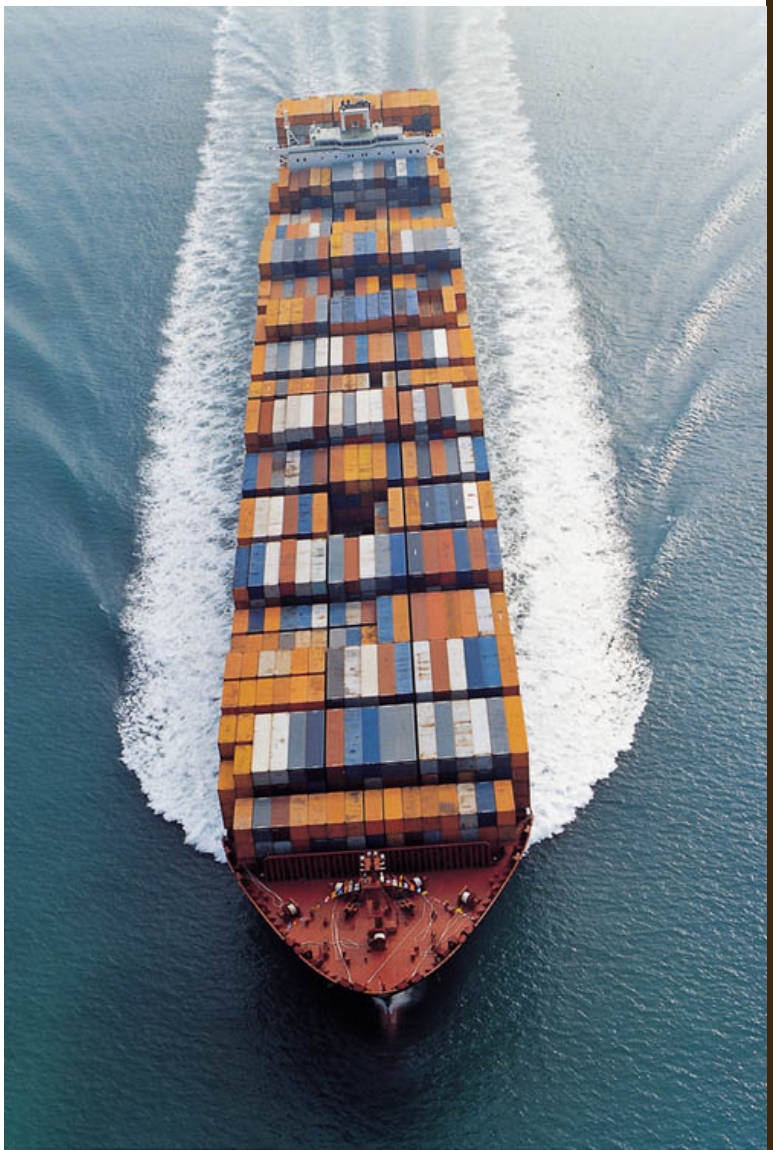

Container ship

Shipping by ocean freighter is usually less impacting than shipping overland.

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- Reduce product and packaging volume
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- Use lowest-impact transport system
- **Source local materials and production**

Bench from local wood

A street bench made from wood that is locally grown (or from the region) reduces transport distances.

5. Reduced Behavior and Use Impacts

- Design to encourage low-consumption behavior
- Reduce energy during use
- **Reduce material consumption during use**
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Metal coffee filter

Designing a reusable coffee filter eliminates consumption of paper filters.

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Sink/Toilet
by Rico's Watercloset

This system stores water from washing hands and reuses it in the toilet.

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Cross-BreedsShopping-Cart
by Cannondale

This combination bike and shopping cart reduces reliance on automobiles by using human power.

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Solar Mower
by Husqvarna

Robotic and solar powered, this mower autonomously maintains a lawn area.

6. System Longevity

- **Design for durability**
- Foster emotional connection to product
- **Design for maintenance and easy repair**
- Design for reuse and exchange of products
- Create timeless aesthetic appeal

Split-Head Hammer
by ATOMdesign and Vaughan

This hammer is designed for rough treatment, easy repair and a long lifetime. 2007 IDEA Award

6. System Longevity

- Design for durability
- **Foster emotional connection to product**
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Iron pot
by Timo Sarpaneva, Finland

This cooking utensil has a minimal aesthetic and material quality that references both past and future.

7. Transitional Systems

- **Design upgradable products**
- Design for second life with different function
- Provide for reuse of components

Photocopier

These systems often have standardized parts that can be upgraded , reused, or recycled.

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Jelly Jar Glasses

These jars are designed to be readily reused in a new function as drinking glasses.

8. Optimized End-of-Life

- **Design for fast manual or automated disassembly**
- Design recycling business model
- Use recyclable non-toxic materials
- Provide ability to biodegrade
- Integrate methods for used product collection
- Design for safe disposal

Disassembled Mirra Chair
by Herman Miller

This chair was designed to be manually disassembled. Most of its materials are recyclable.

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Eatware

Although this may appear to be a bioplastic (which may not be compostable), this food container is made of pressed fibers from bamboo, sugar cane pulp, and potato starch. It is compostable in normal yard compost conditions.

Ecodesign strategy brainstorm

- Make teams of two to three people per team. You will be assigned a product to redesign. Groups brainstorm using strategies for redesign to reduce environmental impact.
- Write down the specific ecodesign strategy (not the category) to keep track of your concepts.

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This information is found on page 4 of *Okala Practitioner*.

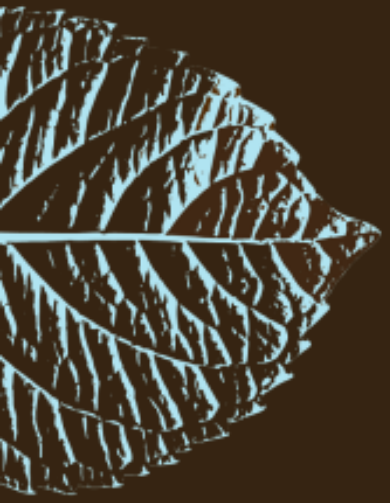
Ecodesign strategy brainstorm

- Groups select their three best ideas for reducing environmental impacts. You will quickly sketch how each of the three ideas is applied in the product.
- To receive credit, you must also write down the specific strategy that you used for each of the three concepts using. Also, write down the benefits and drawbacks of how this may affect the functionality of the product.

Ecodesign strategy brainstorm

Each group presents their three redesign strategies along with rationales for impact reduction.

Make sure to describe how each ecodesign strategy has been applied, using complete sentences. For credit, hand in your ecodesign brainstorm ideas with the name of the team members.



Okala Practitioner

Integrating Ecological Design

This presentation is part of an educational presentation series that supports teaching from the *Okala Practitioner* guide.

Okala Practitioner and these presentations were created by the Okala Team to disseminate fact-based knowledge about ecological design to the design disciplines and business.

The Okala Team:

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The Okala Team initiated the collaboration with the US EPA and the Industrial Designers Society of America (IDSA) in 2003. The team developed Okala Practitioner with support from Autodesk, IBM, Eastman Chemical and the IDSA Ecodesign Section.

Okala Practitioner is available through amazon.com.

More information and the free Okala Ecodesign Strategy App are found at Okala.net.