Balancing Trade-offs
Often a proposed solution shows clear advantages for all stakeholders:

- the environment
- the user
- society at large
- the manufacturer/client

Sometimes, however, making one choice compromises another, and decision-making becomes less clear.
Typical Making these choices:

- Using recycled materials
- Increasing energy efficiency
- Extending product life
- Design for disassembly
- Biodegradability
- Local production
- Leasing instead of owning
- Dematerialization
- Aggressive green marketing

Trade-offs Can sometimes mean:

- Lower tolerances & specifications
- Higher electronic design costs
- New product sales reduction
- Higher production costs
- Shorter life, lower strength
- Fewer choices / less selection
- Increased transport impacts
- Fragility / shorter life
- Potential perception of inferior quality
Balancing trade-offs:

Case studies

The Liberty Ridge Parka climbing jacket was produced by Recreation Equipment International (REI).

The parka is made primarily of Nylon 66, in several laminated layers (making it difficult to recycle), with zippers, storm flaps, and hood.

The following examples show how the jacket shown at right was redesigned, and discusses the tradeoffs of each approach.

The projects shown in this series were developed by several students at the University of Washington’s Whole Product Design Project.
Functional simplification

A change in the ventilation system of the jacket resulted in more efficient venting, and used less material. By eliminating the pit zips, pockets, and storm flaps, the overall weight of the jacket was reduced by 6.3 oz. Climbers appreciate the lower weight. Water Tight™ zippers eliminate the need for cumbersome zipper flaps, Velcro and metal snaps.

Increased functionality benefits user.

Reduced material usage benefits client and user.

Increased hardware cost challenges both client and user.

Climbing jacket design by Richey and Rafie
Re-use material in different product

This redesign proposes a system of collection and reconstruction, whereby the jacket is cut apart and reassembled into a rope bag. The durability, light weight, and waterproof qualities of the material provide service over an extended period of time.

This returns system fosters loyal customers. The positive environmental practices also build brand which benefits the client.

Makes new product from old with minimal processing, a benefit to environment.

The costs of the collection and reuse system must be attractive to both the client and the user.

Rope pack design by Chung & Szabo
Customized product

An online ordering system allows people of non-standard sizes the to fit a jacket exactly to their specifications. Further, this gives the opportunity to “create” a jacket uniquely their own.

- Reduces the amount of stock held and unsold, a benefit to client.
- Requires the organization and expense of an administrative and production network to manage customization.
- Fosters product stewardship, and length of life of a jacket would increase, a benefit to environment.
- Increases customer loyalty, a benefit to client.
- Provides products for a neglected portion of the population.

Climbing jacket design by Rotondi and Gunderson
Coating Service Program

This service applies a water-proof coating to the jackets.

Useful life of product is extended.

Company can control effluent from the cleaning and coating products.

The consumer feels secure that the coating was professionally applied and with service guarantee.

Many jackets can be coated at one time, reducing waste of the water-proofing compound.

Service program would require initial company investment in facilities and promotion.

Consumer must make the effort to return product for servicing.

Climbing jacket by Richey and Gunderson
Material Change

Change in material to hemp was justified by REI’s client data, that indicated 97% of purchasers bought a climbing jacket to **look like** a climber, but they do not use it for climbing.

With the exception of hardware, the jacket can now be composted.

Jacket loses functionality for climbing.

Shorter life, because the hemp degrades faster than nylon.

Hemp costs more than nylon.

Climbing jacket by Ando, Balagot

Industrial hemp
Typical Trade-offs

Making these choices:

- Using recycled materials
- Increasing energy efficiency
- Extending product life
- Design for disassembly
- Biodegradability
- Local production
- Leasing instead of owning
- Dematerialization
- Aggressive green marketing

Can sometimes mean:

- Lower tolerances & specifications
- Higher electronic design costs
- Reduction of new product sales
- Higher production costs
- Shorter life, lower strength
- Fewer choices / less selection
- Increased transport impacts
- Fragility / shorter life
- Potential perception of inferior quality
Trade-off discussion

1. You will be assigned to a group of three.

2. Each group must identify four products with design problems where there is an environmental trade-off.

3. You must be specific about the product (or product system) and the tradeoffs.

4. Each team describes each of the four product features that have trade-offs in complete sentences on a piece of paper.

5. Hand in the paper with your names on it.
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.

Unless provided in the presentations, Information sources are found in the *Okala Practitioner* guide.

**The Okala Team:**

Philip White IDSA  
Associate Professor, Arizona State University

Louise St. Pierre  
Associate Professor, Emily Carr University of Art + Design

Steve Belletire IDSA  
Professor, Southern Illinois University Carbondale

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](http://amazon.com).

More information and the free Okala Ecodesign Strategy App are found at [Okala.net](http://Okala.net).

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