How Sustainable Design Can Drive Innovation Globally

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Vision

A world of environmental, social, and economic prosperity created and sustained by local and global collective action.

Development Engineering creates solutions to improve people’s lives at scale.
Design Thinking

Concrete

Abstract

Frameworks
(Insights)

Analysis

Imperatives
(Ideas)

Synthesis

Observations
(Contexts)

Development
Context

Concrete

Solutions
(Experiences)

Scalable
Technologies &
Business Models

Social &
Sustainability
Goals
Life Cycle Thinking

**Design Thinking** that increases customer satisfaction while minimizing the negative environmental impacts associated with a product or service over its life cycle.
Green Product Strategies

- **Design Strategies for Innovation**
  - Green Parts and Supply Chain
  - Localization
  - Use Strategies
  - Dematerialization and Material Selection
  - Modular Architecture
  - Designing Products as Services
  - Biomimicry
  - Timeless Design
  - Cradle-to-Cradle (upcycling)

- **End-of-Life Strategies**
  - Reuse
  - Service
  - Remanufacture
  - Design for Disassembly or Recycling (Recycling w/ without Disassembly)
  - Disposal
Prioritize, Ideate and Evaluate

- Energy
- Renewable
- Reduce
- Better Control
- Right-sizing
- Logistics
- Materials
- Design for Lifetime

http://autodesk.com/sustainabilityworkshop
Refrigerator Design Example

Jeremy Faludi, faludidesign.com
Focus on High Impact

Raw Materials
- Depletes non-renewable resources, causes pollution, uses land.

Manufacturing
- Uses energy, causes pollution (solid waste, air pollution)

Transportation
- Uses energy and fuel, causes air pollution

Energy Use
- Uses electricity. Impacts vary based on energy source (coal, nuclear, wind).

Disposal
- Land use (landfilling), may release some pollutants into the environment

Jeremy Faludi, faludidesign.com
Whole Systems Map of a Refrigerator

Jeremy Faludi, faludidesign.com
Focus on Life-Cycle Impacts You Can Control

Jeremy Faludi, faludidesign.com
Priorities

1. Reduce Total Energy Use
2. Increase User Convenience
3. Reduce Price
U.S. Refrigerator Energy Use (1947-2001)

The Pinoleville Pomo Nation is a Native American tribe located in northern California, USA.
Concerns of the Pomo Nation

- Rising heating and cooling costs
- HUD-financed housing
- Did not reflect cultural and traditional values
- Drought conditions
Innovation Workshops

- End user is expert on local needs
- End users and designers both control idea creation
- Idea creation is done in context
- Gives agency during the design, development, and implementation
Top Needs and Metrics

- Learn and Use Traditional Techniques (Cultural Values)
  - Round Shape
  - Natural Materials
- Energy Conservation
- Water Conservation
- Privacy
- Exercise
- Storage
- Safety
- Comfort
- Lower Energy Costs
- Space
Framing Sustainability

Ryan Shelby, Ph.D.
Final Co-Design Mockups
Co-Designed

Co-Built
Renewable Energy Solutions

- Geothermal heat pumps
- Solar electric
- Solar thermal
- Micro-hydroelectric
- Wind

- Deployment and development plan that has the renewable energy options and designs that meets the PPN’s cultural, environmental, and economic requirements
Impact

- Empowered the PPN to make informed decisions about renewable energy options
- Capacity building in green technologies
- Students were able to develop professional design and communication skills
- HUD funding secured to build culturally inspired sustainable homes and buildings: ~$1.2 Million in 2009
- DOE funding secured to perform renewable energy feasibility studies: ~$120,000
Renewable energy-efficient systems were co-designed and built by tribal citizens.

Rainwater catchment and grey-water systems reduce vulnerability to water shortages.
Luce Foundation Video

- Sustainability in Products & Practice: http://vimeo.com/35283830
Business Motivation for Sustainable Design

- Population growth
- Energy and water demand
- National and world security
- Resource justice: Today, 16% of the population is using 80% of the planet's resources
- Climate change and pollution
- Reducing waste saves money and landfill
- Business drivers – responsible business practices
- Regulations and policies
- Supply chain quality
Take-Aways

• Use sustainability as a **driver for innovation and improved quality**.

• **Understand the life cycle first** – then focus your attention on areas you can control and have highest impact.

• The company or organization must take on **responsibility in the value chain** – there’s also lots of business (or value added) to be won here.