



# **Sustainable Business Strategies:**

*A Primer for the Manufacturing and Process Industries*

**Dr. Annie R. Pearce**

**Sustainable Facilities & Infrastructure Program**

**Georgia Tech Research Institute**

# Overview



- ◆ What is sustainability?
- ◆ What does sustainability mean for business enterprises?
- ◆ How can you make your enterprise more sustainable?
- ◆ What are the costs and benefits of sustainability to your business?
- ◆ What are the challenges you'll face?

# What is Sustainability?

- ◆ Sustain:
  - “to keep in existence; to maintain” (AHCD 1993)
- ◆ Sustainability:
  - “...a system state marked by stability, where changes to the system remain constrained so as to maintain the stability of the system into the foreseeable future.” (Pearce 1995)

# What is Sustainability?

- ◆ What are we trying to sustain?
- ◆ Sustainable Technology?
- ◆ Sustainable Development:
  - “...development which meets the needs [and aspirations] of present generations without compromising the ability of future generations to meet their own needs.” (World Commission on Environment & Development 1987)

# What is Sustainability?



- ◆ Sustainability of Humans & Human Race
- ◆ Objectives:
  - Meeting human needs and aspirations now
  - System stability over time
- ◆ What are the important factors?

# What is Sustainability?

- ◆ Thermodynamic Foundations:
  - System:  $\text{Earth} + \text{Solar Input} - \text{Heat Output}$
  - Consumption Increases Entropy and Decreases Utility
  - Ecosystems are the Primary Mechanism for Regeneration of Resources

# What is Sustainability?

- ◆ Thermodynamic Objectives:
  - Minimize negative impacts on natural ecosystems (since they are the primary mechanism for capturing solar energy in the form of photosynthesis)
  - Minimize the gain in entropy of matter as a result of consumption-related processes

# What is Sustainability?

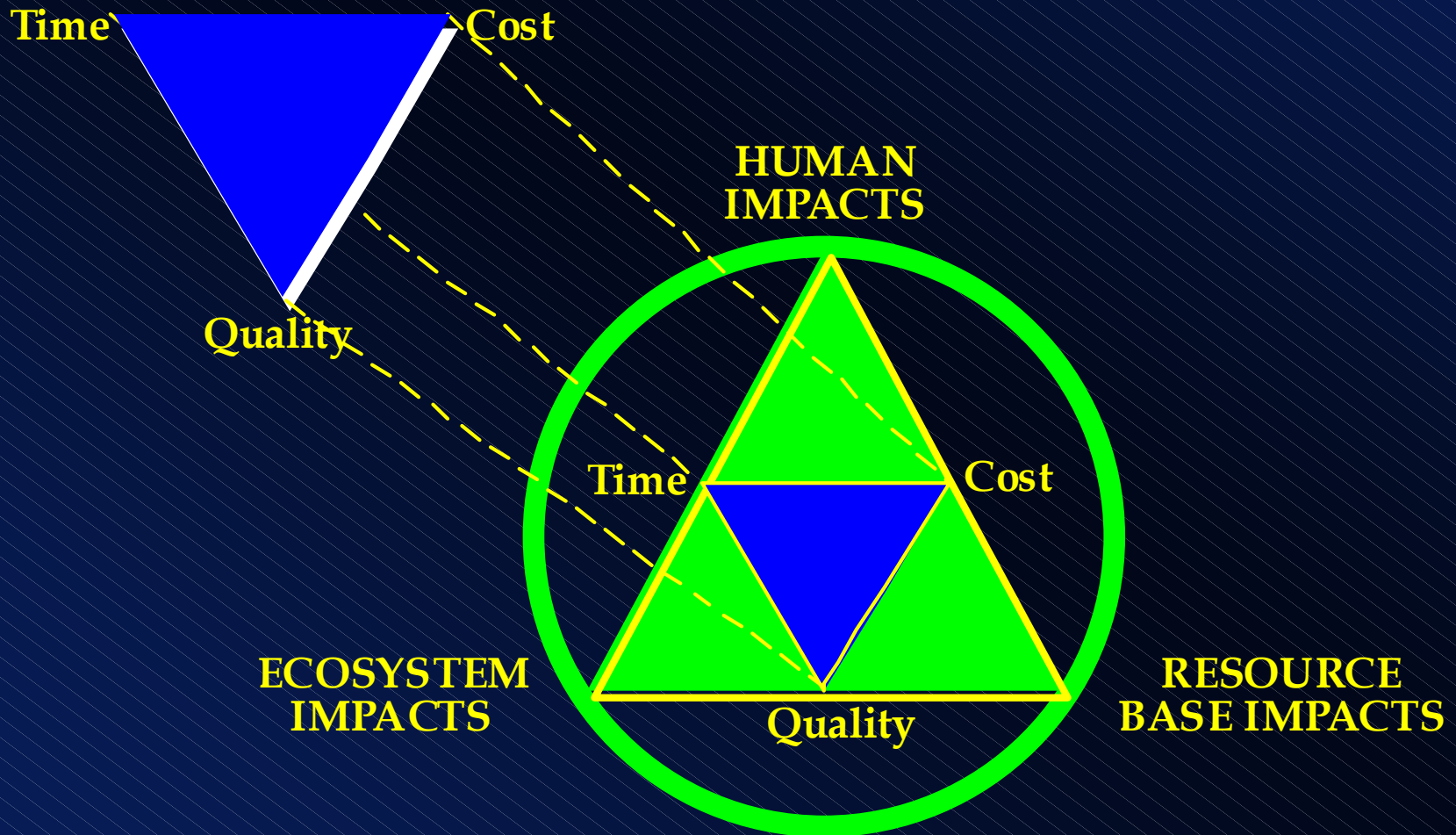
- ◆ The Anthropocentric Component:
  - Intragenerational Equity: meet the requirements for human survival in the present
  - Intergenerational Equity: leave the Earth in at least as good a condition as we found it
  - Motivation for Initiators: maintain standards of living at least as good as the ones which currently exist

# What is Sustainability?

## ◆ Dimensions and Objectives:

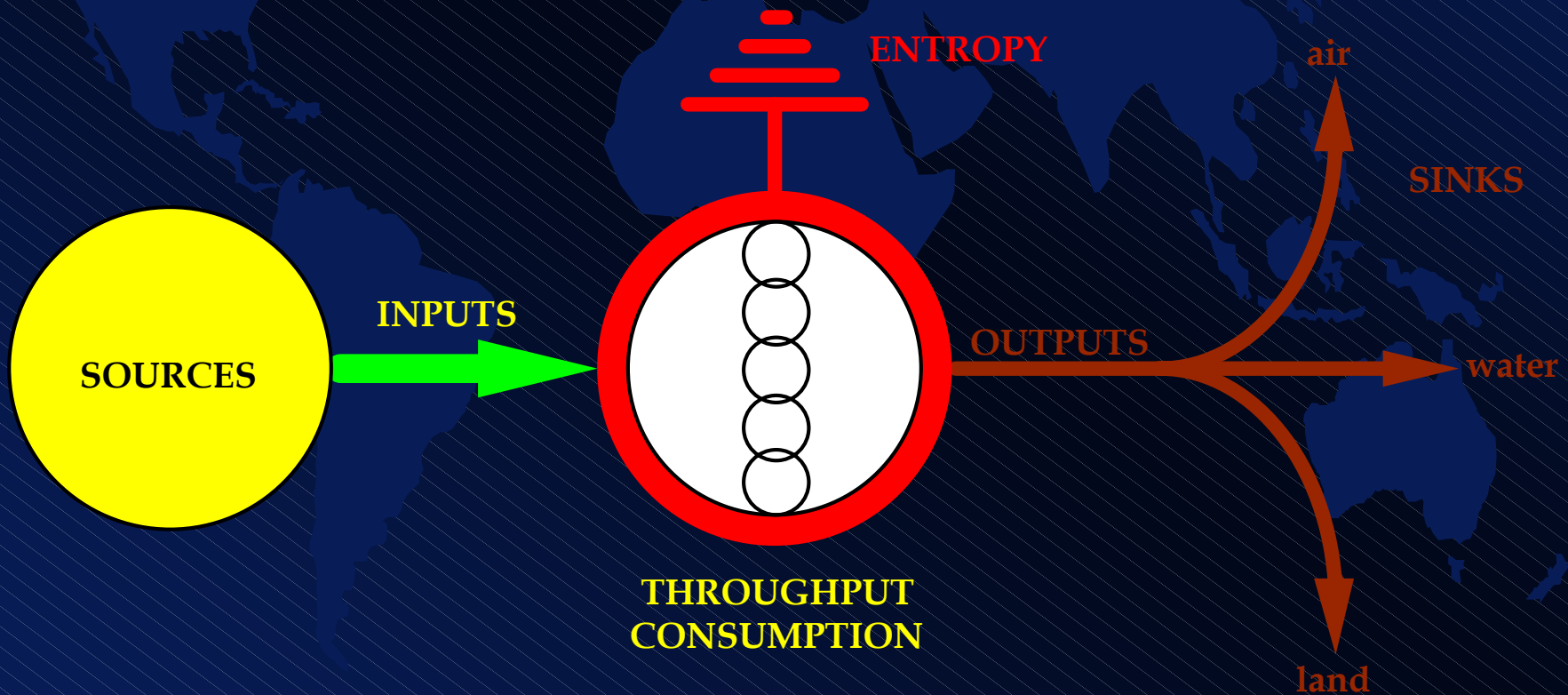
- Resource Base Impacts: protect supplies of matter and energy - don't overconsume
- Ecosystem Impacts: protect natural ecosystems - don't impact them more than they can recover
- Human Impacts: satisfy human needs and aspirations, particularly those of stakeholders

# Sustainability Considerations

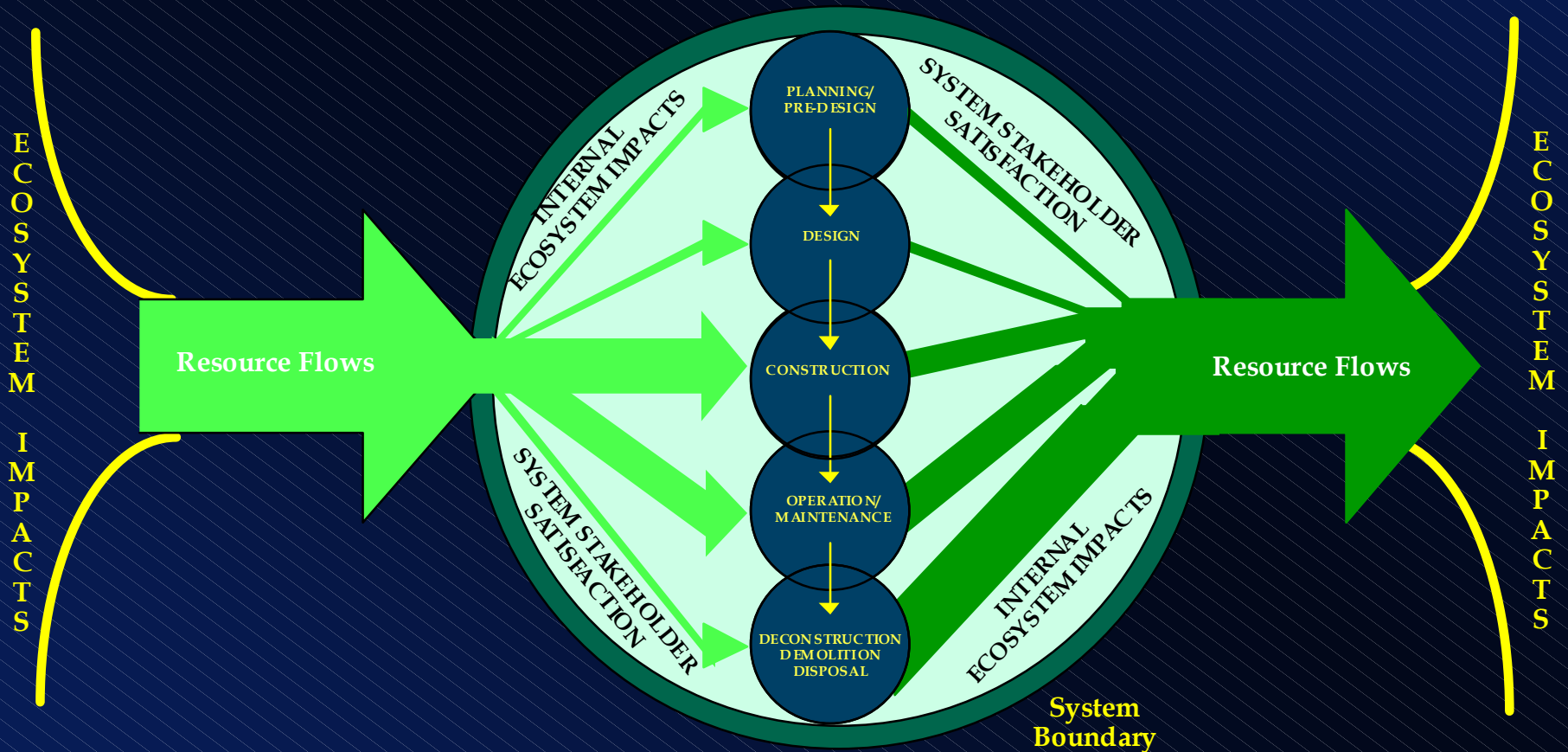


# What does sustainability mean for business enterprises?

## ◆ The Paleotechnic Model: Linear Throughput

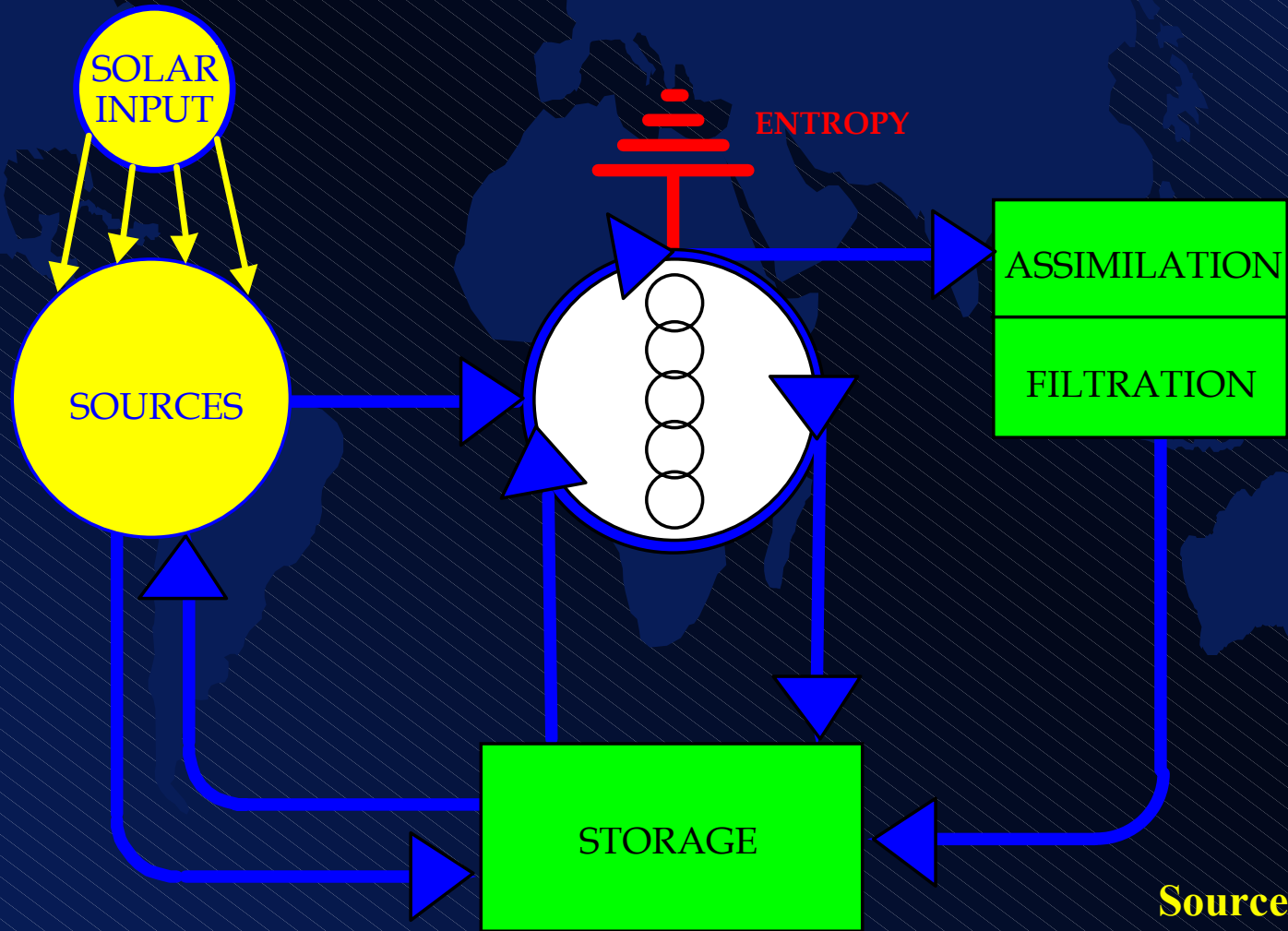


# Impacts of System Flows



# What does sustainability mean for business enterprises?

- ◆ The Regenerative Model: Cyclical Synergies



# How can you make your enterprise more sustainable?

- ◆ Radical resource productivity: doing more with less
- ◆ Biomimicry: follow the example of natural systems - waste is food!
- ◆ Service and flow economy: product as a *means*, not an end
- ◆ Investing in natural capital: sustaining, restoring, and expanding resource bases and ecosystems

# What are the costs and benefits of sustainability to your business?



## ◆ Costs:

- New way of thinking about business
- Shift in standard procedures takes time and money
- Education is an important component!

# What are the costs and benefits of sustainability to your business?

## ◆ Benefits:

- Reduced costs of consumption, waste disposal, and noncompliance
- Reduced liability and environmental risk
- Improved use of assets, particularly human assets
- New markets
- Preparedness for future regulations and market trends

# What are the challenges you'll face?

- ◆ Closing the loop
- ◆ Finding symbiotic partners
- ◆ Tunneling through the cost barrier with respect to compliance
- ◆ Recognizing and considering systems effects
- ◆ Considering the whole life cycle of your product

# Summary

- ◆ Sustainability is about stability
- ◆ Think life cycle, think systems
- ◆ Use Nature as a model
- ◆ Start inside and move outward to close the loop
- ◆ Choose your battles wisely - do only as much as the situation permits
- ◆ Don't hesitate to ask for help!



Questions?