



# **Economics, Environment, and Sustainability**

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## **Chapter 23**

# Core Case Study: A New Economic and Environmental Vision

- **Economic growth and development**
  - **Neoclassical economists**
  - **Environmentally sustainable economy (eco-economy)**
    - **Ecological economists**
    - **Environmental economists**
  - **Economic revolution: sustainability revolution**
-

# Components of More Environmentally Sustainable Economic Development

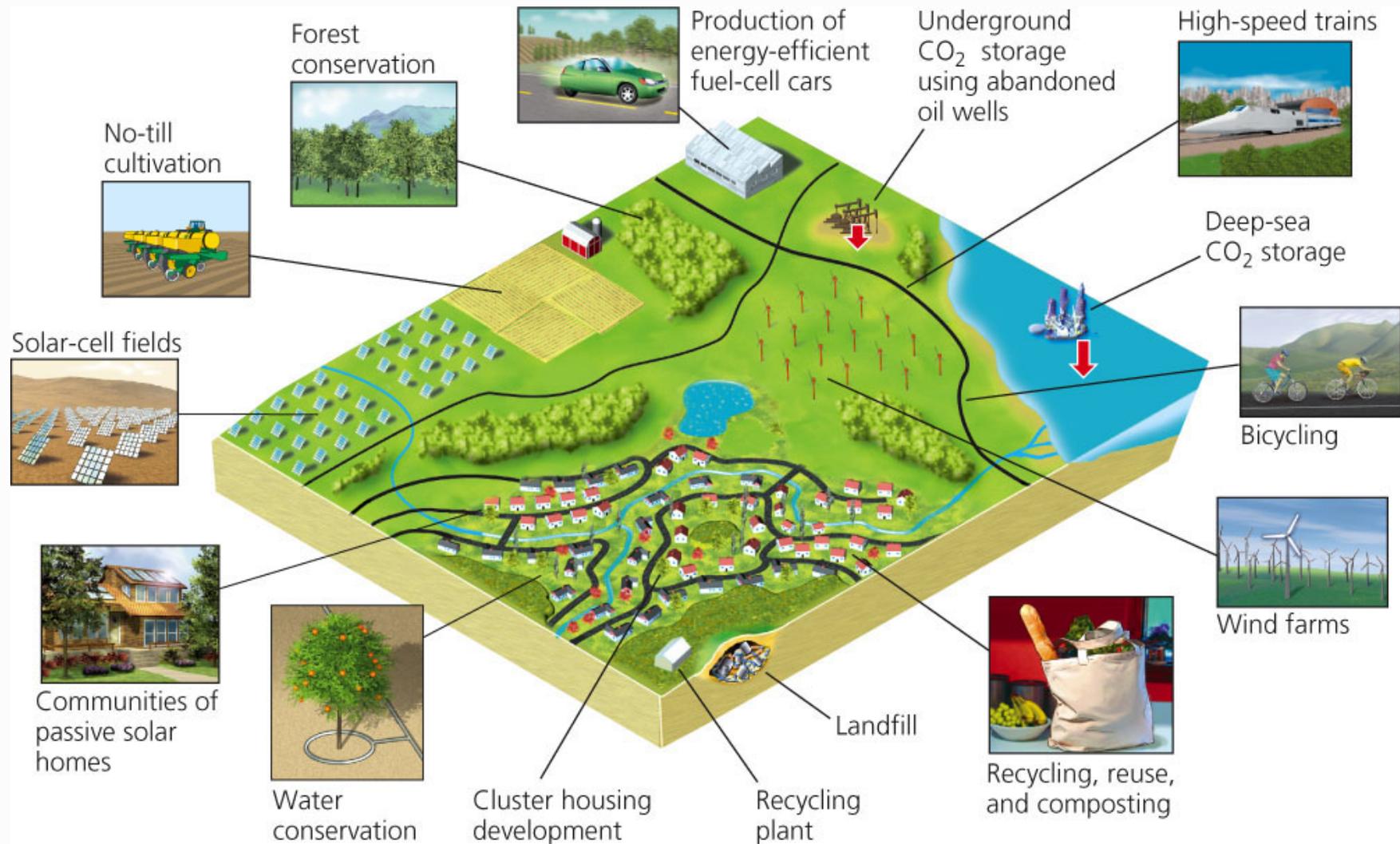




Fig. 23-1, p. 611

## ***23-1 How Are Economic Systems Related to the Biosphere? (1)***

- **Concept 23-1A** *Ecological economists and most sustainability experts regard human economic systems as subsystems of the biosphere and subject to its processes and limiting factors.*
-

## ***23-1 How Are Economic Systems Related to the Biosphere? (2)***

- **Concept 23-1B** *Governments intervene in market economies to help correct or prevent market failures such as the failure to protect natural capital, which supports life and all economies.*
-

# Economic Systems Are Supported by Three Types of Resources

- **Economic systems** are supported by
    - **Natural capital**
    - **Human capital, human resources**
    - **Manufactured capital, manufactured resources**
-

# Three Types of Resources Are Used to Produce Goods and Services



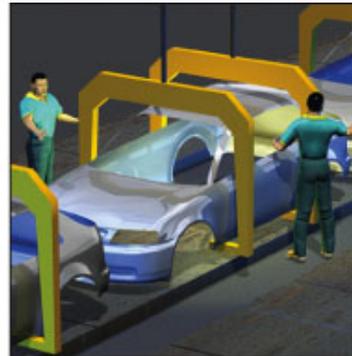
Natural Resources

+



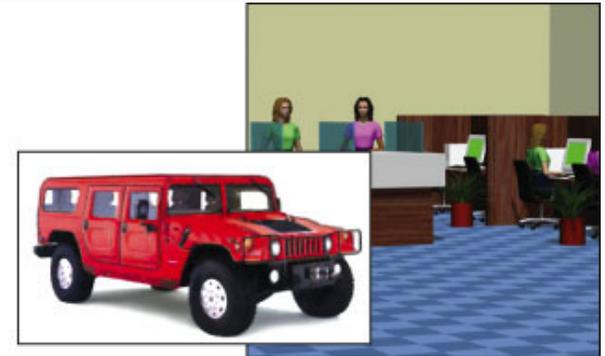
Manufactured Resources

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Human Resources

=



Goods and Services

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**Natural  
Resources**

**Manufactured  
Resources**

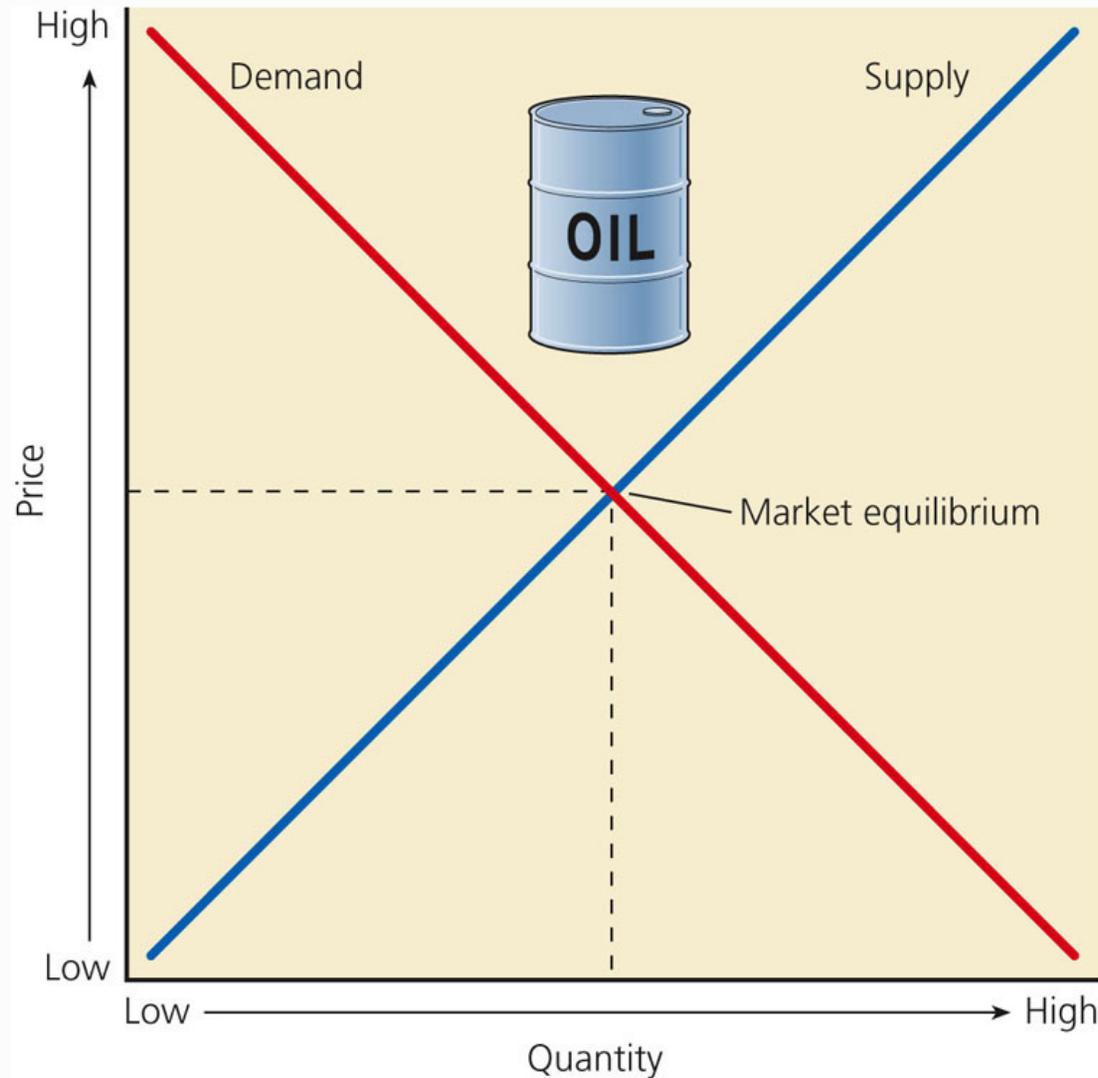
**Human  
Resources**

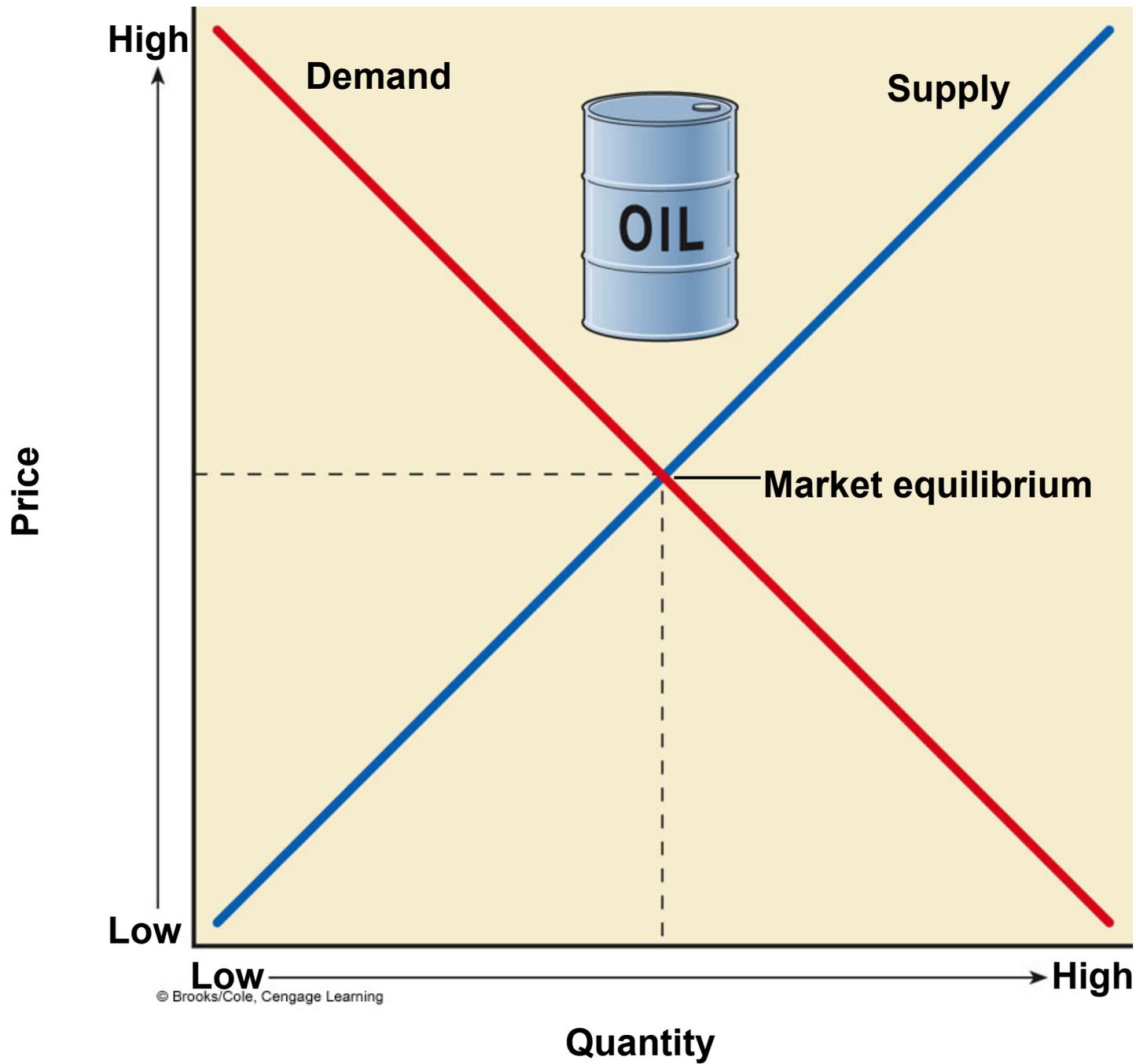
**Goods and  
Services**

# Market Economic Systems Depend on Interactions between Buyers and Sellers

- **Supply, demand, and market price equilibrium point**
  - Benefits of an economy with
    - Private ownership of all resources
    - No governmental interference
  - Opposition to such an economy
-

# Supply, Demand, and Market Equilibrium for a Good in a Market Economic System





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Fig. 23-3, p. 613

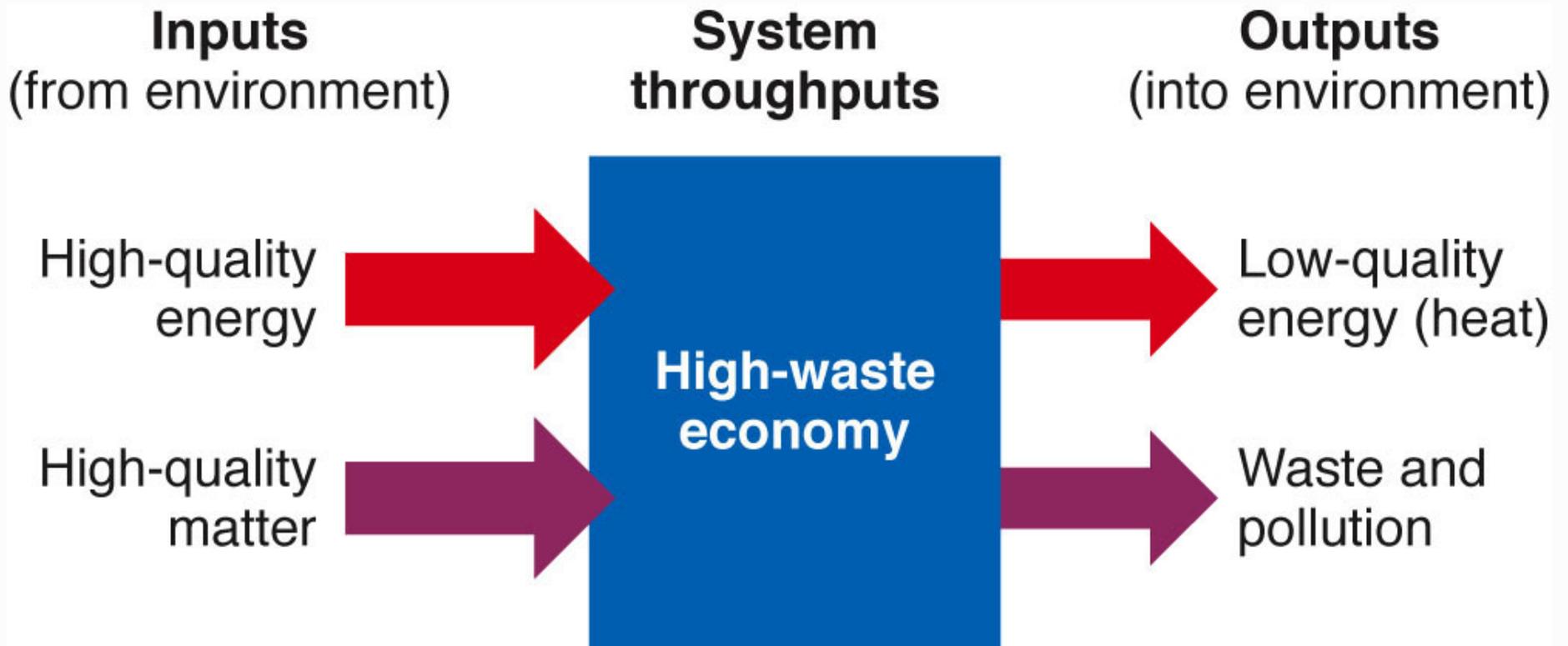
# Governments Intervene to Help Correct Market Failures

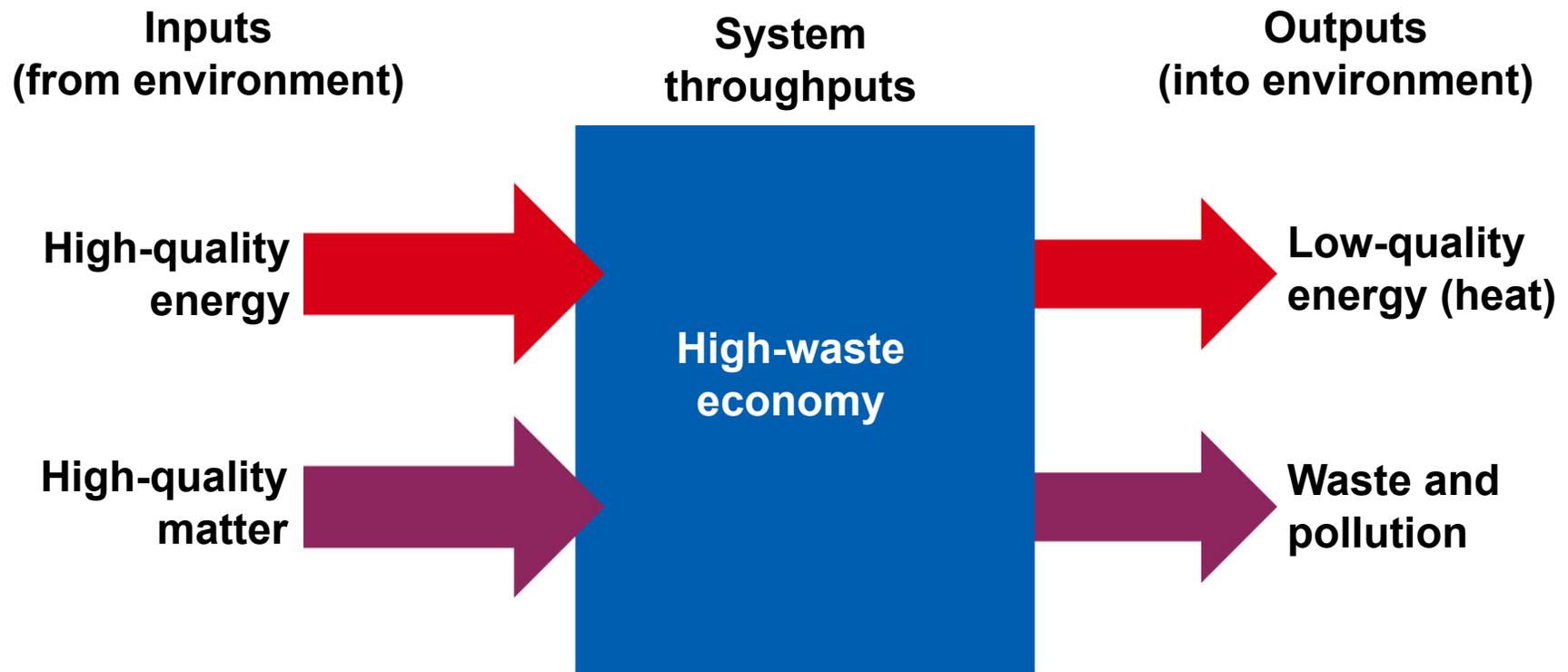
- **Private goods**
  - **Public services**
  - Reasons for government intervention in the marketplace
-

# Economists Disagree over Natural Capital, Sustainable Economic Growth

- **High-throughput economies**
    - Resources flow through and end up in planetary **sinks**
  - Models of ecological economists
  - Strategies toward more sustainable economies
-

# High-Throughput Economies Rely on Ever-Increasing Energy, Matter Flow

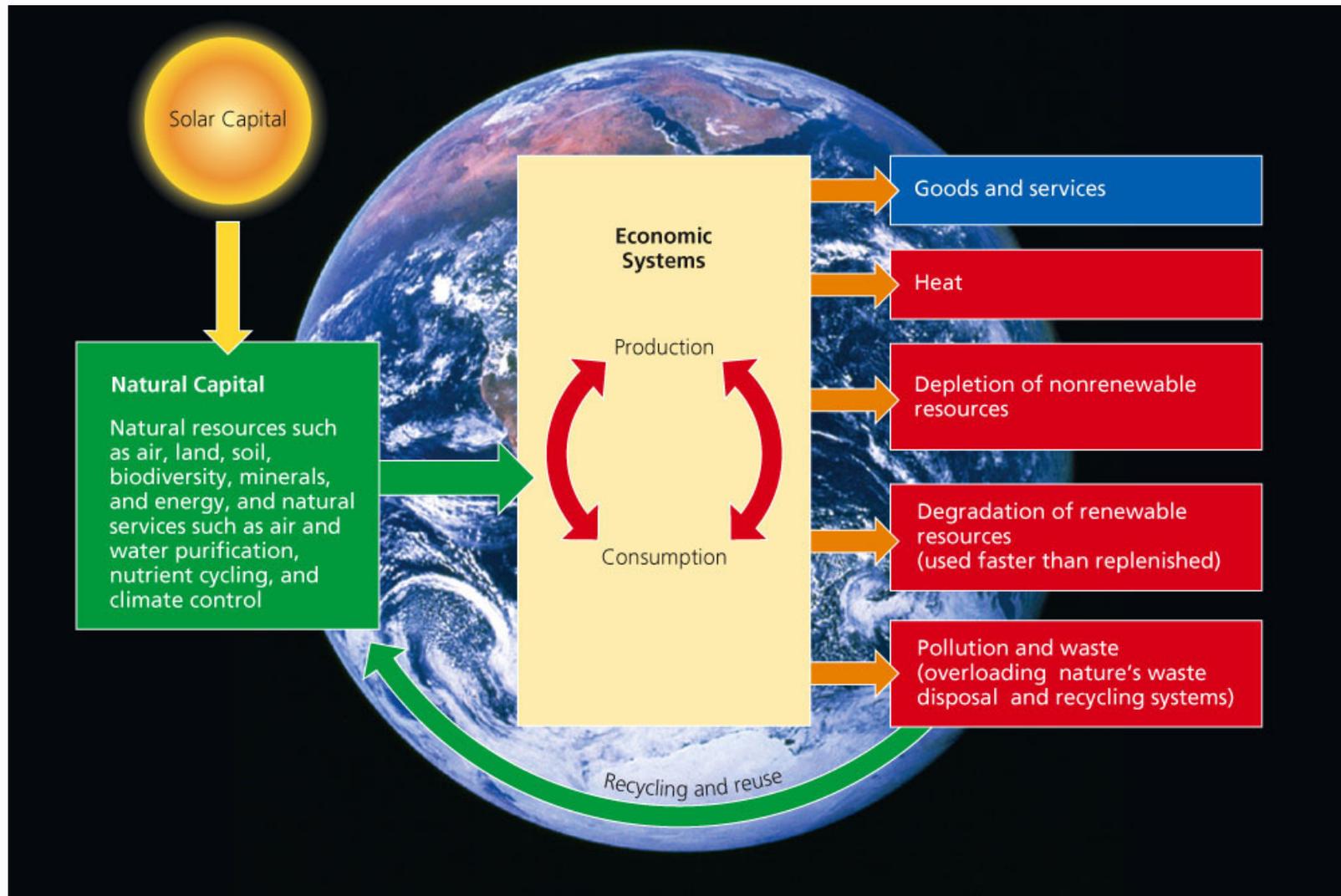


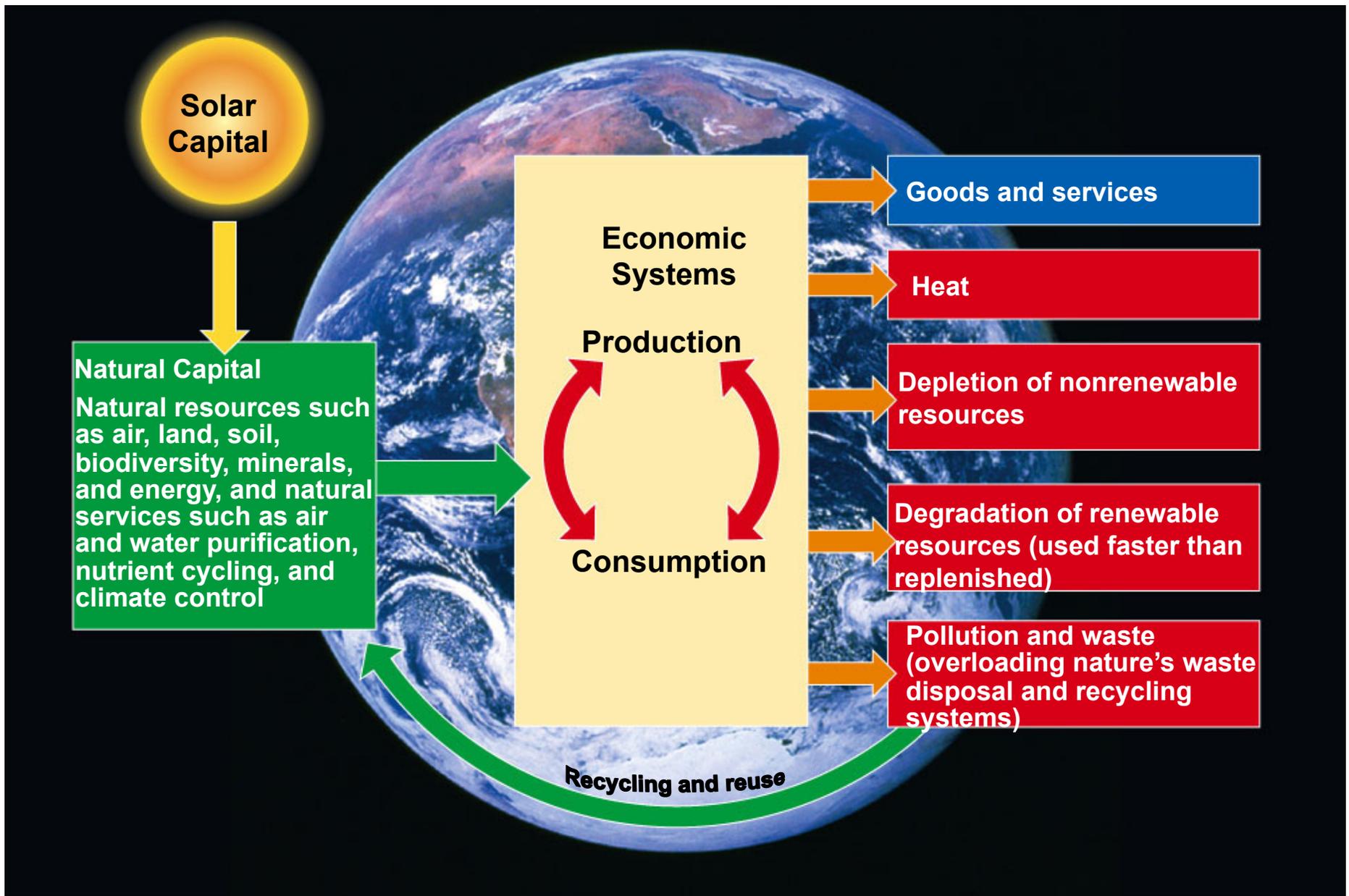


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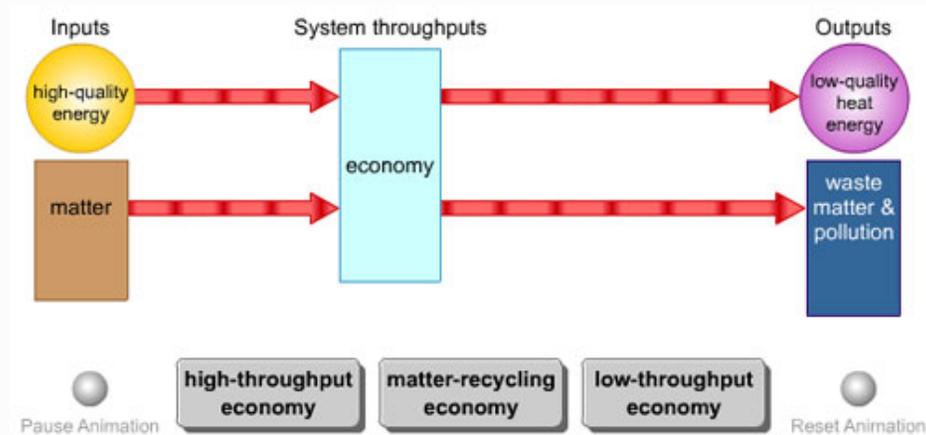
Fig. 23-4, p. 614

# Ecological Economists: Economies Are Human Subsystems of the Biosphere

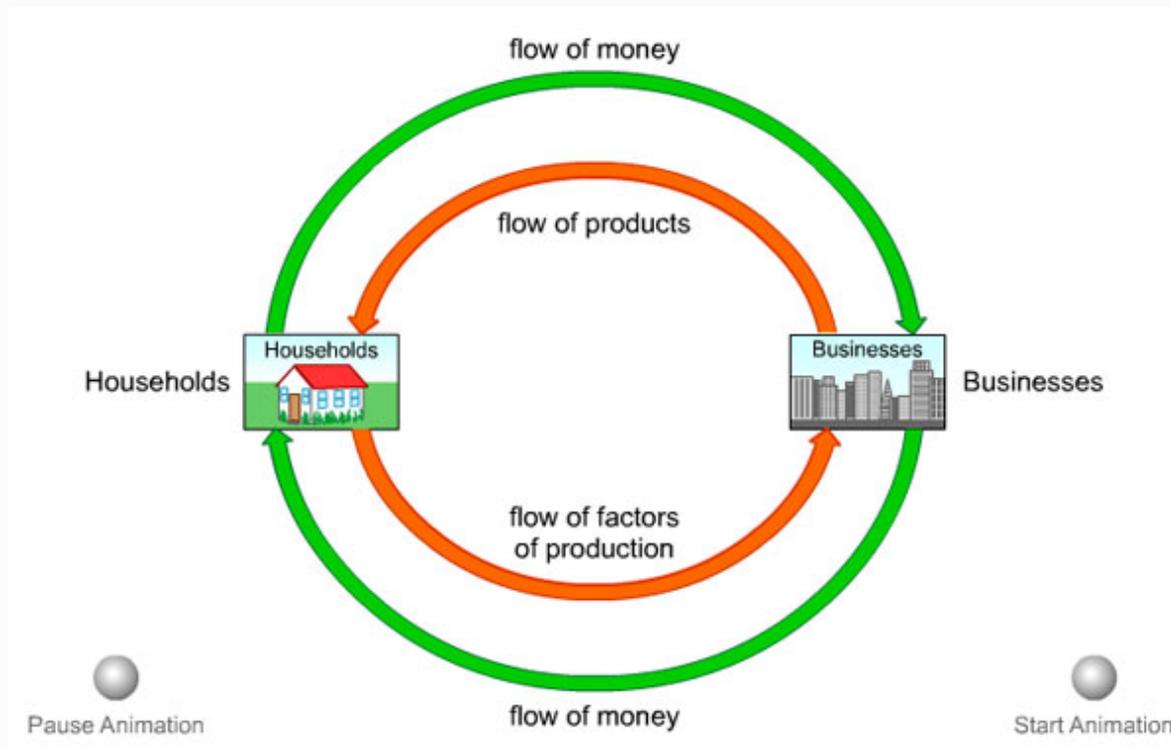




# Active Figure: Economic types



# Active Figure: Two views of economics



## ***23-2 How Can We Put Values on Natural Capital, Pollution Control, Resource Use?***

- ***Concept 23-2A*** *Economists have developed several ways to estimate the present and future values of a resource or ecological service and optimum levels of pollution control and resource use.*
  - ***Concept 23-2B*** *Comparing the likely costs and benefits of an environmental action is useful but involves many uncertainties.*
-

# Taking into Account the Monetary Value of Natural Capital

- Estimating the values of the earth's natural capital
  - Estimate **nonuse values**
    - **Existence value**
    - **Aesthetic value**
    - **Bequest value, option value**
  - Estimating these types of monetary values
    - **Mitigation cost**
    - **Willingness to pay**
-

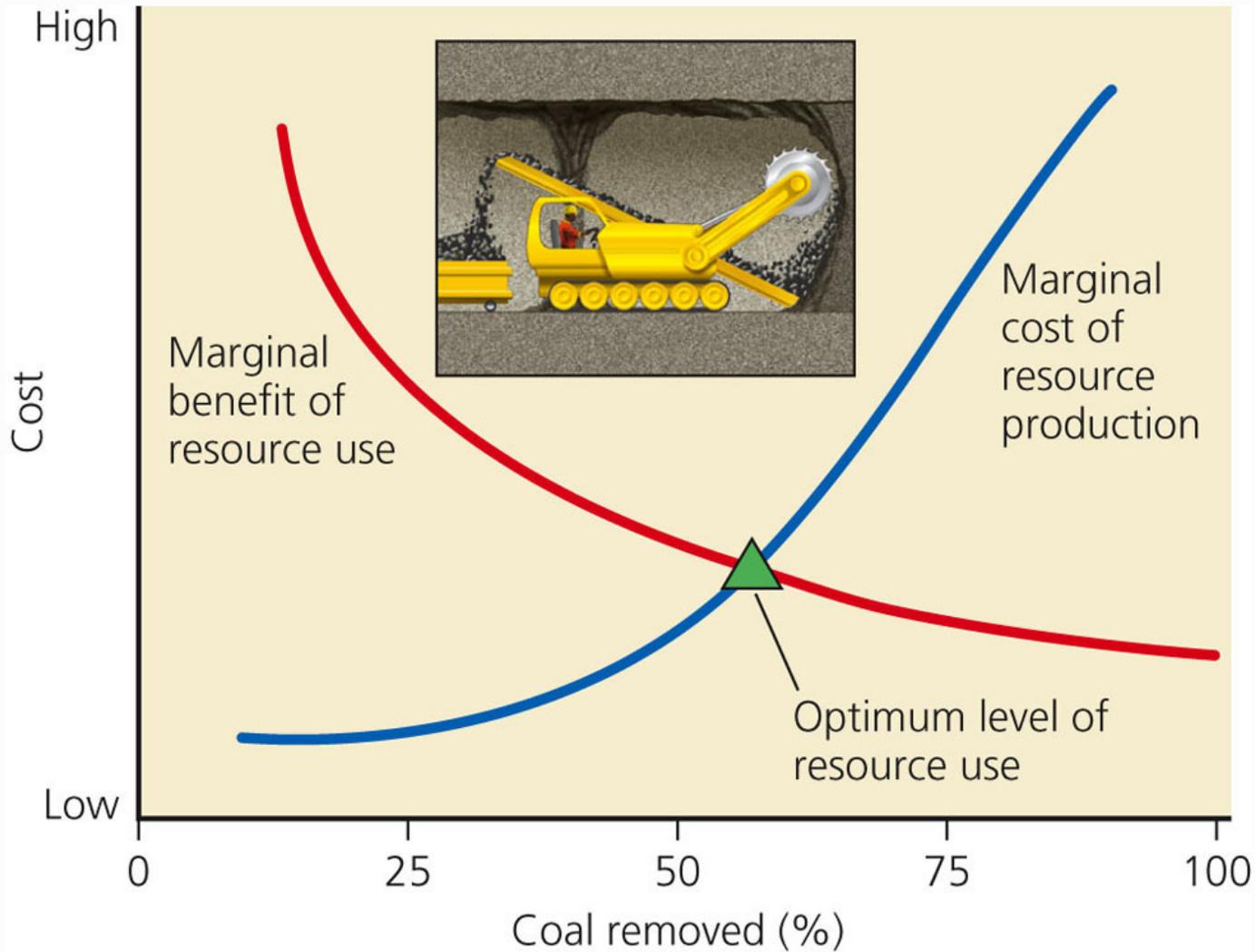
# Estimating the Future Value of a Resource Is Controversial

- **Discount rates**
  - Proponents of a high discount rate
  - Critics of a high discount
-

# We Can Estimate Optimum Levels of Pollution Control and Resource Use

- Relationship between
    - Marginal benefit of resource use
    - Marginal cost of resource production
  - Optimum level of resource use
  - Optimum level for pollution cleanup
-

# Optimum Resource Use



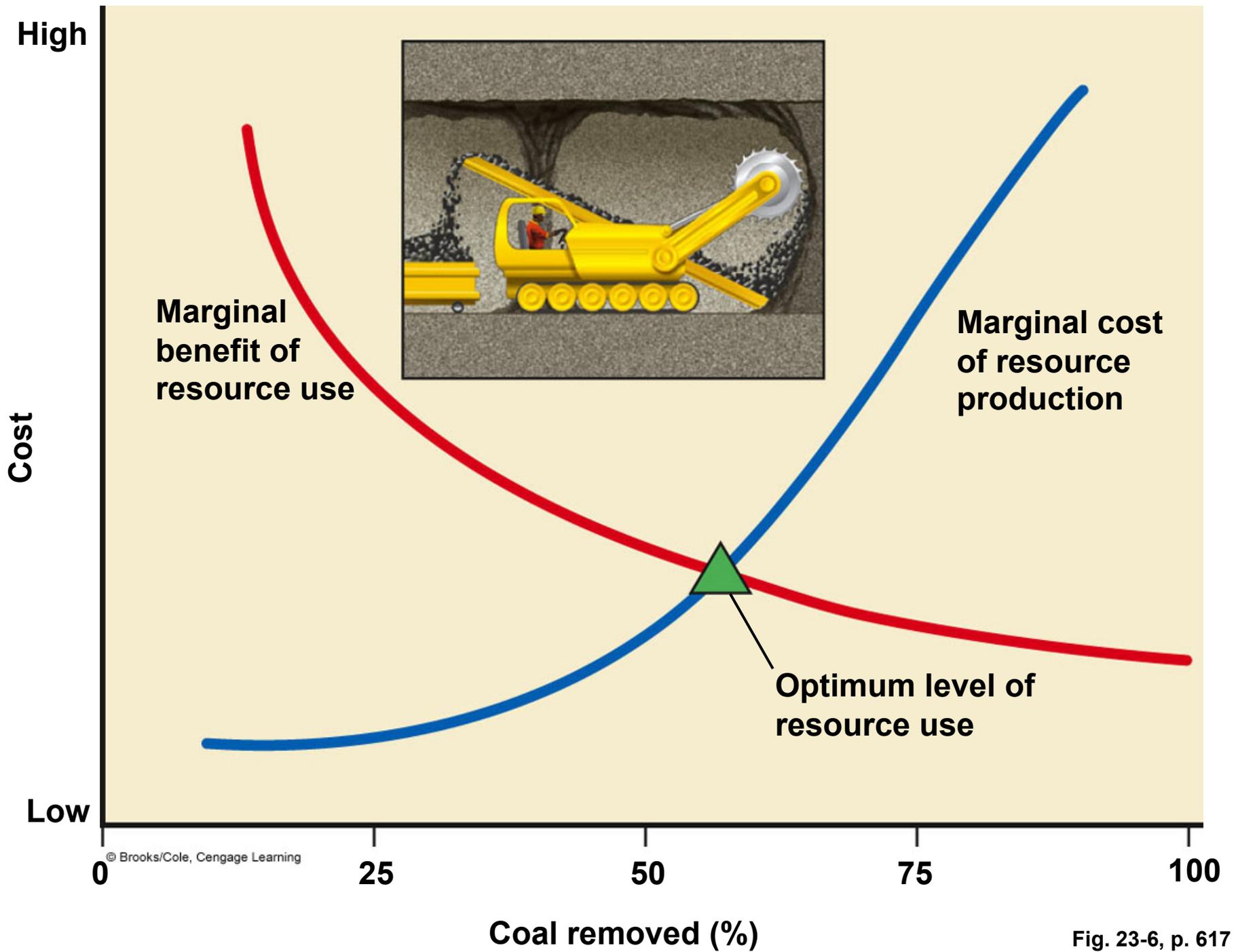
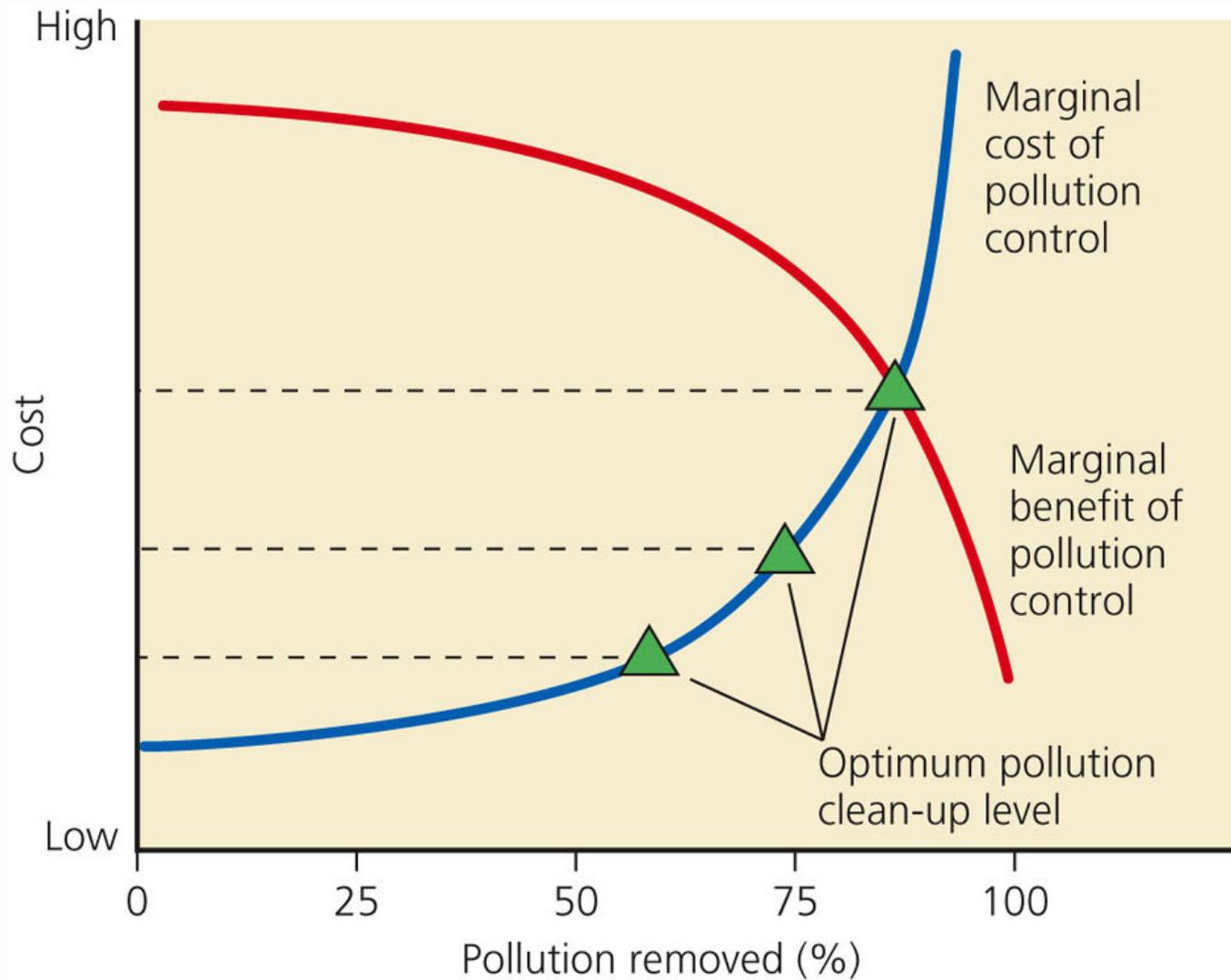


Fig. 23-6, p. 617

# Optimum Pollution Control



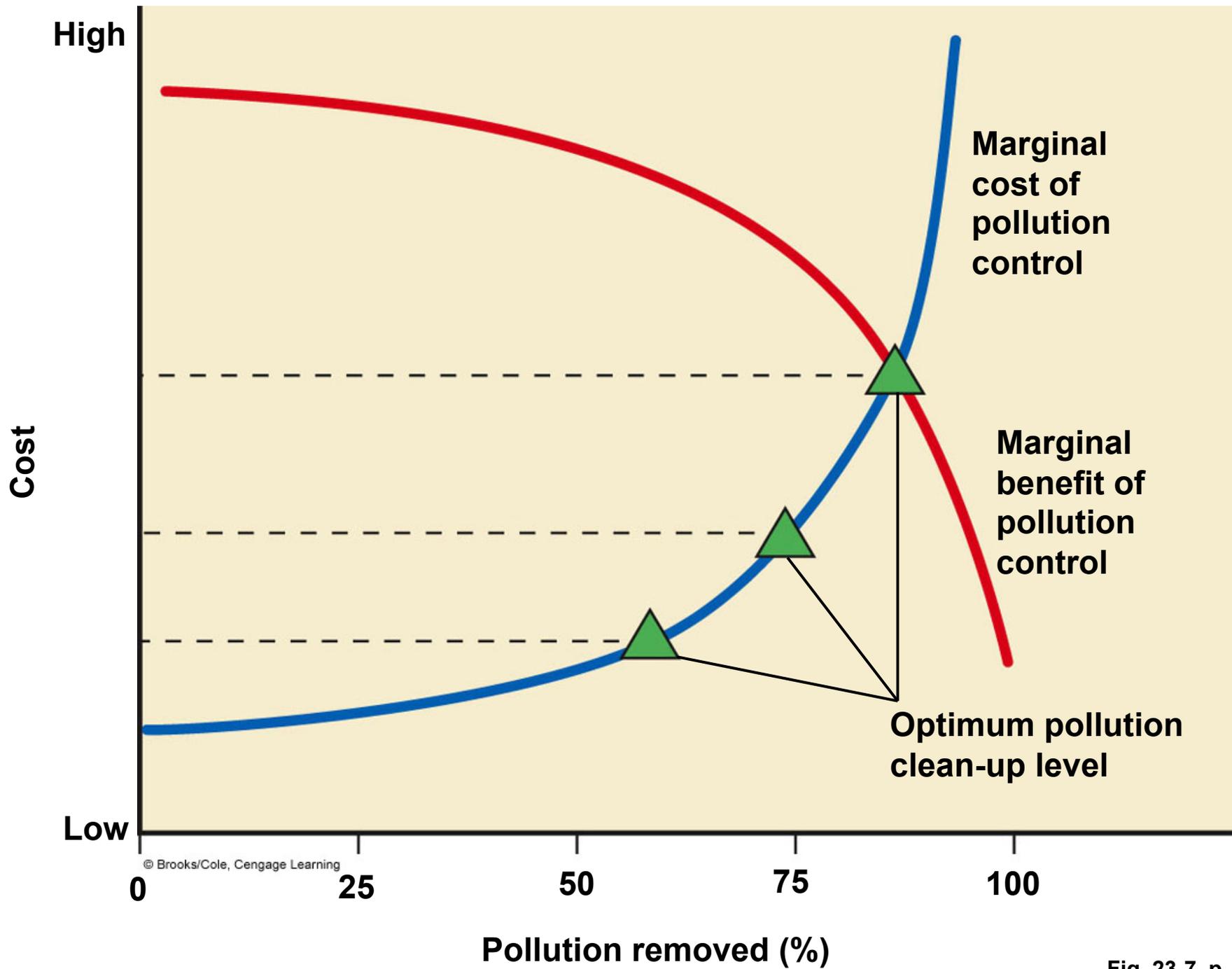


Fig. 23-7, p. 618

# Cost-Benefit Analysis Is a Useful but Crude Tool

- **Cost-benefit analysis** follows guidelines
    - Use uniform standards
    - State all assumptions used
    - Include estimates of the ecological services
    - How reliable is the data?
    - Estimate short-and long-term benefits and costs
    - What are alternatives?
    - Summarize range of estimated costs and benefits
-

## *23-3 How Can We Use Economic Tools to Deal with Environmental Problems? (1)*

- **Concept 23-3A** *Using resources more sustainably will require including the harmful environmental and health costs of resource use in the market prices of goods and services (full-cost pricing).*
-

## ***23-3 How Can We Use Economic Tools to Deal with Environmental Problems? (2)***

- **Concept 23-3B** *Governments can help to improve and sustain environmental quality by subsidizing environmentally beneficial activities and taxing pollution and waste instead of wages and profits.*
-

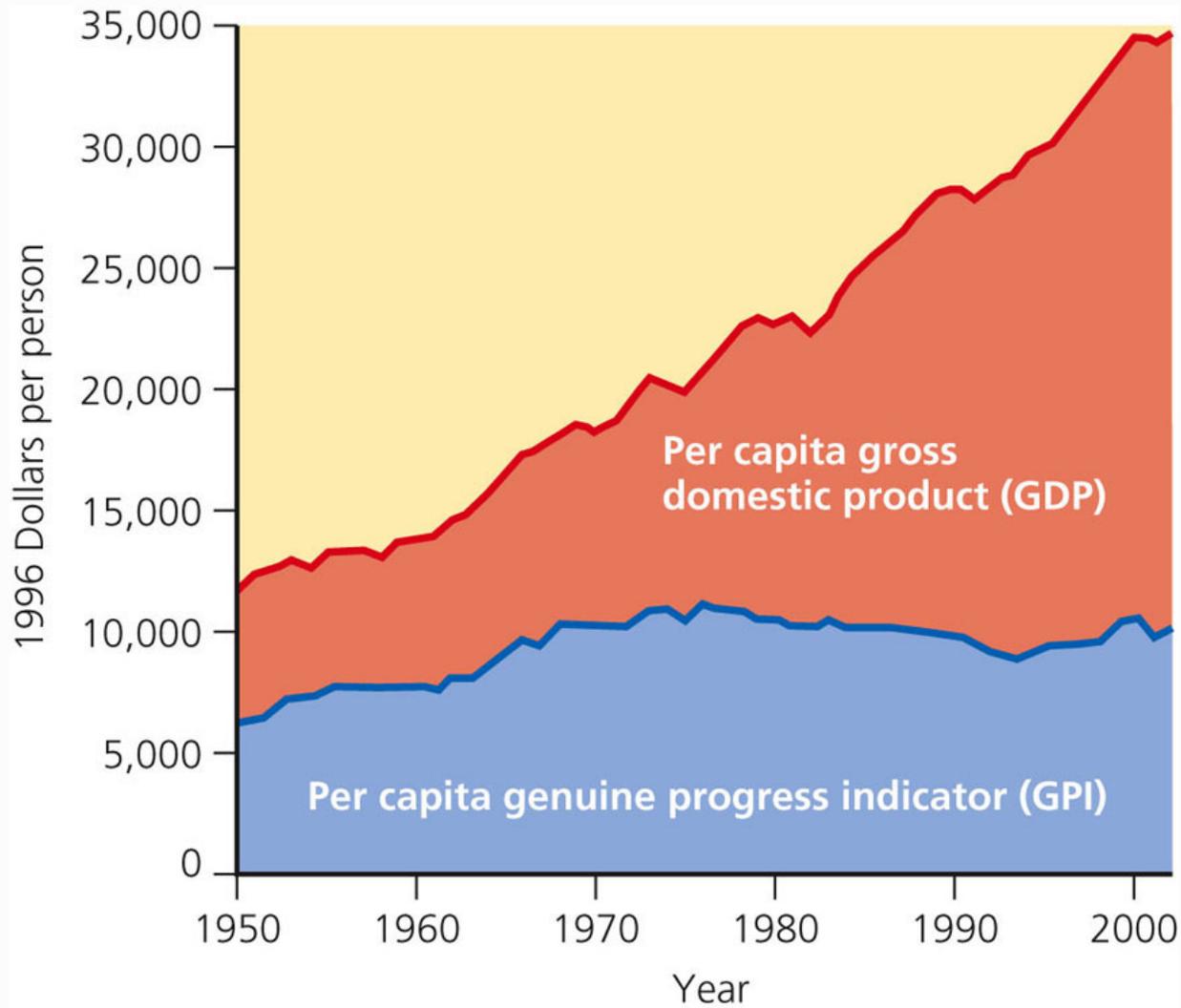
# Most Things Cost a Lot More Than You Think

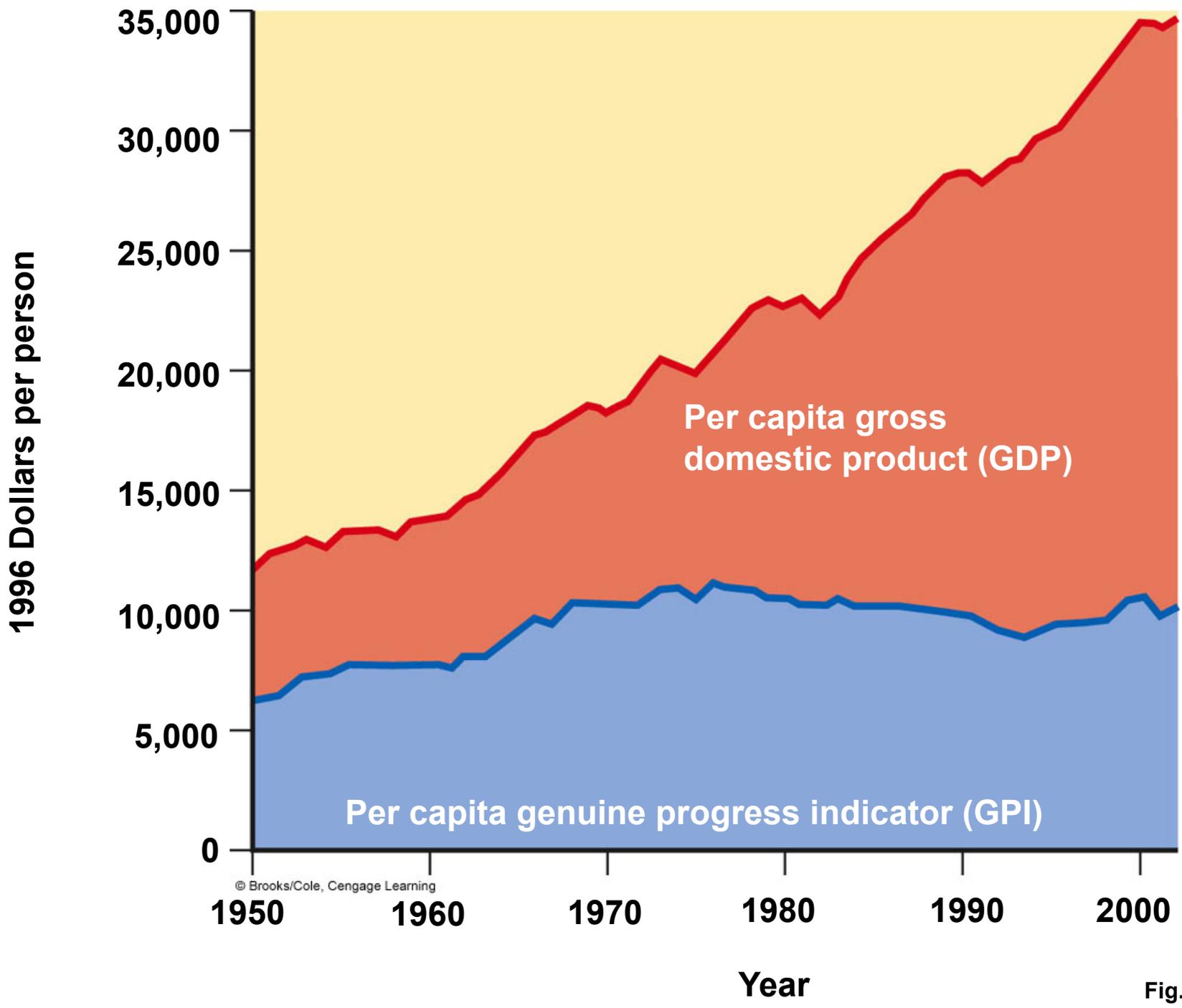
- **Market price, direct price**
  - **Indirect, external, or hidden costs**
  - Direct and indirect costs of a car
  - Should indirect costs be part of the price of goods?
    - Economists differ in their opinions
-

# Using Environmental Economic Indicators Can Help Reduce Our Environmental Impact

- Measurement and comparison of the economic output of nations
    - **Gross domestic product (GDP)**
    - **Per capita GDP**
  - Newer methods of comparison
    - **Genuine progress indicator (GPI)**
    - **Happy Planet Index (HPI)**
    - **General National Happiness (GNH)**
-

# Monitoring Environmental Progress: Comparing Per Capita GDP and GPI





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Fig. 23-8, p. 620

# We Can Include Harmful Environmental Costs in the Prices of Goods, Services

- **Environmentally honest market system**
  - Why isn't full-cost pricing more widely used?
  - Government action to phase in such a system
-

# Environmentally Informed Consumers Can Vote with Their Wallets

- **Product eco-labeling**
  - **Certification programs**
  - The U.S. Green Seal labeling program
-

# We Can Reward Environmentally Sustainable Businesses

- Phase out environmentally harmful subsidies and tax breaks
  - Phase in environmentally beneficial subsidies and tax breaks for pollution prevention
  - Pros and cons
  - Subsidy shifts
-

# Individual Matters: Ray Anderson

- CEO of Interface, largest commercial manufacturer of carpet tiles
  - Goals
    - Zero waste
    - Greatly reduce energy use
    - Reduce fossil fuel use
    - Rely on solar energy
    - Copying nature
  - How's it working?
-

# We Can Tax Pollution and Wastes instead of Wages and Profits

- **Green taxes, ecotaxes**
  - Steps for successful implementation of green taxes
  - Success stories in Europe
-

# Trade-Offs: Environmental Taxes and Fees, Advantages and Disadvantages

**TRADE-OFFS**

**Environmental Taxes and Fees**

<b>Advantages</b>		<b>Disadvantages</b>
Help bring about full-cost pricing		Low-income groups are penalized unless safety nets are provided
Encourage businesses to develop environmentally beneficial technologies and goods to save money		Hard to determine optimal level for taxes and fees
Easily administered by existing tax agencies		Governments may use money as general revenue instead of improving environmental quality and reducing taxes on income, payroll, and profits
Fairly easy to detect cheaters		

# TRADE-OFFS

## Environmental Taxes and Fees

### Advantages

Help bring about full-cost pricing

Encourage businesses to develop environmentally beneficial technologies and goods to save money

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### Disadvantages

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Governments may use money as general revenue instead of improving environmental quality and reducing taxes on income, payroll, and profits

# Environmental Laws and Regulations Can Discourage or Encourage Innovation

- **Regulation**
  - **Command and control** approach
  - **Incentive-based regulations**
  - **Innovation-friendly regulations**
-

# We Can Use the Marketplace to Reduce Pollution and Resource Waste

- Incentive-based regulation example
  - Cap-and-trade approach used to reduce SO<sub>2</sub> emissions
  - Advantages
  - Disadvantages
-

# Trade-Offs: Tradable Environmental Permits, Advantages & Disadvantages

## TRADE-OFFS

### Tradable Environmental Permits

#### Advantages

Flexible

Easy to administer

Encourage pollution prevention and waste reduction

Permit prices determined by market transactions

Confront ethical problem of how much pollution or resource waste is acceptable



#### Disadvantages

Big polluters and resource wasters can buy their way out

May not reduce pollution at dirtiest plants

Can exclude small companies from buying permits

Caps can be too high and not regularly reduced to promote progress

Self-monitoring of emissions can promote cheating

# TRADE-OFFS

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# Reduce Pollution and Resource Waste by Selling Services instead of Things

- 1980s: Braungart and Stahl
    - New economic model
  - **Service-flow economy, eco-lease (rent) services**
    - Xerox
    - Carrier
    - Ray Anderson: lease carpets in the future
-

## *23-4 How Can Reducing Poverty Help Us to Deal with Environmental Problems?*

- **Concept 23-4** *Reducing poverty can help us to reduce population growth, resource use, and environmental degradation.*
-

# The Gap between the Rich and the Poor Is Getting Wider

- **Poverty**
  - **Trickle-down effect**
  - **Flooding up**
  - **Wealth gap**
-

# Poor Family Members Struggling to Live in Mumbai, India



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# We Can Reduce Poverty

- South Korea and Singapore reduced poverty by
    - Education
    - Hard work
    - Discipline
    - Attracted investment capital
  - Developed countries can help
    - Cancel debt of the poorest nations
    - What else can they do?
-

# Case Study: Making Microloans to the Poor (1)

- **Micro-lending or microfinance**
  - 1983: Muhammad Yunus
    - Grameen (Village) Bank in Bangladesh
    - Provides microloans; mostly to women
    - “Solidarity” groups
    - How does it work?
-

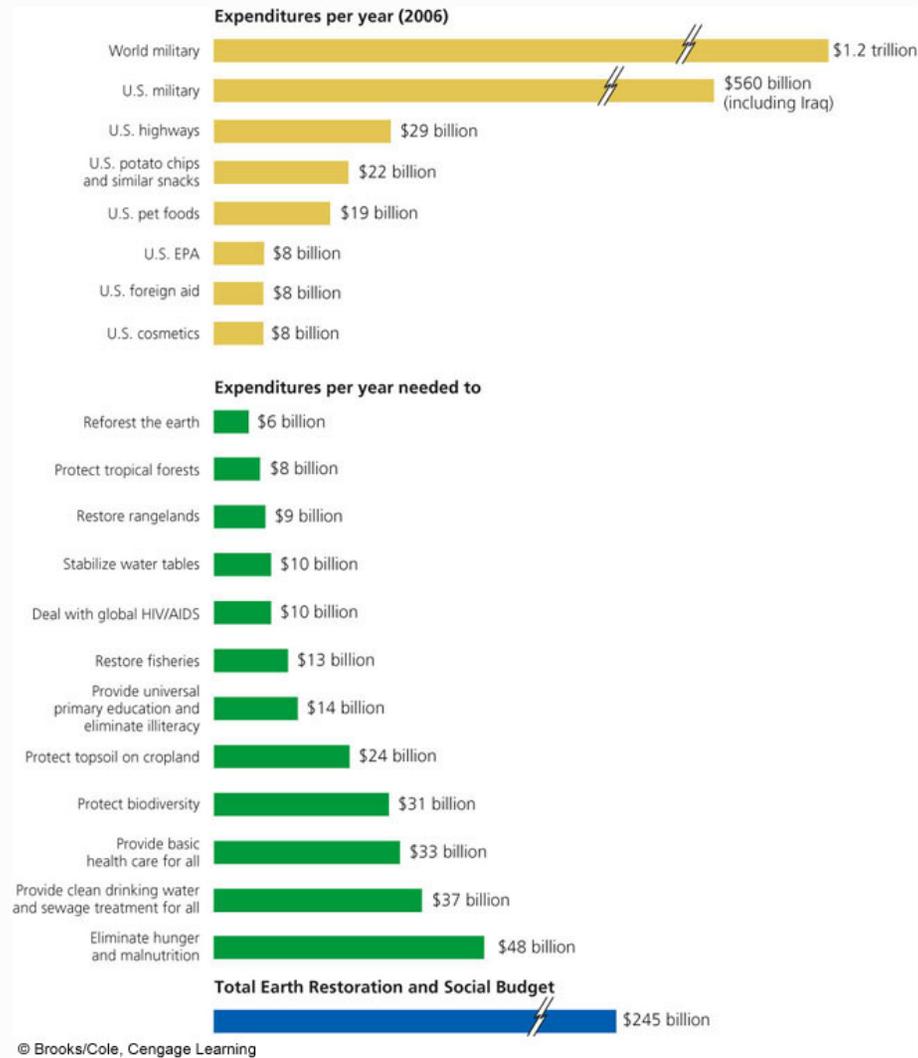
# Case Study: Making Microloans to the Poor (2)

- 2006: Muhammad Yunus
    - Nobel Peace Prize
  - 2006: Citibank and TIAA-Cref
    - Microloans
-

# We Can Achieve the World's Millennium Development Goals

- 2000: Millennium Development Goals
    - Sharply reduce hunger and poverty
    - Improve health care
    - Empower women
    - Environmental sustainability by 2015
    - Developed countries: spend 0.7% of national budget toward these goals
  
  - How is it working?
-

# What Should Our Priorities Be?



## *23-5 Making the Transition to More Environmentally Sustainable Economics*

- **Concept 23-5** *We can use the four principles of sustainability and various economic and environmental strategies to develop more environmentally sustainable economies.*
-

# We Can Shift from High-Throughput to Matter Recycling and Reuse Economies

- **Matter recycling and reuse economies**
  - Mimic nature
-

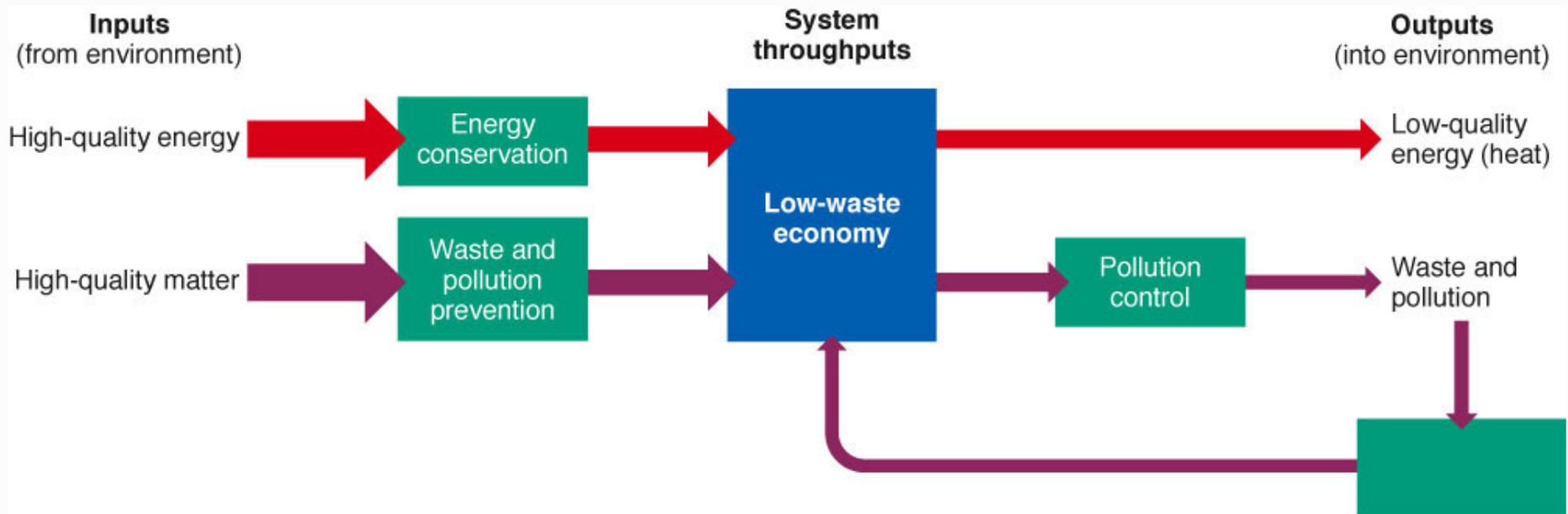
# We Can Put More Emphasis on Localizing Economic Production

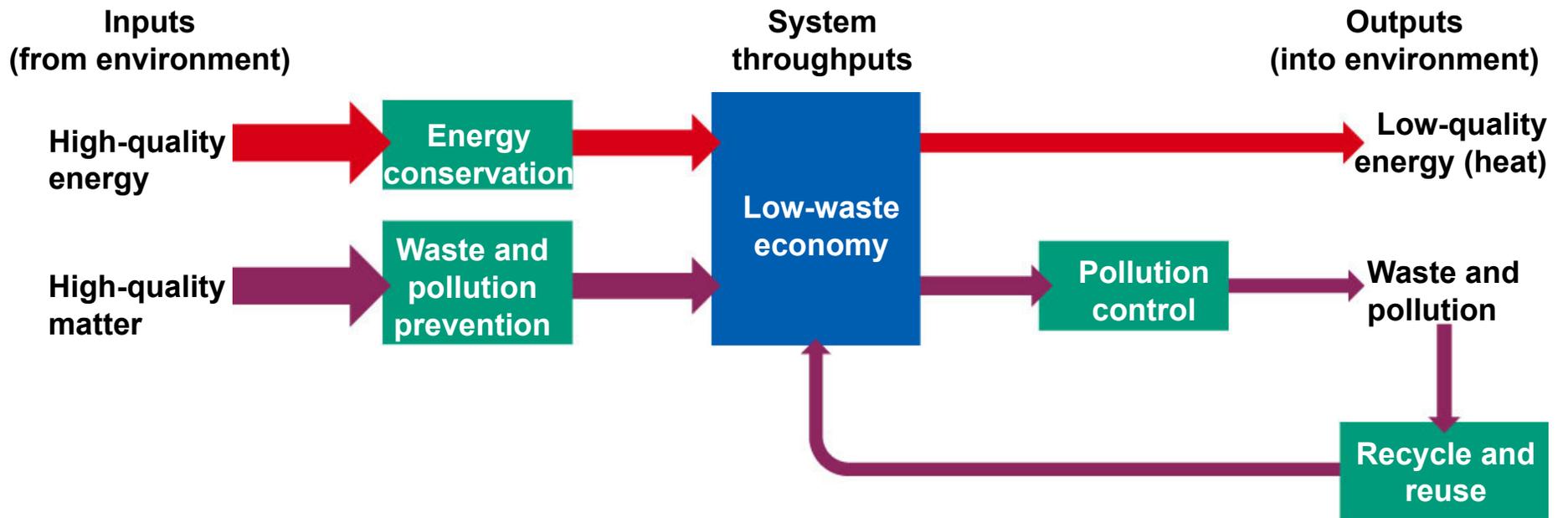
- Increase local environmental and economic stability
  - Businesses selling goods and services globally might decline
-

# We Can Use Lessons from Nature to Shift to More Sustainable Economies

- Donella Meadows: contrasts the views of neoclassical economists and ecological economists
  - Best long-term solution is a shift to
    - **Low-throughput, low-waste, economy**
-

# Solutions: Lessons from Nature: A Low Throughput Economy





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Fig. 23-13, p. 629

# We Can Make Money and Create Jobs by Shifting to an Eco-Economy (1)

- Hawken, Brown, and other environmental business leaders
    - Transition to environmentally sustainable economies
    - Some companies will disappear
    - New jobs will be created
-

# We Can Make Money and Create Jobs by Shifting to an Eco-Economy (2)

- General Electric: **“ecoimagination plan”**
  - Bainbridge Graduate Institute and Presidio graduates
    - Triple bottom line: people, planet, and profit
-

# Solutions: Principles for Shifting to More Environmentally Sustainable Economies



## Economics

- Reward (subsidize) environmentally sustainable economic development
- Penalize (tax and do not subsidize) environmentally harmful economic growth
- Shift taxes from wages and profits to pollution and waste
- Use full-cost pricing
- Sell more services instead of more things
- Do not deplete or degrade natural capital
- Live off income from natural capital
- Reduce poverty
- Use environmental indicators to measure progress
- Certify sustainable practices and products
- Use eco-labels on products

## Resource Use and Pollution

- Cut resource use and waste by reducing, reusing, and recycling
- Improve energy efficiency
- Rely more on renewable solar and geothermal energy

## Ecology and Population

- Mimic nature
- Shift from a nonrenewable carbon-based (fossil fuel) economy to a non-carbon renewable energy economy
- Preserve biodiversity
- Repair ecological damage
- Stabilize human population



## Environmentally Sustainable Economy (Eco-Economy)

## Economics

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## Environmentally Sustainable Economy (Eco-Economy)

# Green Careers: Some Eco-Friendly Businesses and Careers

## Environmentally Sustainable Businesses and Careers

Aquaculture

Biodiversity protection

Biofuels

Climate change research

Conservation biology

Eco-industrial design

Ecotourism management

Energy efficient product design

Environmental chemistry

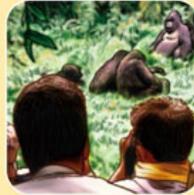
Environmental (green) design

Environmental economics

Environmental education

Environmental engineering

Environmental health



Environmental law

Environmental nanotechnology

Fuel cell technology

Geographic information systems (GIS)

Geothermal geologist

Hydrogen energy

Marine science

Pollution prevention

Reconciliation ecology

Selling services in place of products

Solar cell technology

Sustainable agriculture

Sustainable forestry

Waste reduction

Watershed hydrologist

Water conservation

Wind energy

## Environmentally Sustainable Businesses and Careers

**Aquaculture**

**Biodiversity protection**

**Biofuels**

**Climate change research**

**Conservation biology**

**Eco-industrial design**

**Ecotourism management**

**Energy efficient product design**

**Environmental chemistry**

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