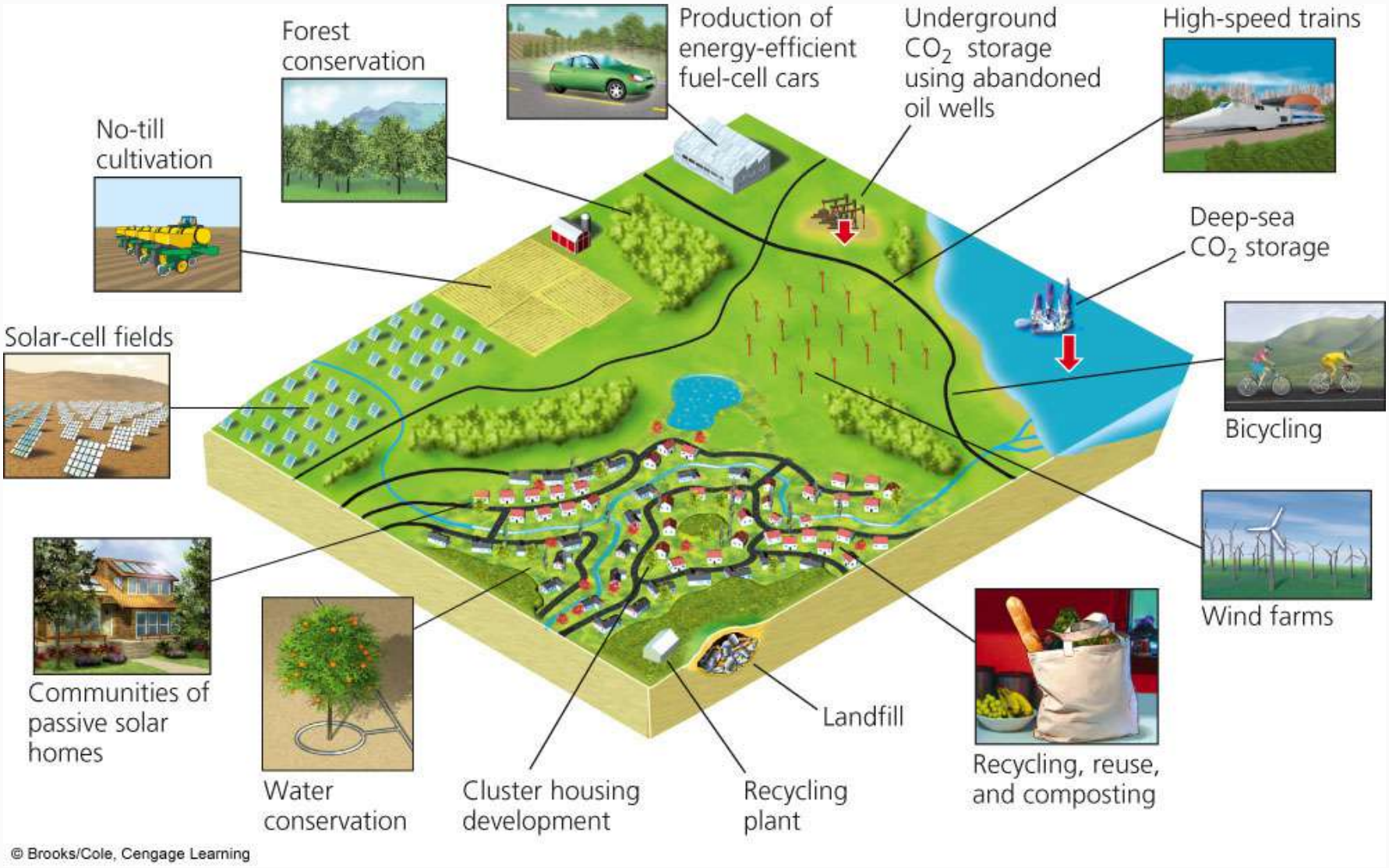
Economics, Environment, and Sustainability

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



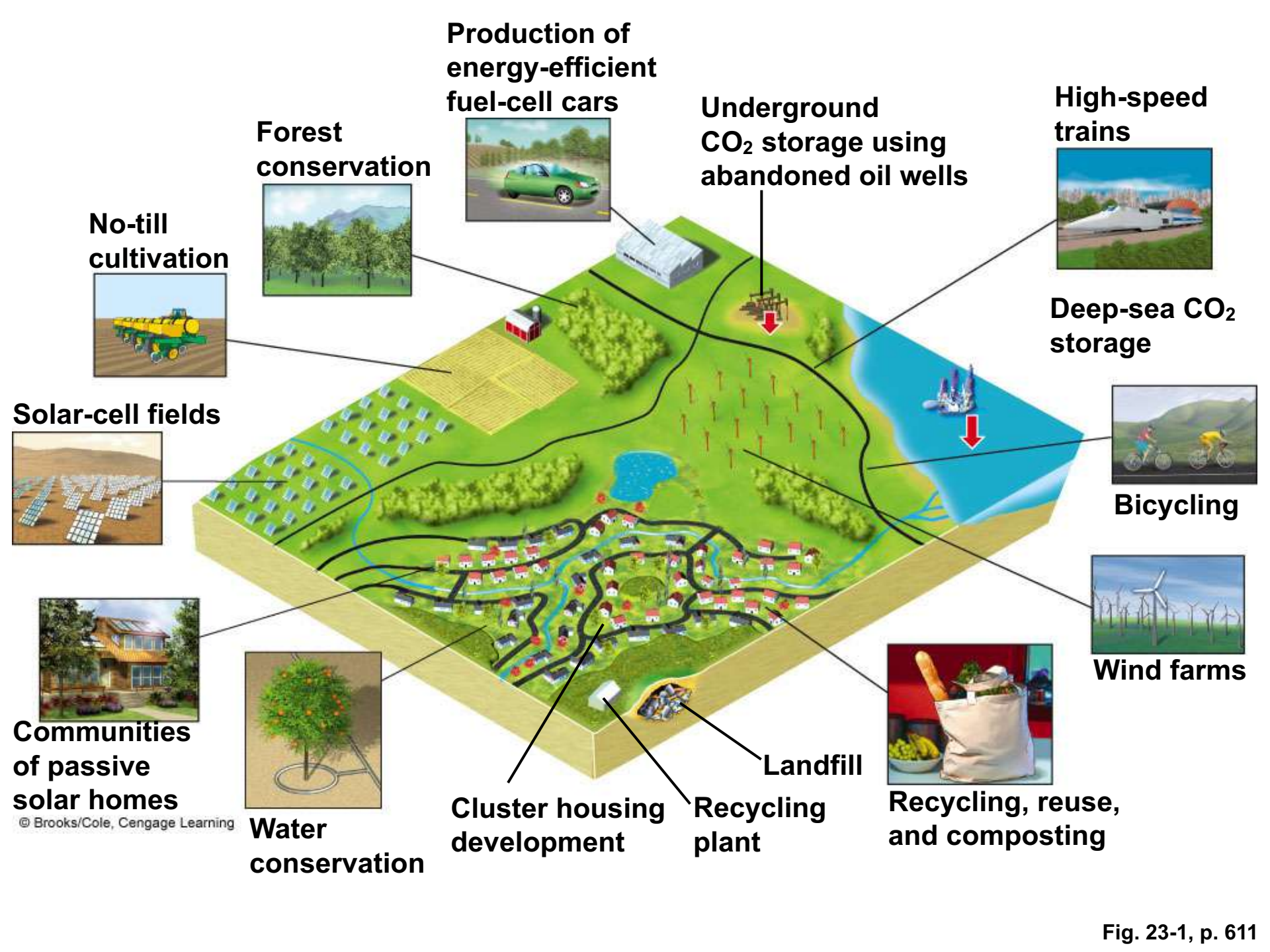


Fig. 23-1, p. 611

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.*

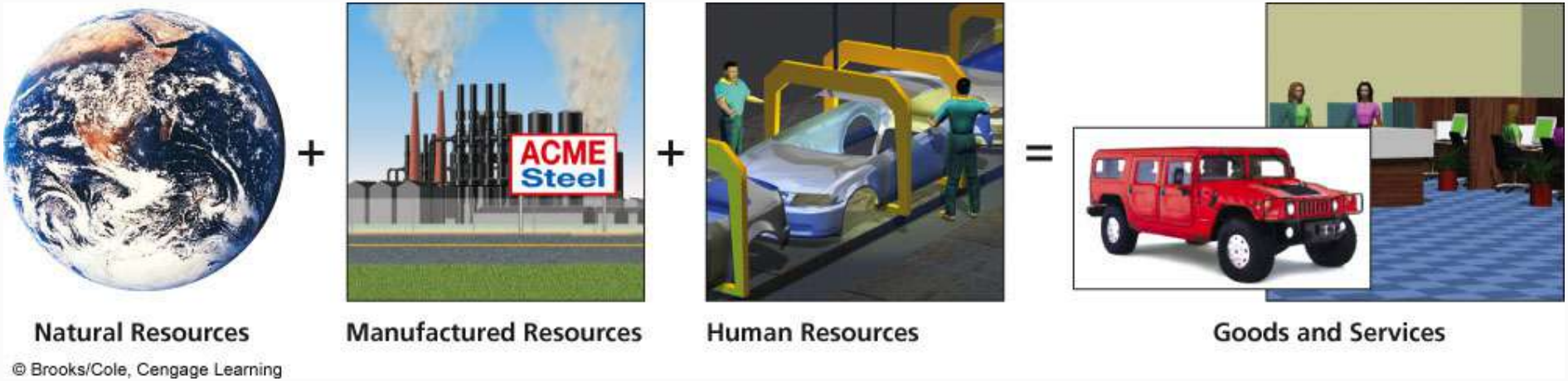
23-1 How Are Economic Systems Related to the Biosphere? (2)

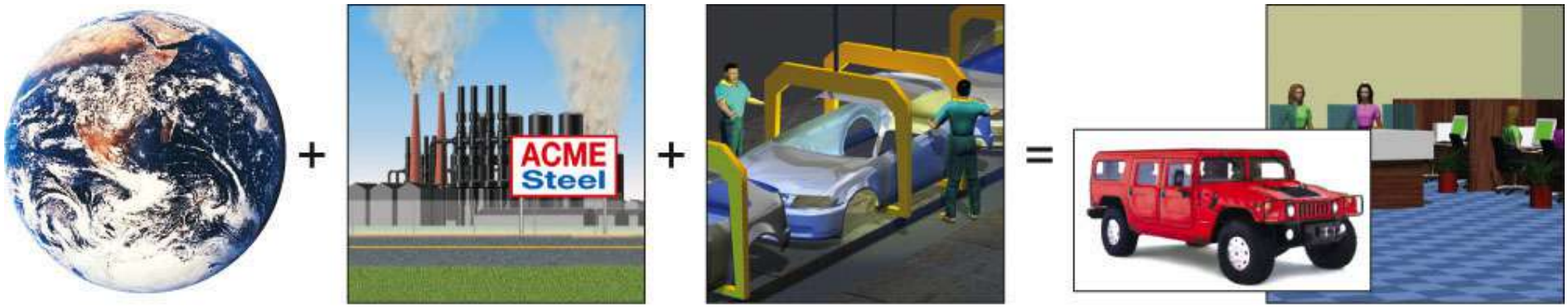
- ***Concept 23-1B*** *Governments intervene in market economies to help correct or prevent market failures such as the failure to protect natural capital, which supports life and all economies.*

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





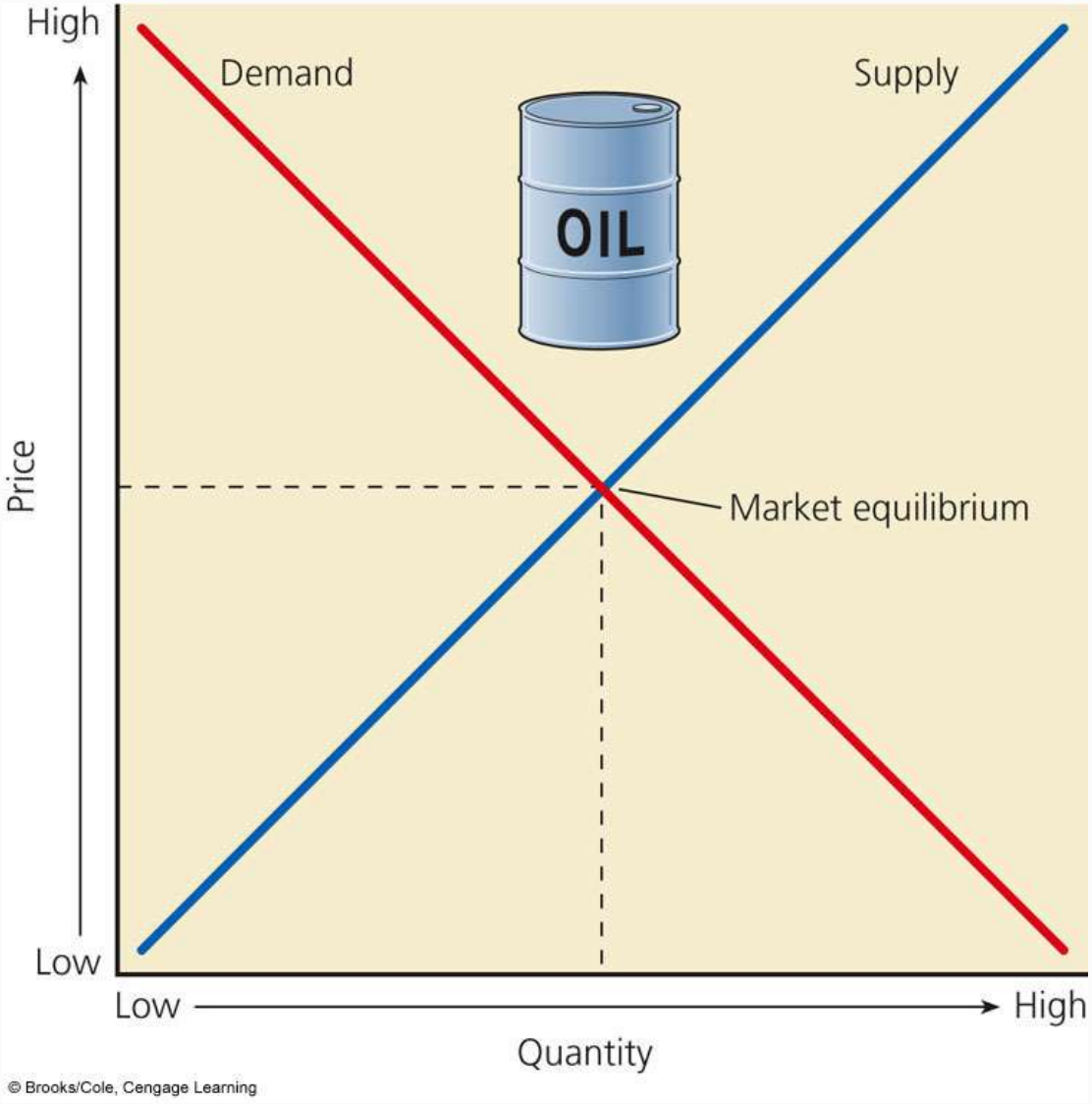
Natural Resources | **Manufactured Resources** | **Human Resources** | **Goods and Services**

Fig. 23-2, p. 613

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



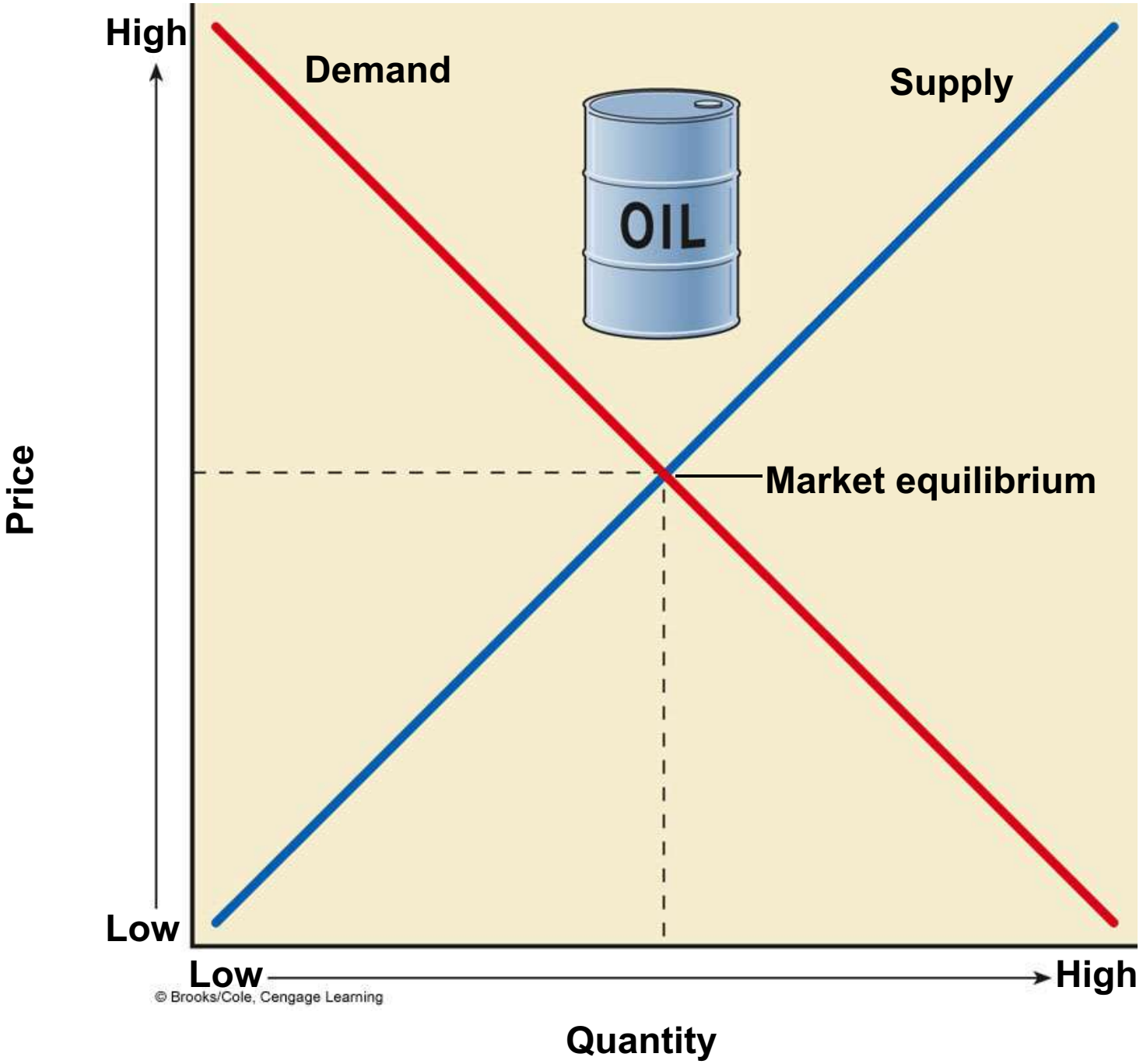

High
Demand
Supply
OIL
Price
Market equilibrium
Low
Low
High
© Brooks/Cole, Cengage Learning
Quantity

Fig. 23-3, p. 613

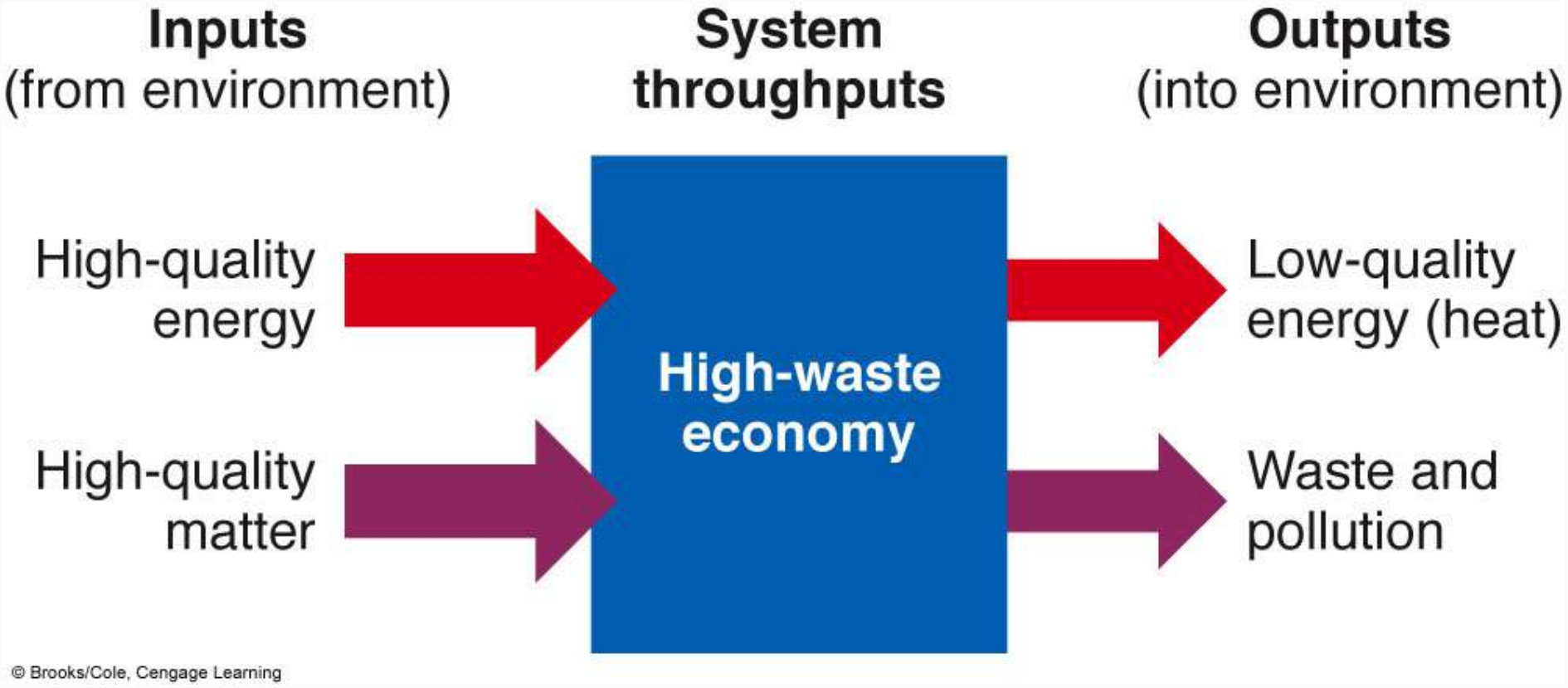
Governments Intervene to Help Correct Market Failures

- **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 eco-economies

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



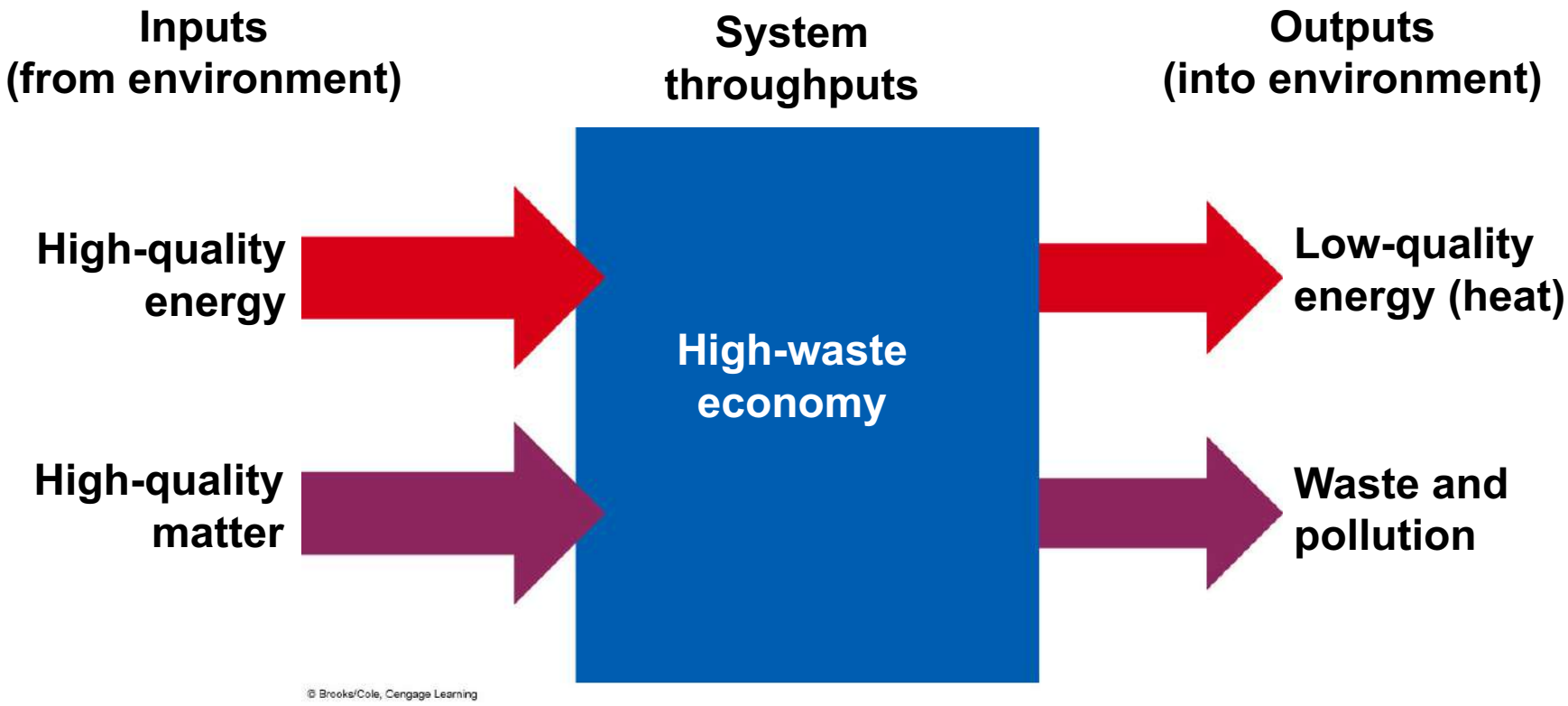
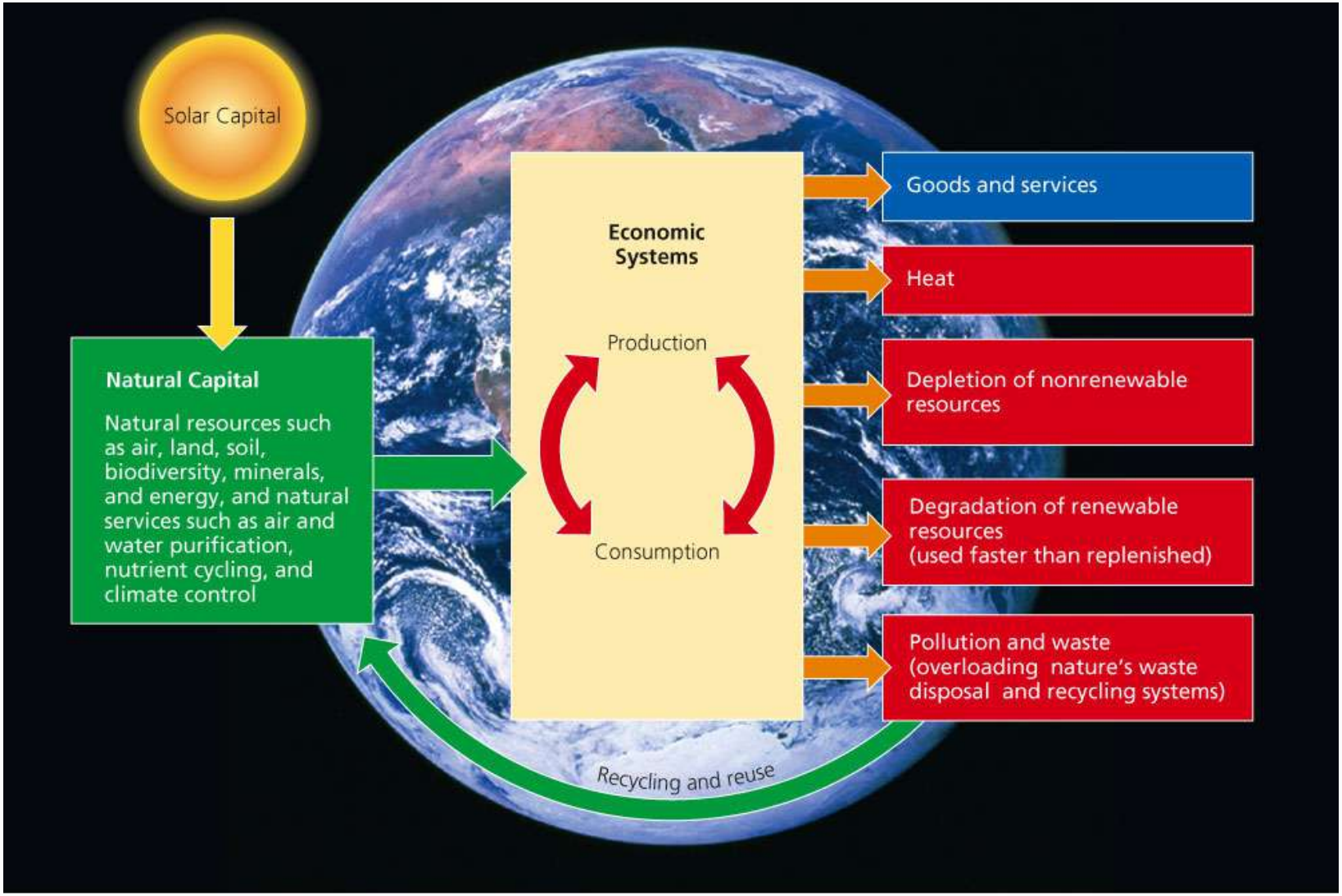

Inputs
(from environment)
System
throughputs
Outputs
(into environment)
High-quality
energy
High-quality
matter
High-waste
economy
Low-quality
energy (heat)
Waste and
pollution
© Brooks/Cole, Cengage Learning

Fig. 23-4, p. 614

Ecological Economists: Economies Are Human Subsystems of the Biosphere



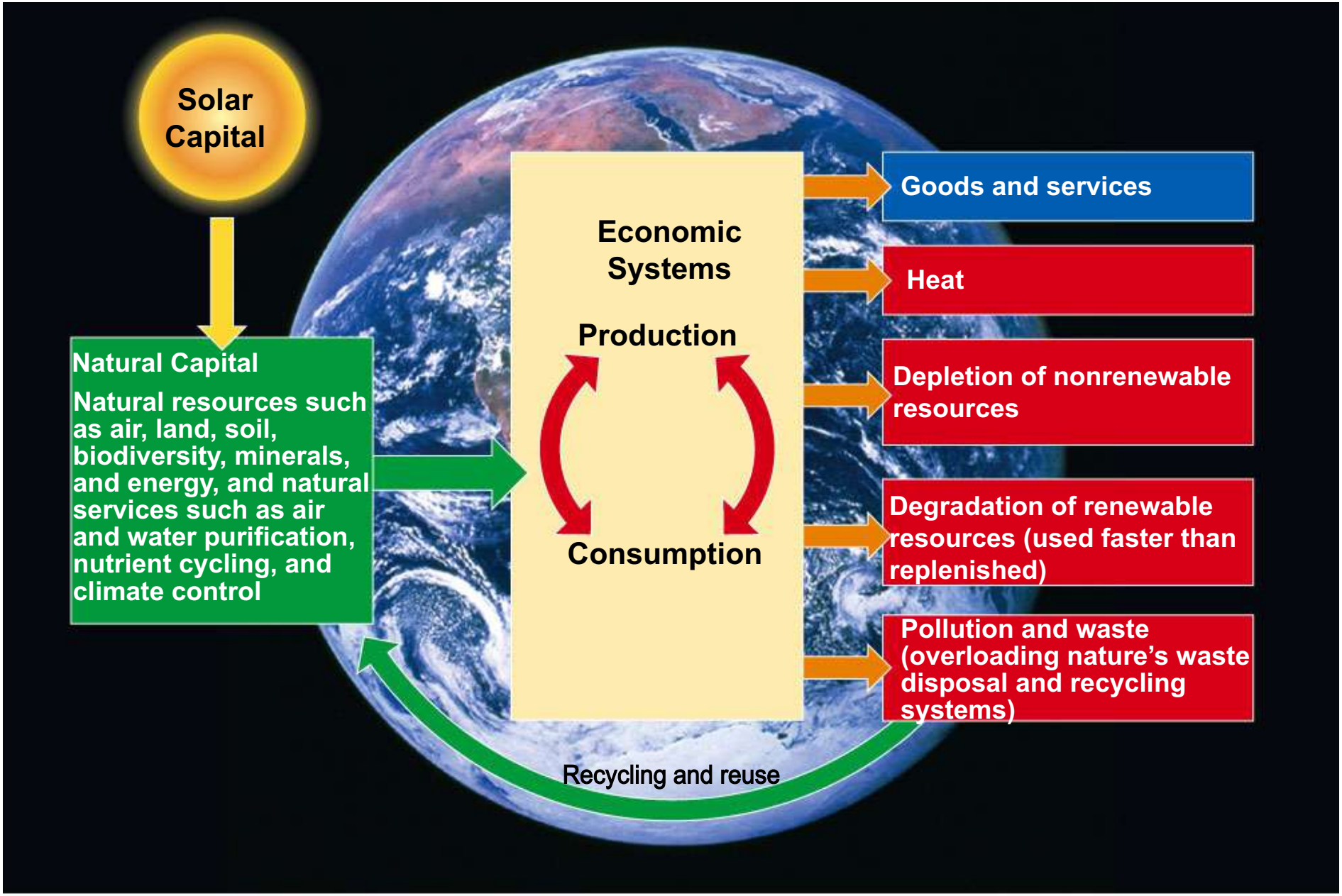
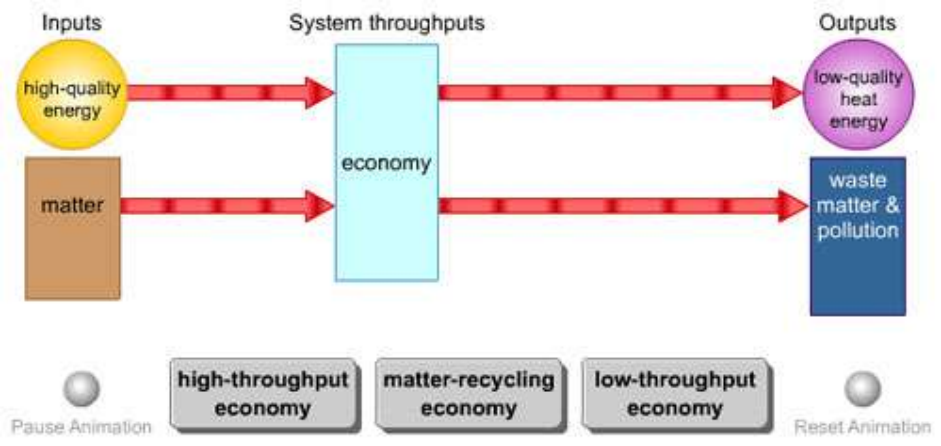


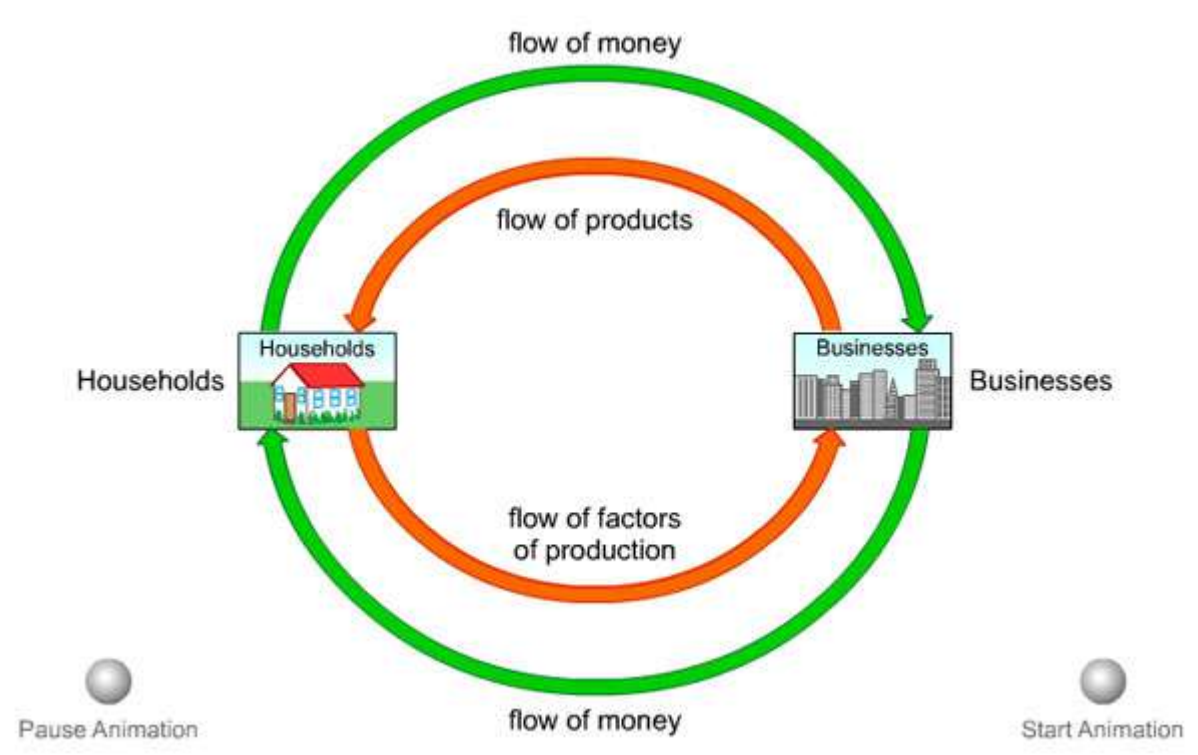
Fig. 23-5, p. 615

Active Figure: Economic types



PLAY

Active Figure: Two views of economics



PLAY

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**

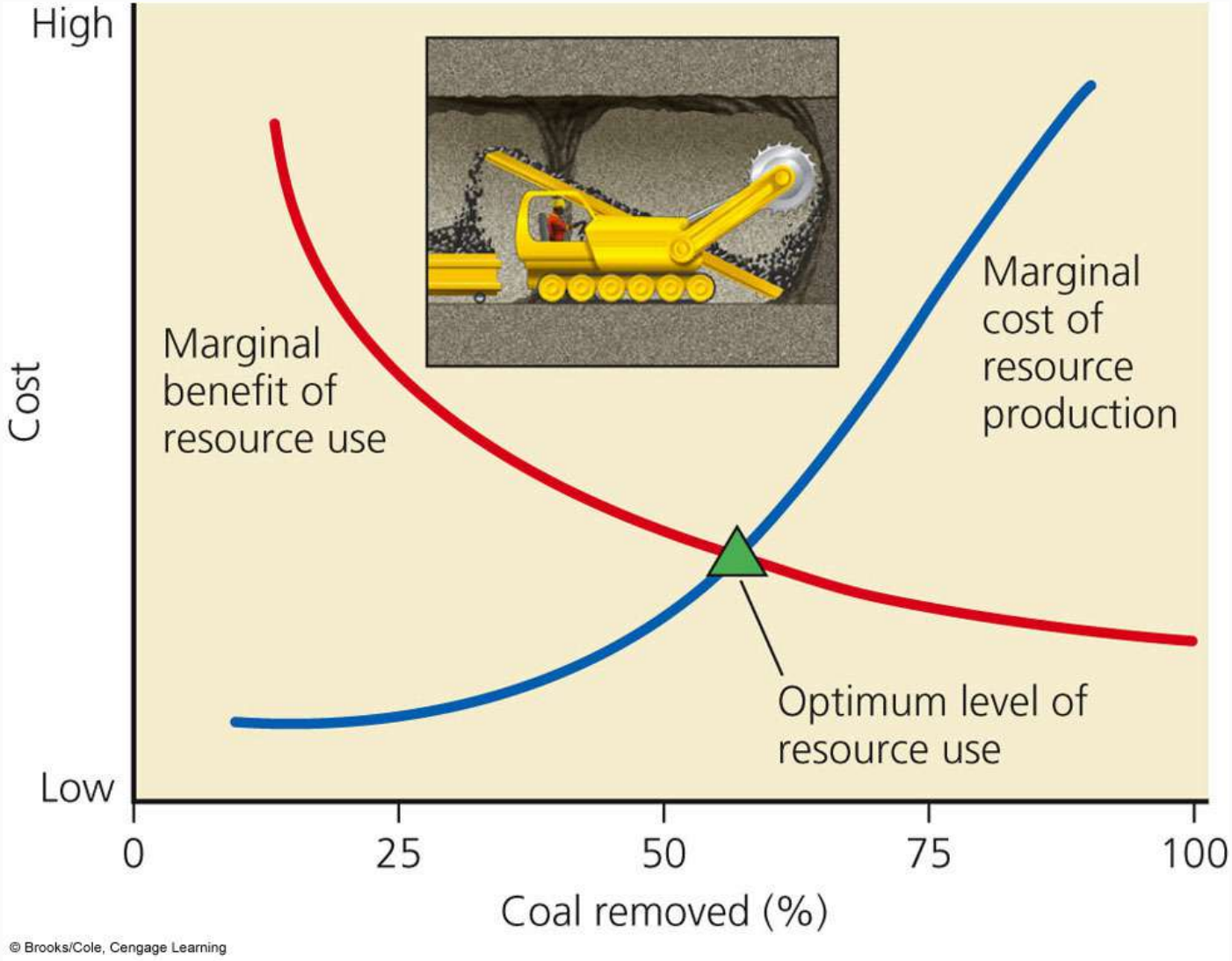
Estimating the Future Value of a Resource Is Controversial

- **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



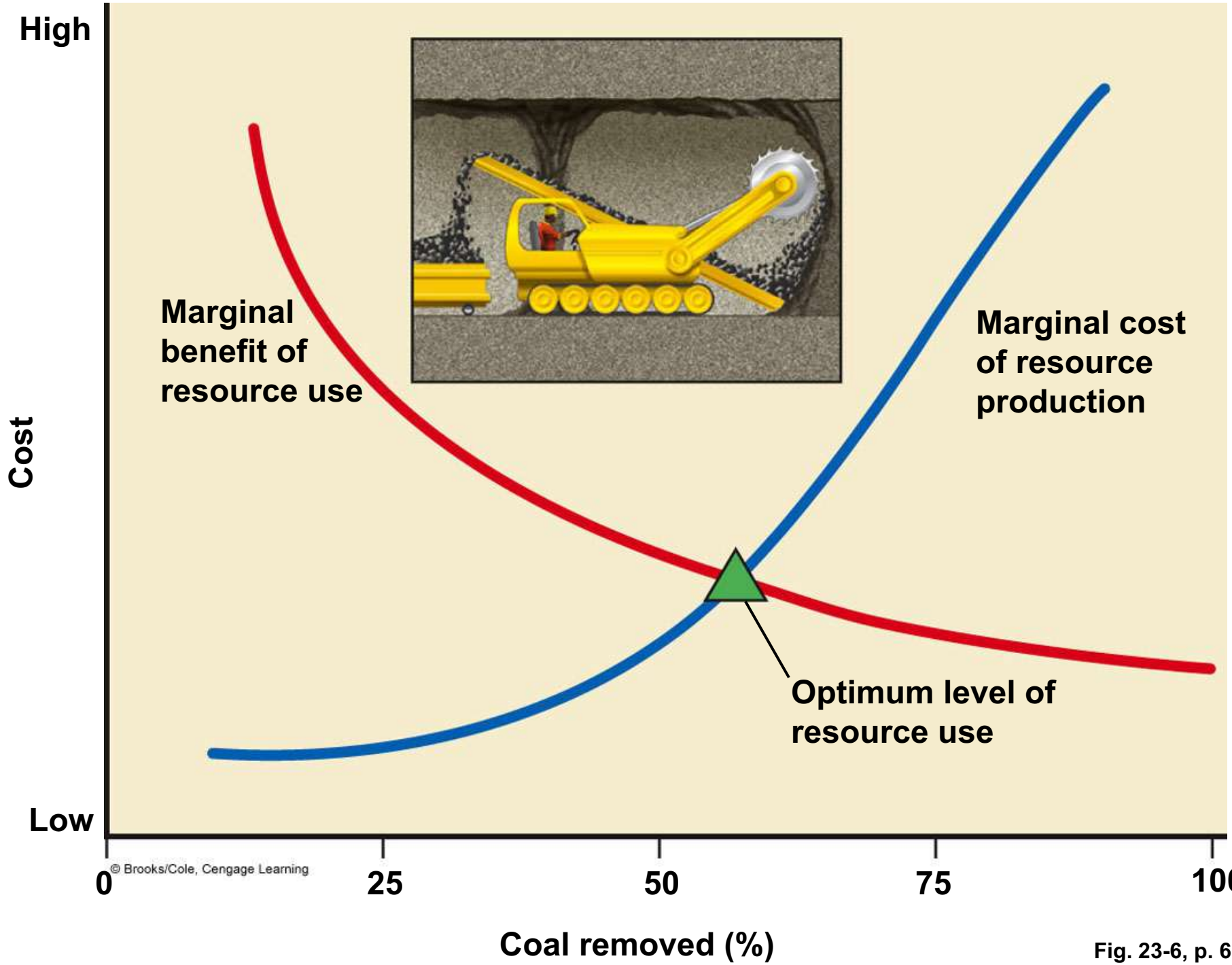
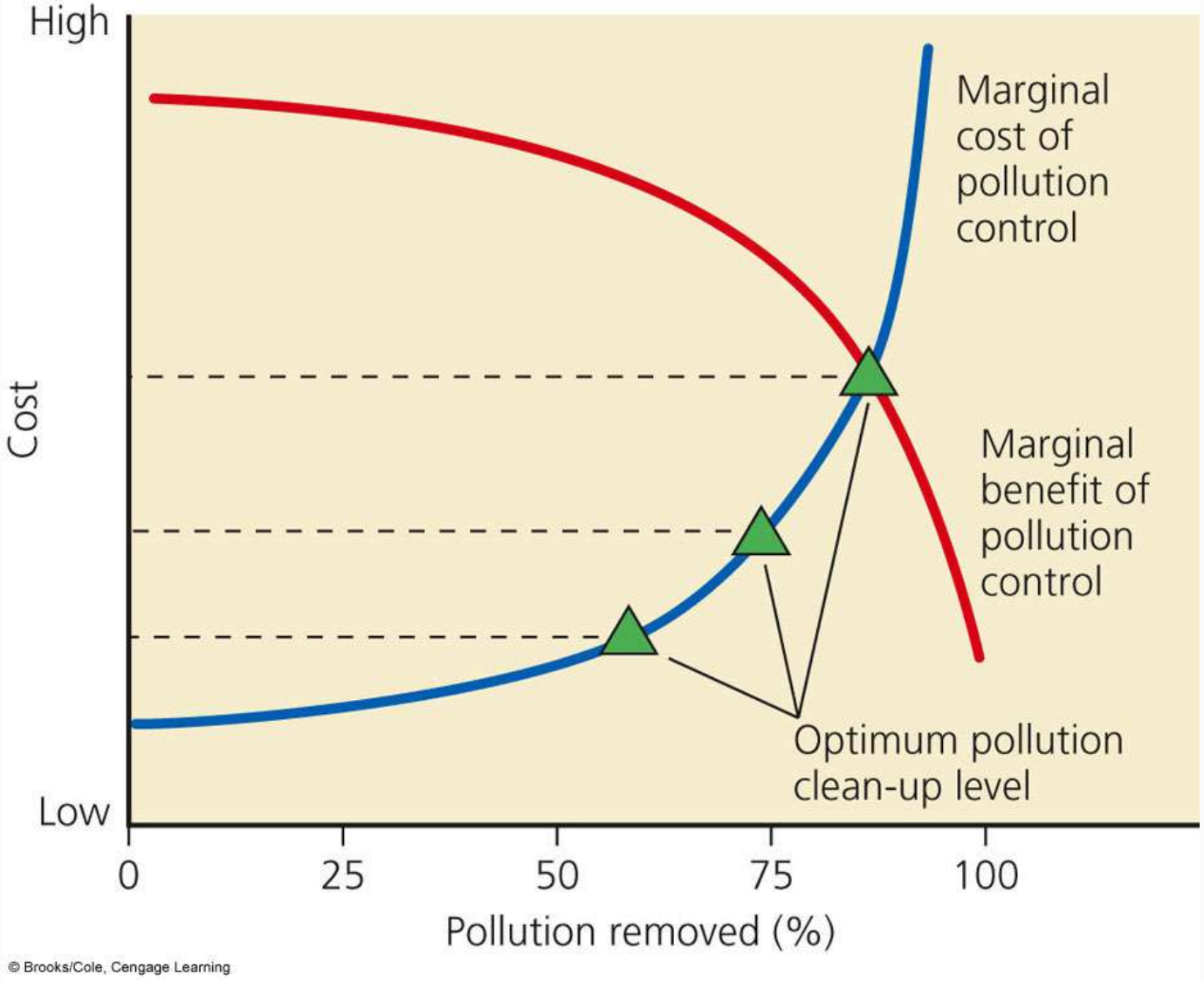


Fig. 23-6, p. 617

Optimum Pollution Control



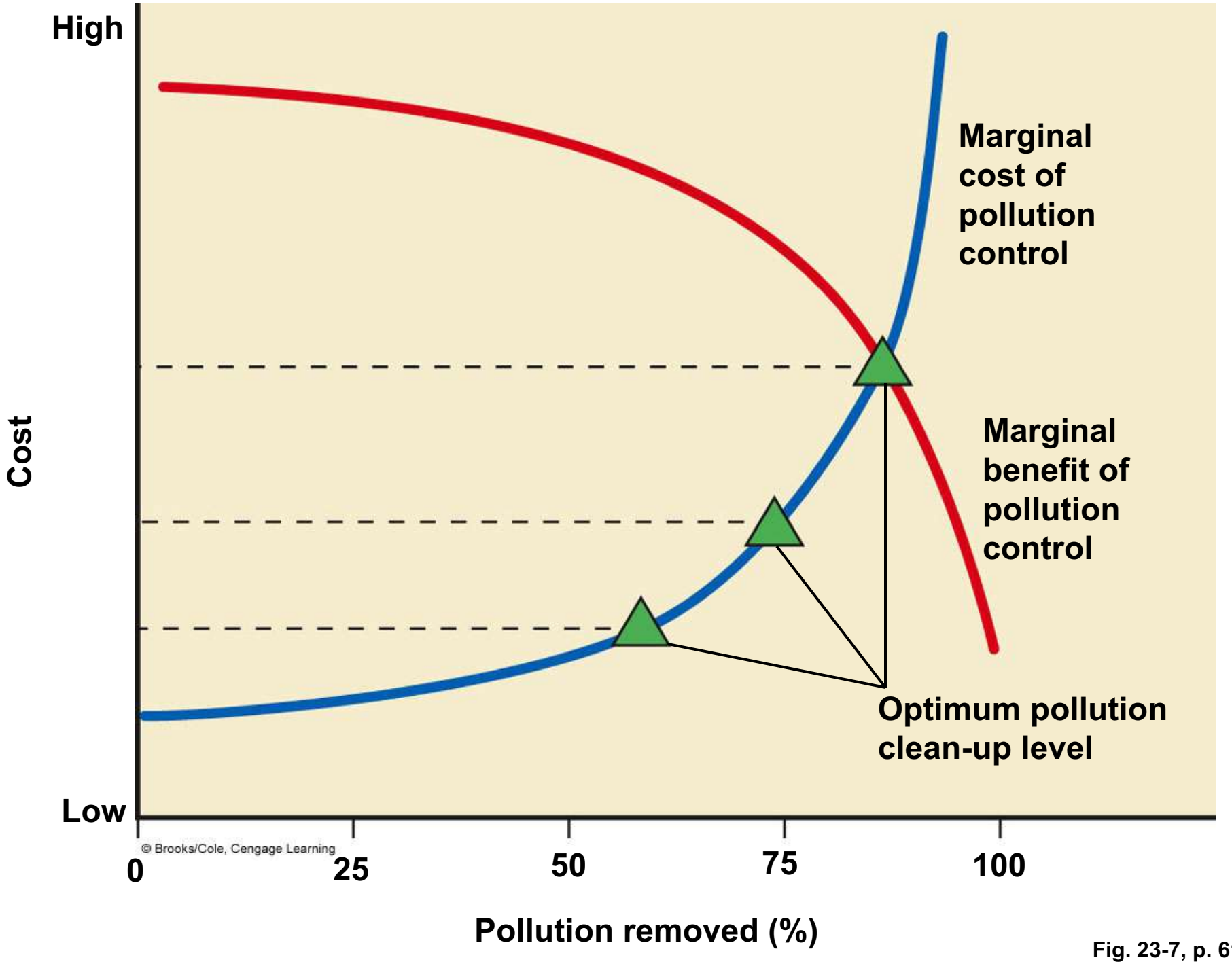

High
Low
Cost
Marginal cost of pollution control
Marginal benefit of pollution control
Optimum pollution clean-up level
© Brooks/Cole, Cengage Learning
0
25
50
75
100
Pollution removed (%)

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

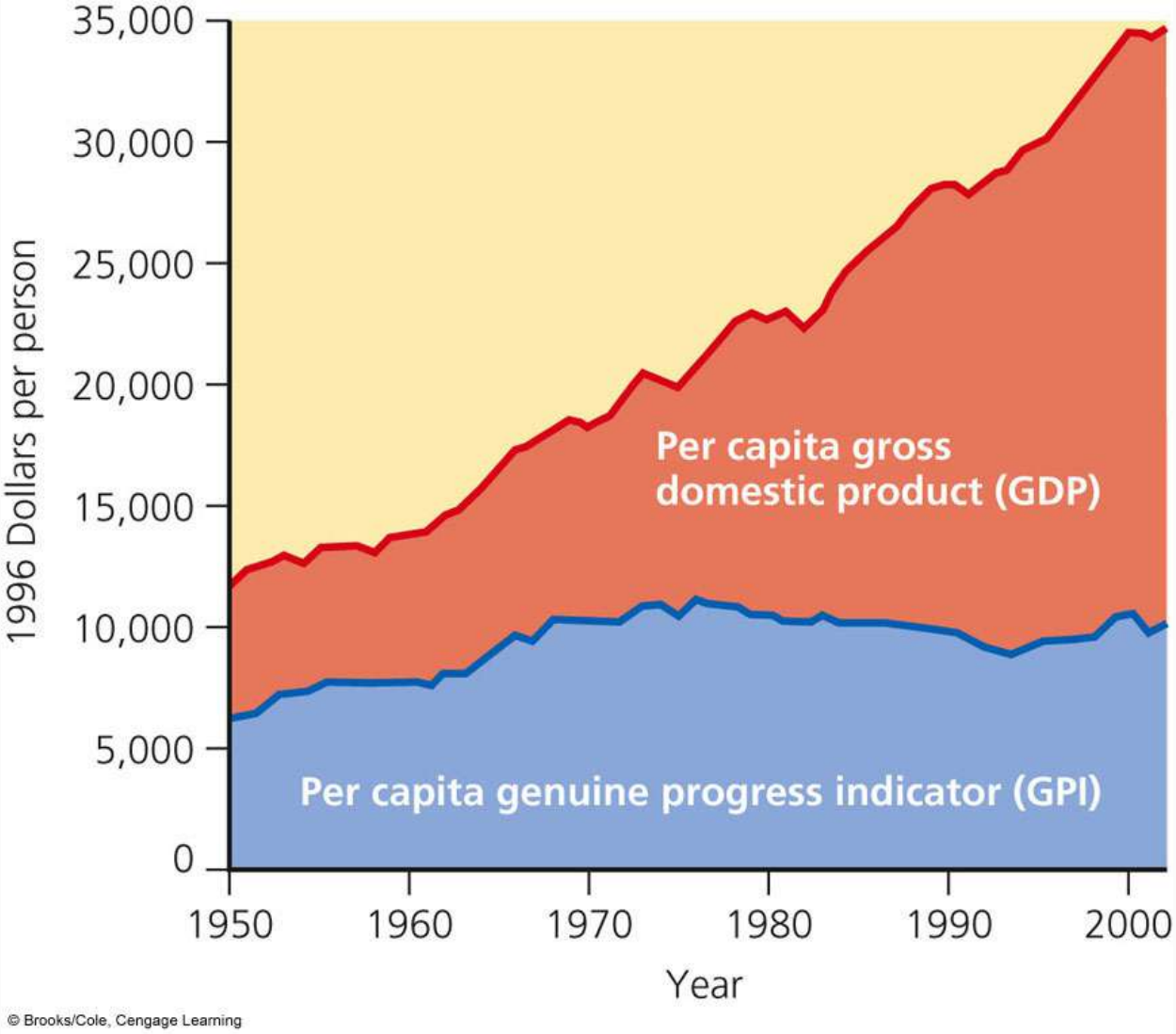
- **Market price, direct price**
- **Indirect, external, or hidden costs**
- Direct and indirect costs of a car
- Should indirect costs be part of the price of goods?
  - Economists differ in their opinions

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



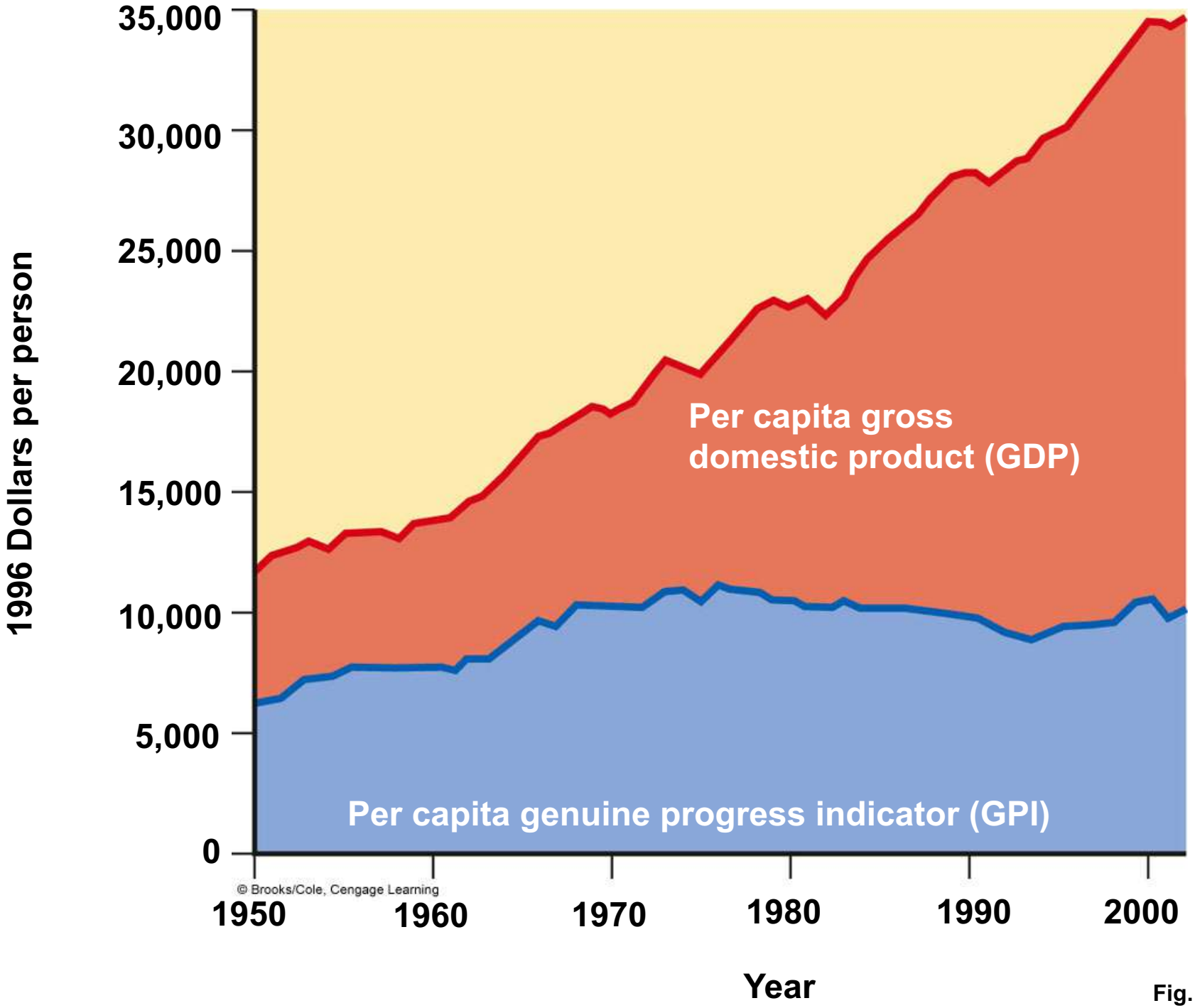

35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1996 Dollars per person
Per capita gross domestic product (GDP)
Per capita genuine progress indicator (GPI)
© Brooks/Cole, Cengage Learning
1950
1960
1970
1980
1990
2000
Year

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

Advantages		Disadvantages
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

Easily administered by existing tax agencies

Fairly easy to detect cheaters

Disadvantages

Low-income groups are penalized unless safety nets are provided

Hard to determine optimal level for taxes and fees

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

Fig. 23-9, p. 623

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_2 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

Tradable Environmental Permits

Advantages

Flexible

Easy to administer

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Fig. 23-10, p. 624

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

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 Banglash
  - Provides microloans; mostly to women
  - “Solidarity” groups
  - How does it work?

Case Study: Making Microloans to the Poor (2)

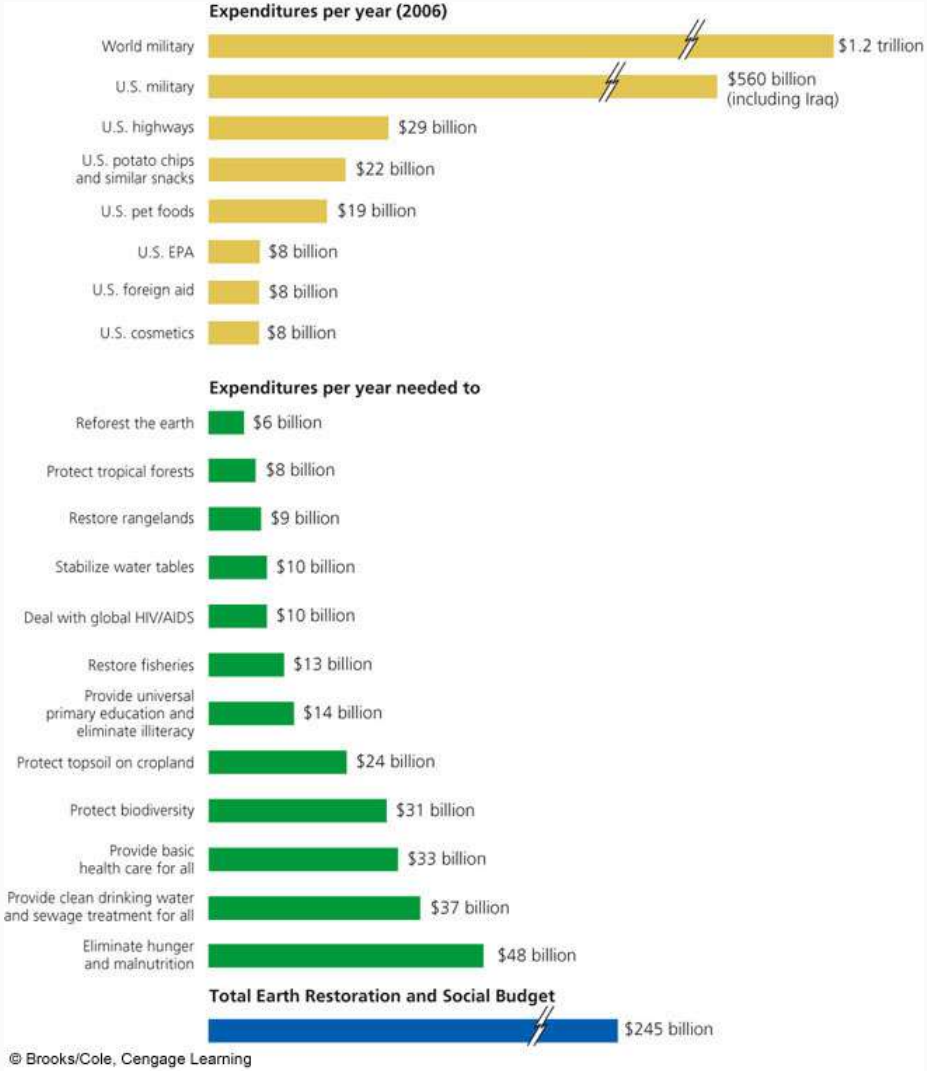
- 2006: Muhammad Yunus
  - Nobel Peace Prize
- 2006: Citibank and TIAA-Cref
  - Microloans

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

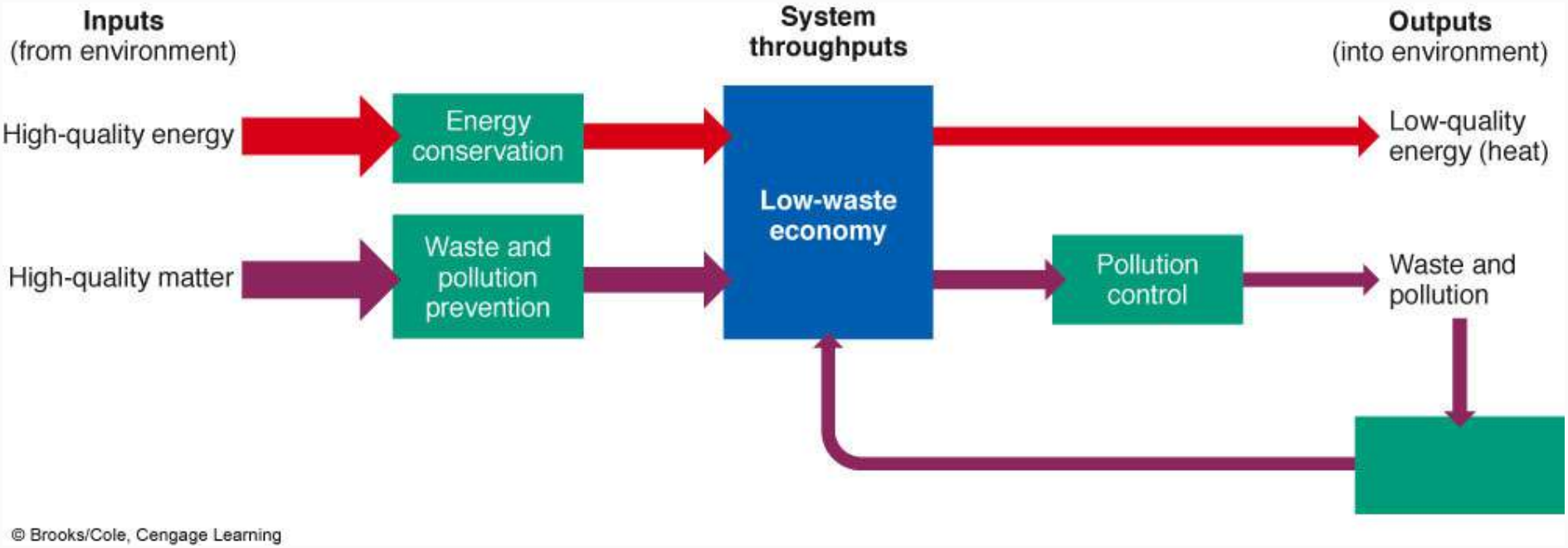
- Increase local environmental and economic stability
- Businesses selling goods and services globally might decline

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



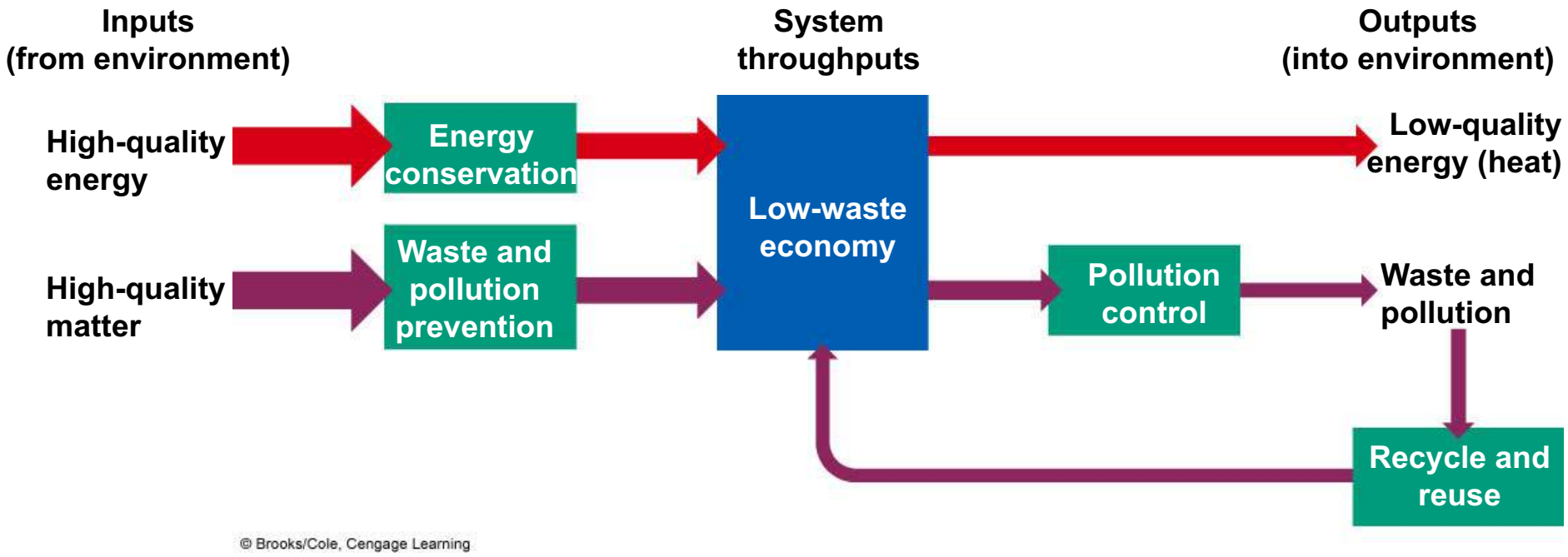


Fig. 23-13, p. 629

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)

Fig. 23-14, p. 630

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

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Cut resource use and waste by reducing, reusing, and recycling

Improve energy efficiency

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Shift from a nonrenewable carbon-based (fossil fuel) economy to a non-carbon renewable energy economy

Ecology and Population

Mimic nature

Preserve biodiversity

Repair ecological damage

Stabilize human population

Environmentally Sustainable Economy (Eco-Economy)

Stepped Art

Fig. 23-14, p. 630

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

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

Fig. 23-15, p. 630