

Increasing Resource Productivity and Promoting the 3Rs in National Economies



March 2008

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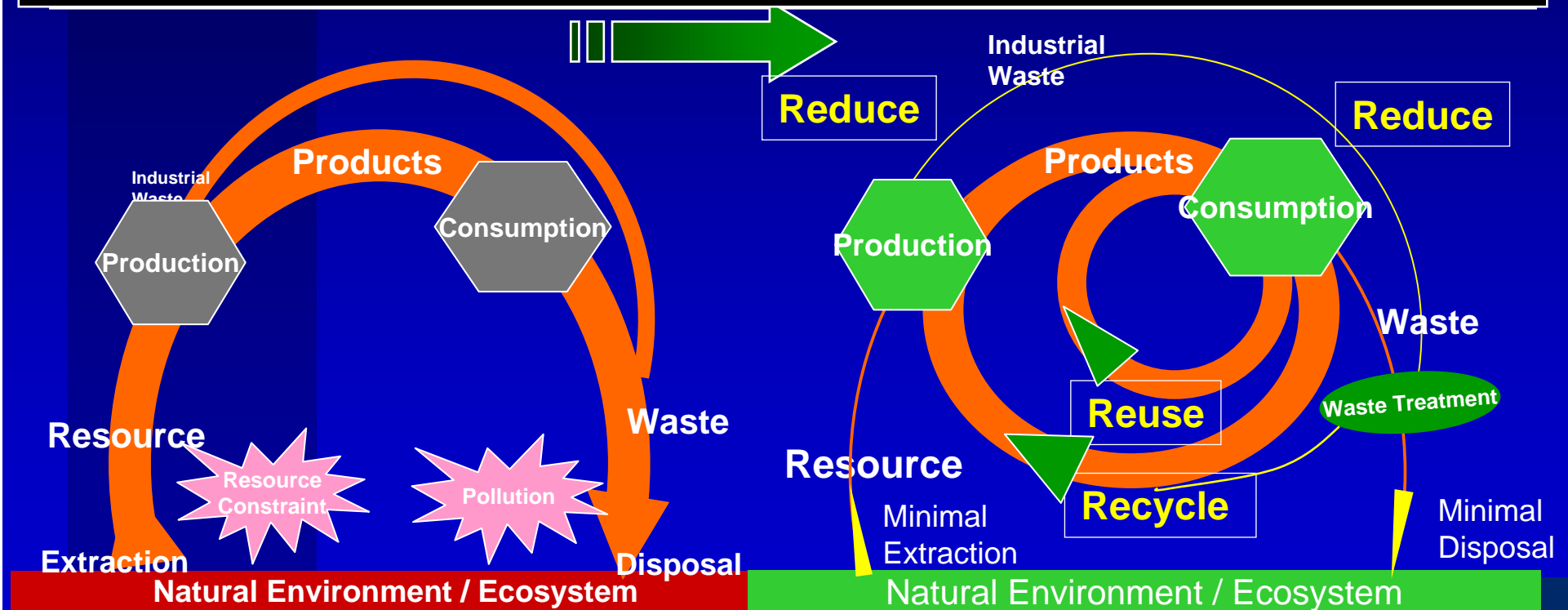
ADB

The Report:

- Propositions:
 1. Current inefficient development patterns do not allow the region to continue support high demand resource without negative impacts:
 - higher price, severe degradation, growing internal competition
 2. Government around the region have the ability to follow an alternative path not only to avoid such impacts but also to take advantage of opportunities to invest in infrastructure and institutes wisely:
 - Strengthen competitiveness, generate jobs, provide clean and productive environment

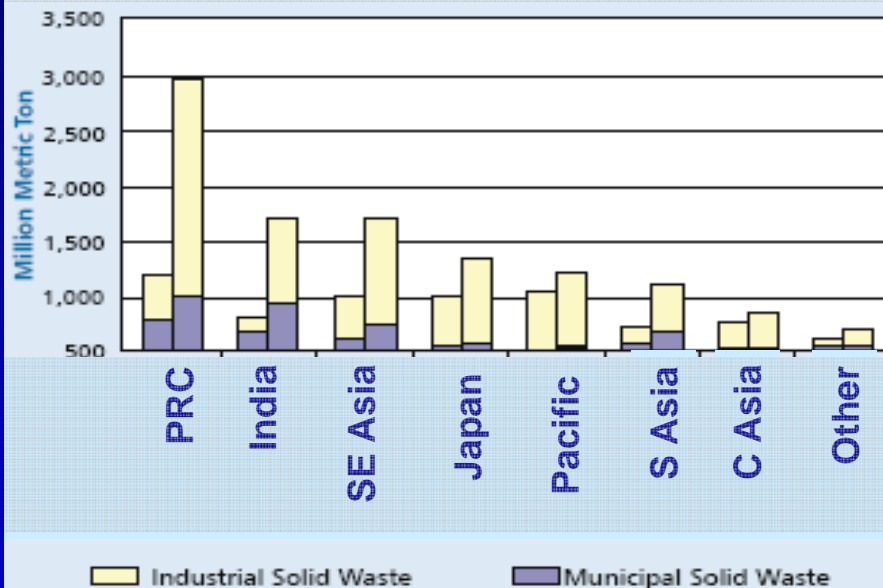
$$\text{Resource Efficiency} = \frac{1}{\text{Resource Productivity}}$$

Practicing resource efficiency involves using smaller amounts of physical resources and generating less waste to produce the same product or service



Economic and population growth in Asia has led to increased waste generation, and energy & water demand

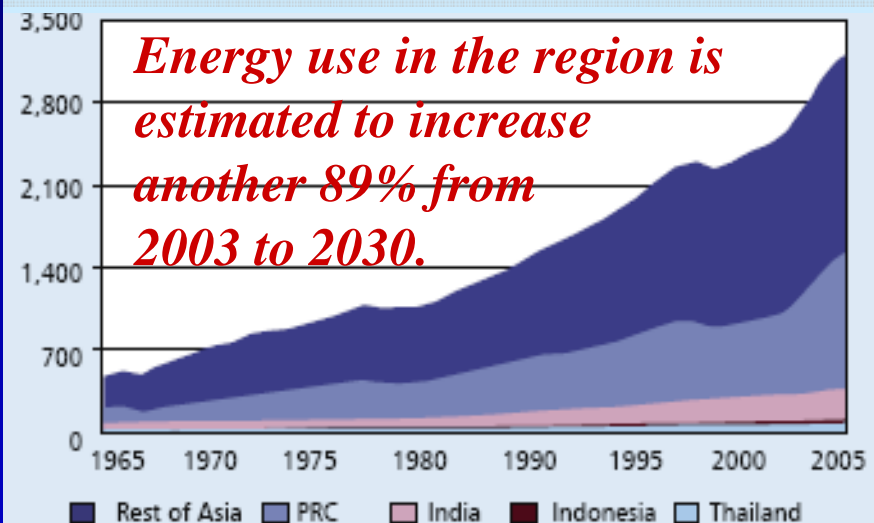
Projected Solid Waste Generation in Asia (MMT) (2000-2050)



PRC = People's Republic of China.

Source: Solid Waste Projection Study by Tanaka et al.

Demand for Energy in Selected Asian Countries (MTOE) (1965-2005)

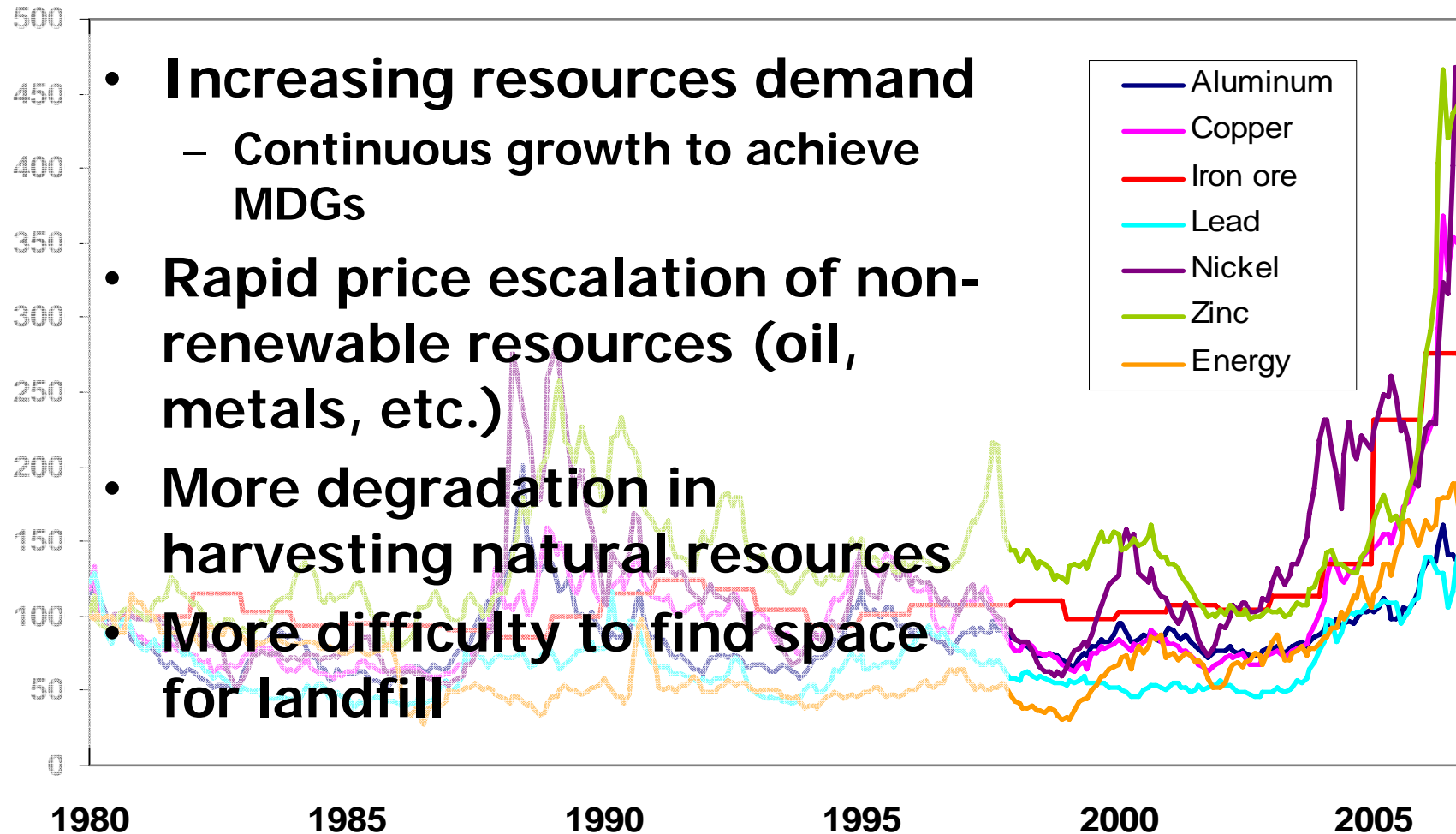


MTOE = million tons of oil equivalent, PRC = People's Republic of China.

Source: British Petroleum. 2006. Statistical Review of World Energy 2006. London.

Increasing Resource Constraint

Price Index of Metals and Energy (nominal, 1980 = 100)



- **Increasing resources demand**
 - Continuous growth to achieve MDGs
- **Rapid price escalation of non-renewable resources (oil, metals, etc.)**
- **More degradation in harvesting natural resources**
- **More difficulty to find space for landfill**

Sources: International Monetary Fund, Primary Commodity Prices, available: www.imf.org, downloaded 9 October 2006; World Bank Development Prospects Group, Commodity Price Indexes.

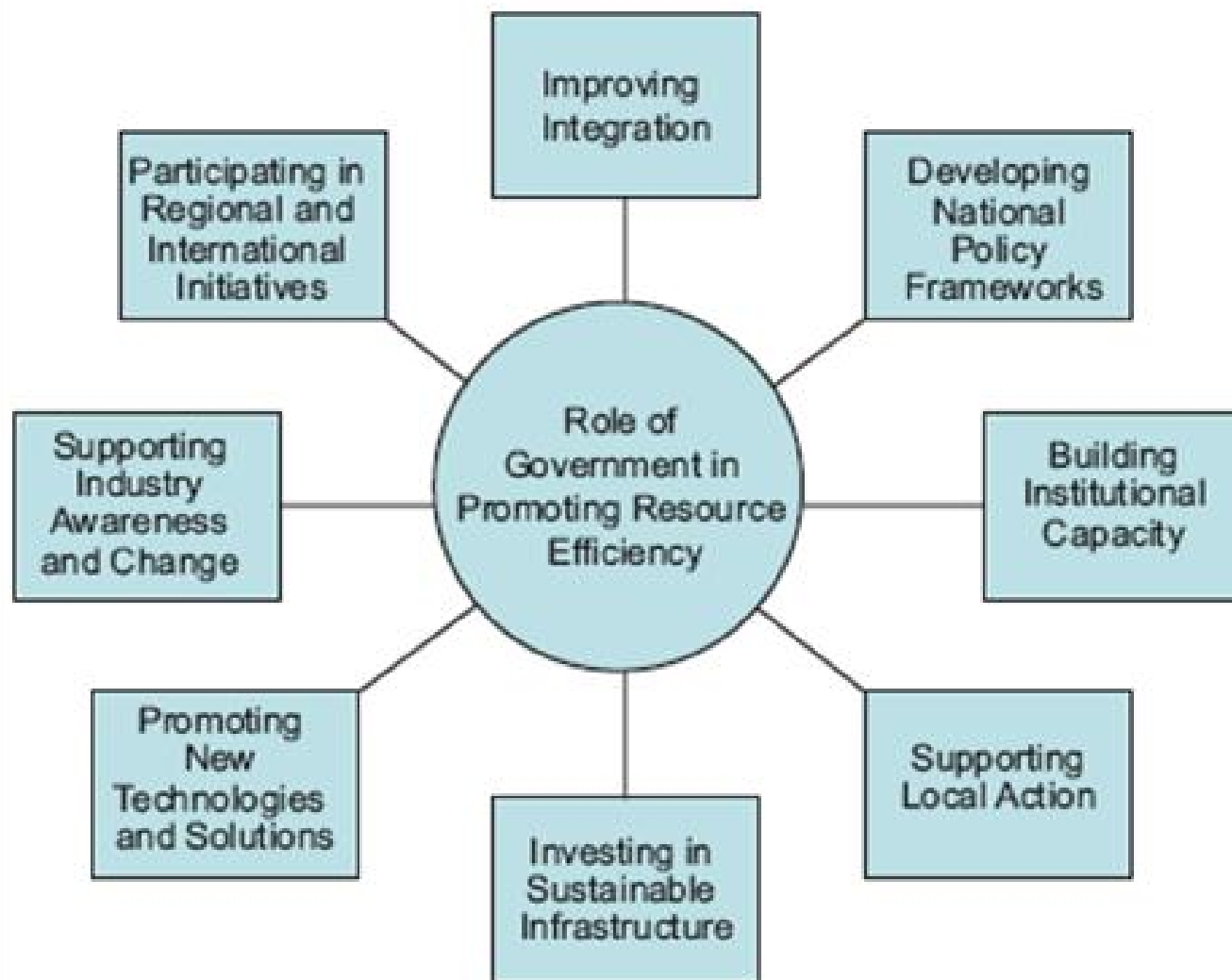
Benefits of Resource Efficiency

- Less natural resource harvesting
- Less waste, pollutant, GHG emissions



- **Less Environmental Impact**
 - Local Pollution, Improve Sanitation
 - Mitigate Climate Change through reducing GHG emission
- **Conserving Natural Resources**
 - Soften Resource Constraints
 - Provide Additional Resources for Achieving MDGs
 - Improve Resource/Energy Security
- **Less Cost in Purchasing Resource/Disposing Waste**
 - Strengthen Competitiveness
- **New Business Opportunities**
 - Private Sectors / Poor Groups

8 Government Roles in Promoting Greater Resource Efficiency



Source: ADB.

Role 1. Improving Integration

- Economic, Social and Environment Spheres
- Material, Energy, Water, and Land
- Urban to Rural to Wild Continuum
- Across Time (Precautional, Transition Management, Climate Change)

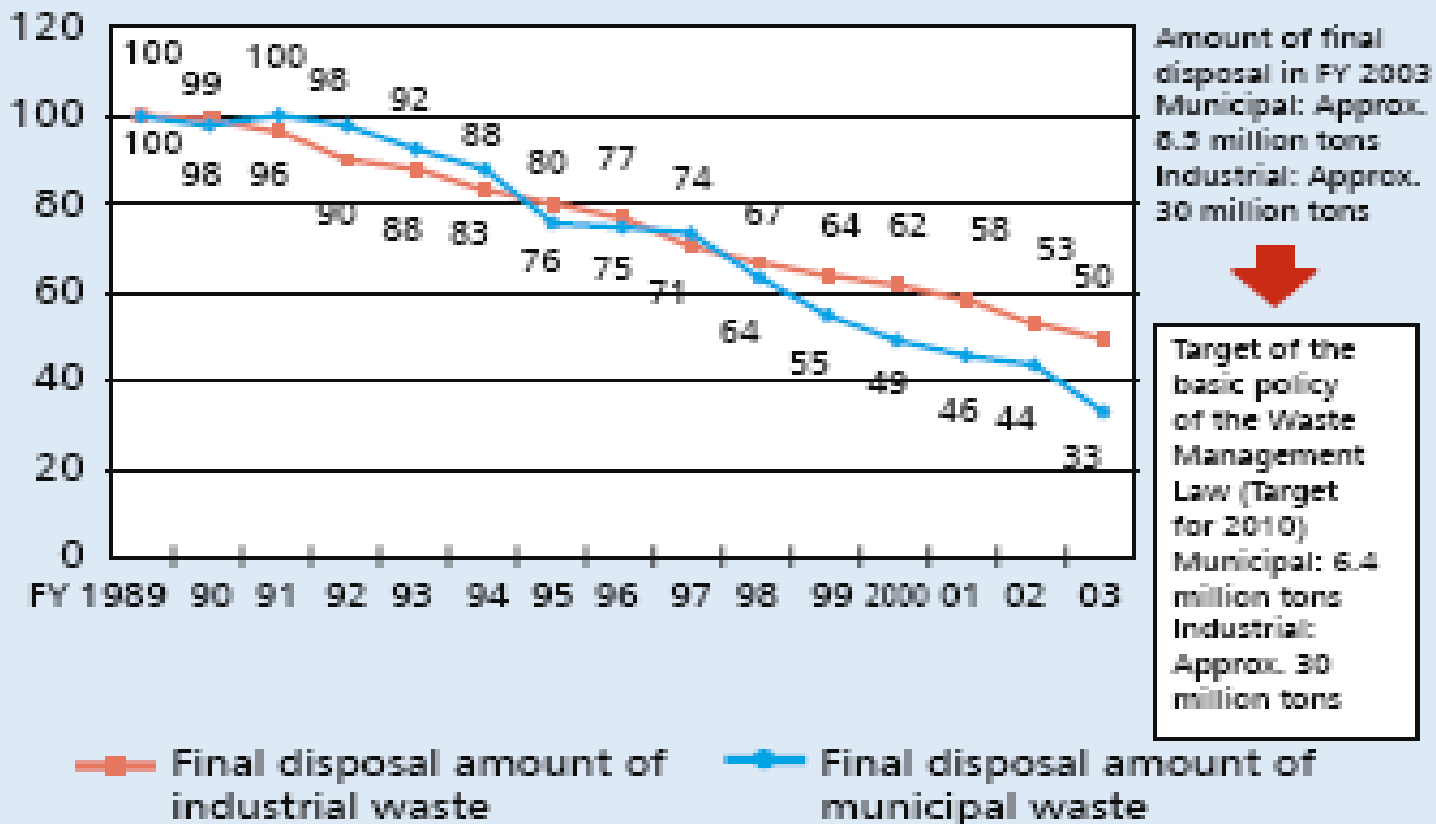
In:

- National Level, Policy Making Mechanism, Funding Mechanism, Knowledge Creation

Role 2. Develop National Policy Framework

Changes in Amount of Final Disposal in Japan (1989-2003)

Value for FY 1989 is set as index for 100



FY = Fiscal Year.

Source: Ministry of the Environment, Japan.

- Overall
 - National
 - Efficient
 - Targeted
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National Policies: Material

PRC: Product related laws are being developed including take-back and recycling of e-appliances, under “Circular Economy” policy.

India: New law obliges municipalities to segregate organic from household waste to treat by composting etc. (2000)

Malaysia: National Environment Policy 2002 guides all programs towards Integrated Waste Management. National Solid Waste Action Plan passed (2003).

Singapore: Its Green Plan 2012 sets “Zero Landfill” objective, with a national recycling program (target: 60% recycling by 2012).

Republic of Korea: has been able to decouple municipal waste generation and private final consumption with new volume based fee and recycling food waste.

Japan: “Sound Material Cycle Society Law” and Kyoto target facilitated recycling based business and consumer behavior to reduce 50% of final disposal, 33% of industrial waste (1989-2003) .

Philippines: Ecological Solid Waste Management Act (2000) for “Zero Waste” requires local government to recycle 25% of waste collected.

image © 2009 TerraMetrics

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National Policies: Energy

PRC: In 2007, it set a new target of reducing energy intensity (Energy/GDP) of the nation by 20% by 2020 in its 5-year economic development plan.

India: The Energy Conservation Act of 2001 calls for energy savings of 95,000 gigawatts (or 13% of estimated demand), as well as voluntary energy saving target of approx. \$90 million per year by industry.

PRC: *In March 2008, it strengthens annual reduction target to 5% from 4% for 2008-2010. It proposes to reorganize bodies addressing environment and energy efficiency*

Malaysia: In 2004, the Ministry of Energy, Water and Communications moved into the first large government building specifically designed as an integrated energy-efficient building and fitted with cost-effective features.

Singapore: It employs a vehicle quota system, which employs an open bidding process for certificates of entitlement to own a vehicle.

Japan: The country's Energy Conservation Law was amended in 2005 to cover factories, product manufacturers, transportation businesses, and buildings consuming a lot of energy.

Regional: August 2007, the first East Asian Summit Energy Ministers' Meeting was held and agreed to formulate, on a voluntary basis, individual, quantitative, and where possible, sector-specific EE goals and action plans, with the view to presenting the first goals and action plans in 2009.

Indonesia: The Energy Plan for 2003–2020 stipulates wide range of energy efficiency policies and measures

Image NASA

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National Policies: Water

PRC: Recently six ministries jointly confirmed a 10-year goal for saving water in industrial companies. The rate of recycled water was targeted to increase from 50% in 2000 to 60% in 2005 and 65% in 2010.

Thailand: In Bangkok, groundwater charge rates rapidly increased from 2000 to 2003, and a Groundwater Preservation Charge was introduced in 2004 to discourage extraction.

Singapore: Successful water policy includes keeping unaccounted-for-water low, pricing water to reflect scarcity value and to encourage to use and manage water wisely. The Singapore Public Utilities Board has been able to reduce the nonrevenue portion of water to less than 10% of production.

Viet Nam and Other Countries: Many countries are encouraging water resource planning at the watershed level, which is needed to expand improvements beyond individual industries or farms. In Viet Nam, the Law of Water Resources mandated the establishment of river basin organizations (RBOs).

Indonesia: A new water resources law recognizes water as a natural asset with social, cultural, economic, and environmental functions, and with specific chapter and articles related to private sector participation in water management.

Image © 2007 TerraMetrics
Image NASA

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Climate Change and Mitigation Opportunities in Solid Waste Management

- Today, developing Asia accounts for 29% of global energy-related carbon dioxide emissions, three times bigger than its share 30 years ago.
- With an estimated \$6 trillion needed for energy investments by 2030, it is projected that Asia's share of energy-related carbon emissions could rise to 42%.

• *Priority : Reduce, Reuse and Recycle*

• *Waste to Energy Solution:*

• *Agricultural waste → biomass*

• *Methane capturing from landfill*

Conclusion: Report's Message for the Session

- Improving Resource Efficiency is essential for Poverty Reduction and Environmental Conservation
- Integrating Material, Energy and Water Efficiency as well as integrating environment, economic and social objectives are vital, especially in developing world
- Integration of assuring proper solid waste management is also vital
- Policy & administrative tools, technologies are available, providing opportunities of leap frog
- Many interventions are on-going and encouraging, but to be much more and widely accelerated
- Government roles are important

Negative consequences

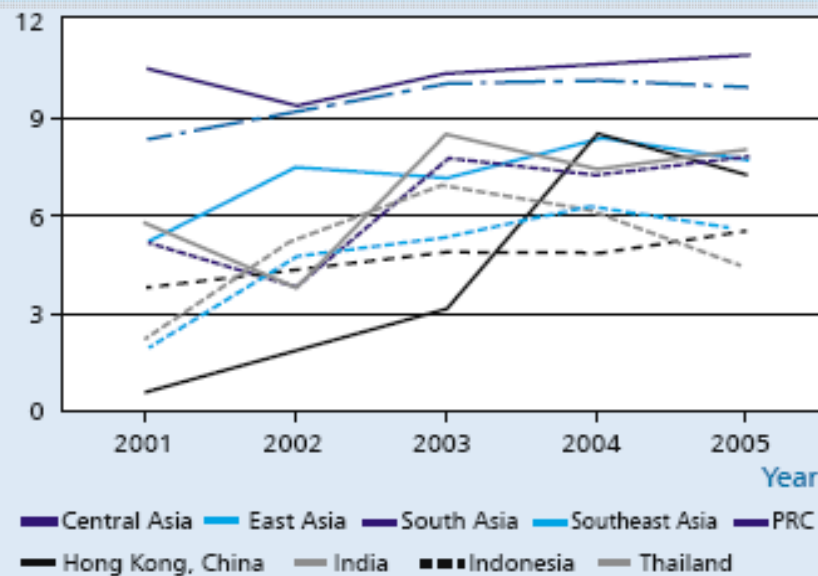
- Decline in Asia's natural capital - shrinking forests, declining biodiversity, disappearing water sources
- Urbanization occurring with few environmental controls - inhibits economic growth, places further stress on natural systems, and damages public health
- Conventional petrochemical farming has serious liabilities - largest single user of resources and source of waste



Photos: Waste Concern; AFP; Prof. C. Visvanathan, AIT

Economic and population growth in Asia...

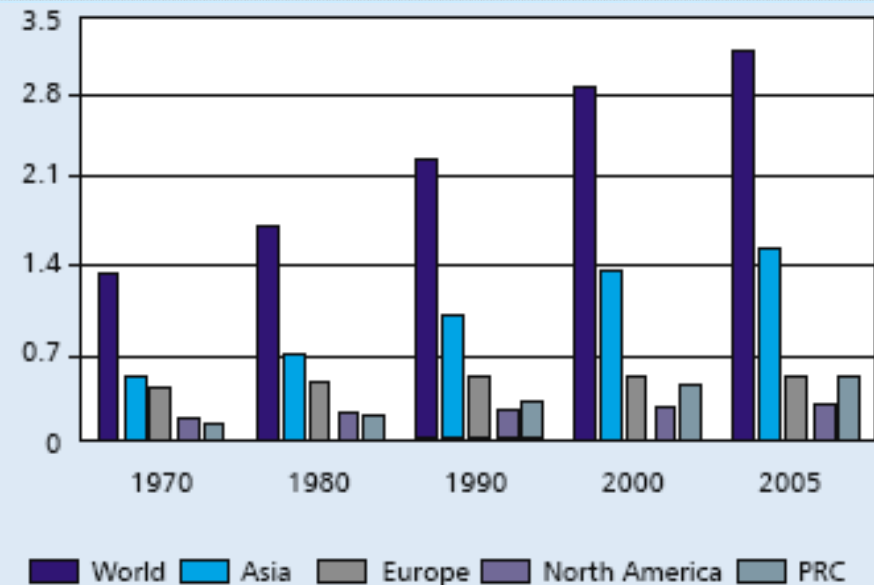
Growth Rate of GDP in Selected Countries in Asia (%)



GDP = gross domestic product, PRC = People's Republic of China, % = percent.

Source: ADB. 2006. *Asian Development Outlook 2006*. Manila.

Asia's Growing Urban Population (Billion)



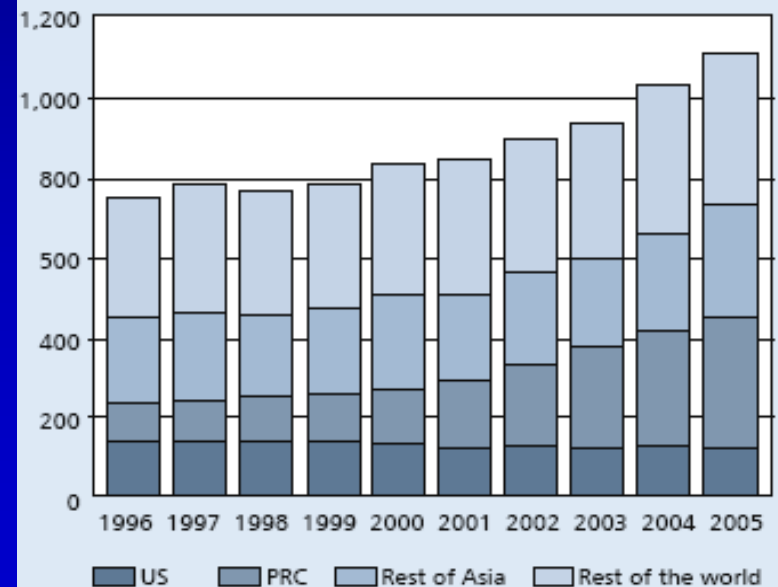
PRC = People's Republic of China.

Source: United Nations. 2005. *World Population Prospects. The 2004 Revisions Population Database*. New York.

PRC's resource-intensive growth

- PRC currently in commodity-intensive stage of development – it consumes half the world's cement output, a third of steel, a quarter of copper, and a fifth of aluminum
- Continuing growth will demand huge increase in production and will multiply pressure on natural resources and environment
- Population of 1.8 billion could reach per capita GDP of \$4,000 per year by 2050, five times current level

World Consumption of Steel (MMT)
(1996-2005)



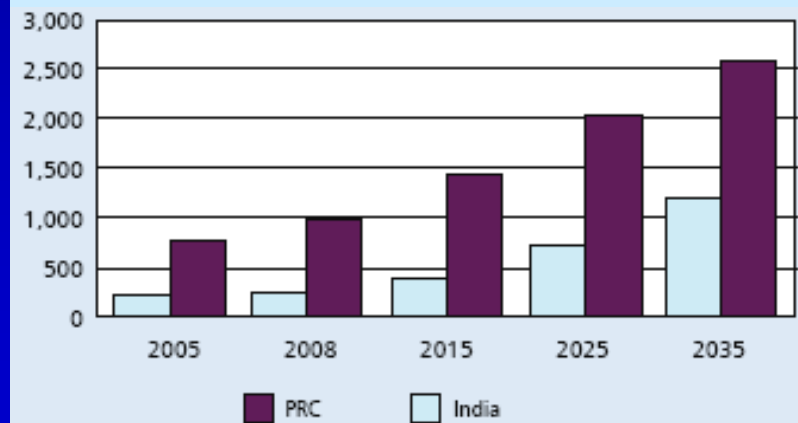
PRC = People's Republic of China, US = United States.

Source: World Coal and Steel Institute.

Climate change and resource productivity

- Much of the global increase in carbon dioxide emissions over the next 20 years is expected to occur in the developing world
- Carbon intensity in developing Asian countries is typically twice the level in developed countries, due to relatively low levels of EE.
- These intensity levels will decrease, but improvements will likely be offset by population growth and per capita increases in energy use

Total CO₂ Emissions from On-road Vehicles (Million Tons)



CO₂ = carbon dioxide, PRC = People's Republic of China.

Source: ADB. 2006. *Energy Efficiency and Climate Change Considerations for On-road Transport in Asia*. Manila.

Implications of climate change

- Likely impacts:
 - rise in sea level, affecting coastal areas
 - higher incidence of extreme weather events
 - less reliable access to water for all human and natural uses
 - impacts on crops and biodiversity
 - new demands on municipal infrastructure
- Developing Asian countries ill-equipped to deal with possible effects on agricultural output, labor productivity, health, infrastructure, and internal displacement
- The hardest hit will be the poor

Toward Resource Efficient Economies in Asia and the Pacific

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Why do we waste?

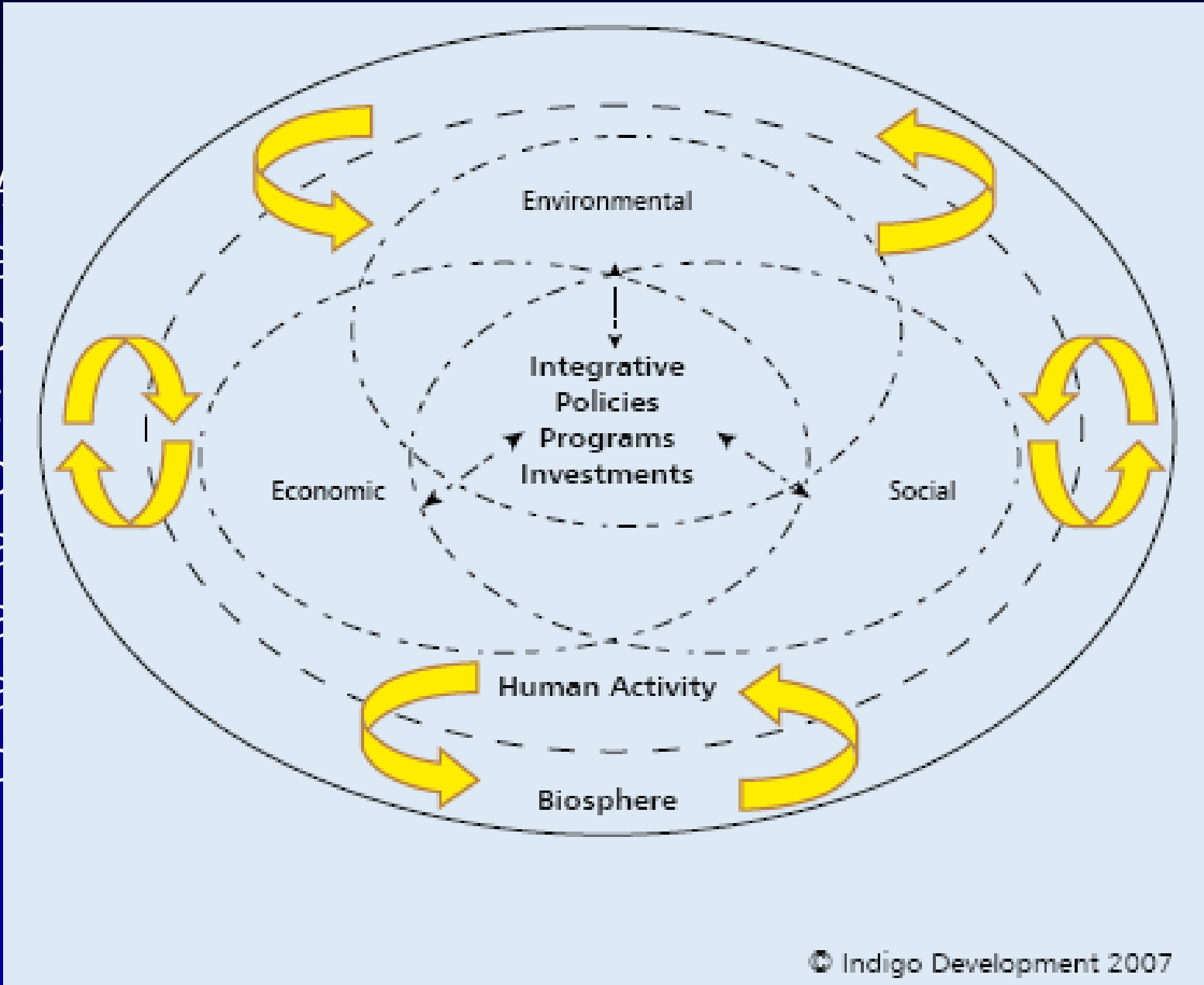
- Societies - governments, managers, and consumers - still act as though resources are to be used and then disposed of.
- Governments: Subsidize key inputs, so prices do not reflect full environmental and social costs of resource use.
- Managers: Most do not understand extent of waste in their systems or its cost to bottom line.
- Consumers: Increasingly using and discarding voluminous materials; increasing consumption driving up resource utilization beyond rate of efficiency improvements.

Waste generation and resource use in an economy



Every stage in the life cycle of products & services uses resources and creates waste & environmental residuals that can become chemical or organic pollutants

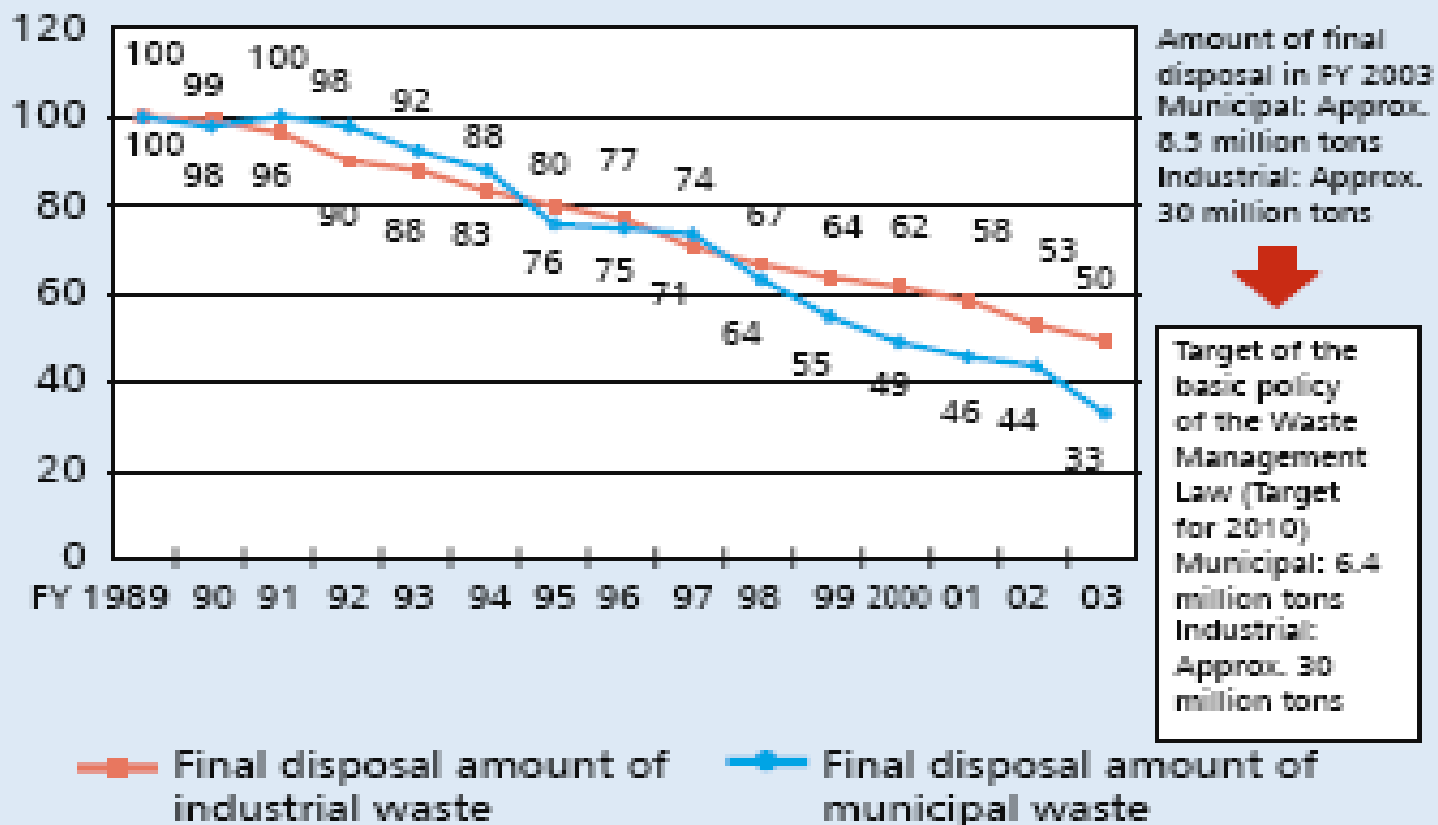
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Changes in Amount of Final Disposal in Japan (1989-2003)

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FY = Fiscal Year.

Source: Ministry of the Environment, Japan.

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Functions of government, cont.

#3 – Address weaknesses of environmental institutions through: improving coordination of environmental and developmental policies; increasing resources for environmental goals; and devolving functions to local authorities.

#4 – Support local government efforts to promote resource efficiency, esp. through incentive mechanisms for local governments. NGOs and community-based organizations also play an essential role.

Example: Decentralization Efforts in Philippines

Functions of government, cont.

#5 – Governments must promote new enterprises and the development of new technologies, including: research and development; technology transfer; and technology evaluation.

Example: Waste Concern (Bangladesh)

- Large-scale composting plant in Dhaka, producing 50,000 tons of organic fertilizer per year
- Initiated CDM project

Photos: Waste Concern



Functions of government, cont.

#6 – Governments can promote investments in resource-efficient infrastructure and leapfrog directly to appropriate and cost-effective solutions.

Example: Beijing Decentralized Water Treatment System

#7 – Governments can offer valuable support to industry, including industrial managers and public facility managers. Actions can include raising awareness and capacity of businesses and co-regulatory instruments.

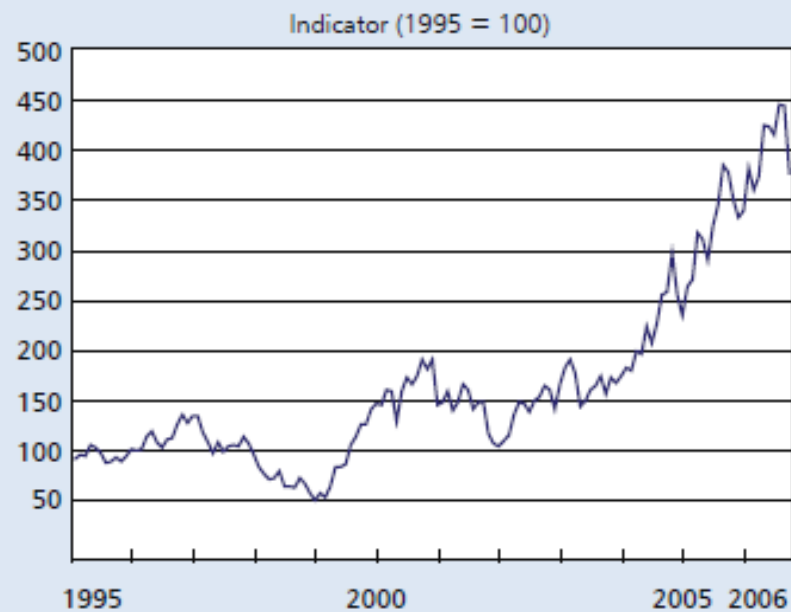
Example: Gujarat Environmental Audit Scheme

Functions of government, cont.

#8 – Finally, governments should address the regional aspects of achieving resource efficiency, including promoting safe trade of secondary materials.

Example: Asian Network for Prevention of Illegal Transboundary Movement of Hazardous Wastes

Figure 1.8: Brent Crude Prices (1995–2006)



Source: International Monetary Fund. Primary Commodity Prices.
Available: www.imf.org, downloaded 9 October 2006;