Eco-Efficiency

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PRESENTATION OUTLINE

- **Eco-Efficiency Concept**
- **Case Study and Lesson Learned**
- **Evaluation of Eco-Efficiency Indicators**

The World in One Second

- Population is increasing by 2.4 persons
- 4.2 TVs are manufactured
- 21.1 mobile phones are manufactured
- 38 tonnes of solid waste is generated
- 390,000 m^3 of CO_2 is being emitted.
- Glaciers in Greenland melt by 1,620 m^3
- 0.002 species or one species every 7 minutes becomes extinct
- USD 6,500 in insurance money is being paid for damage caused by natural disasters
- 6.9 tons of meat, consisting of 3 cows, 7 pigs, and 1,100 chickens are consumed

Source: UNEP

Problem Awareness

Fossil fuel

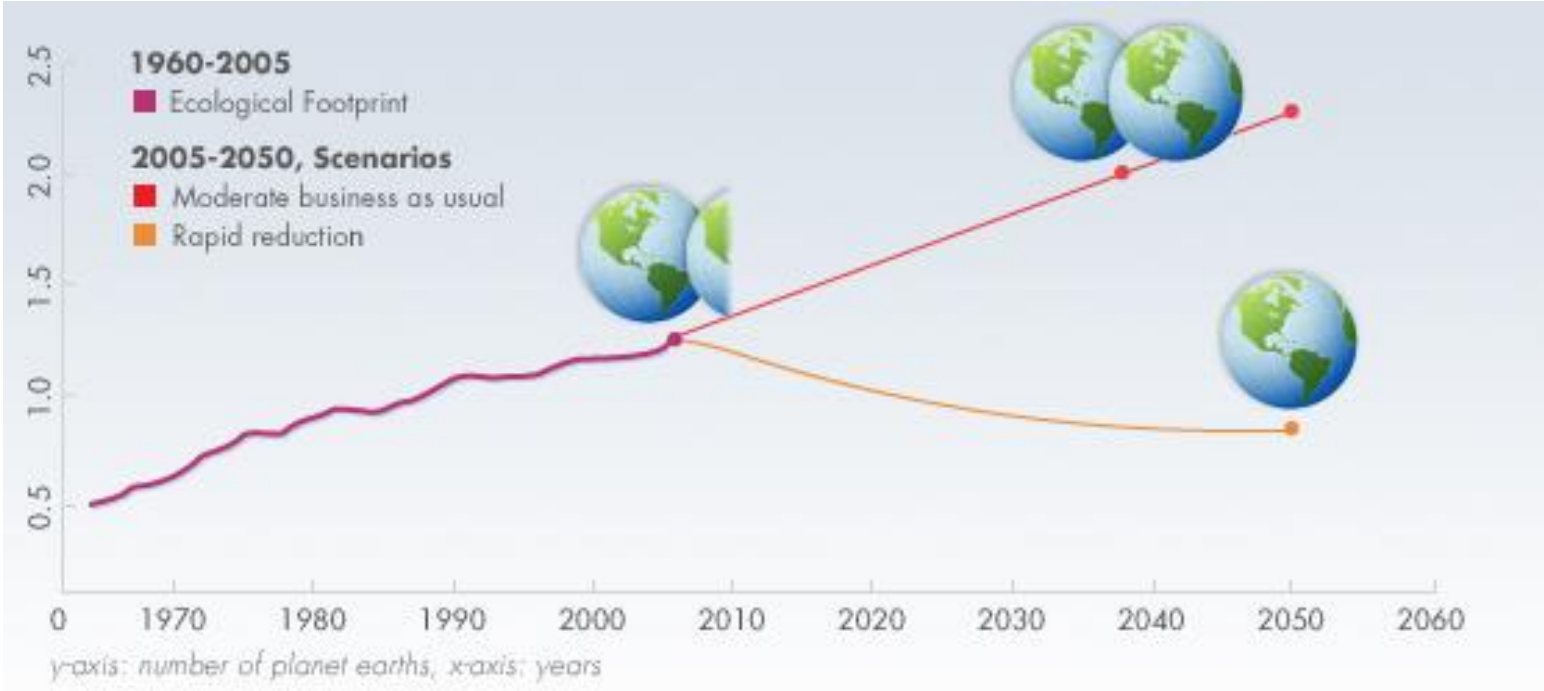
Natural Resource

Impact on
-Human Health
-Ecosystem
-Resource

INTERNATIONAL AND LOCAL PROBLEMS

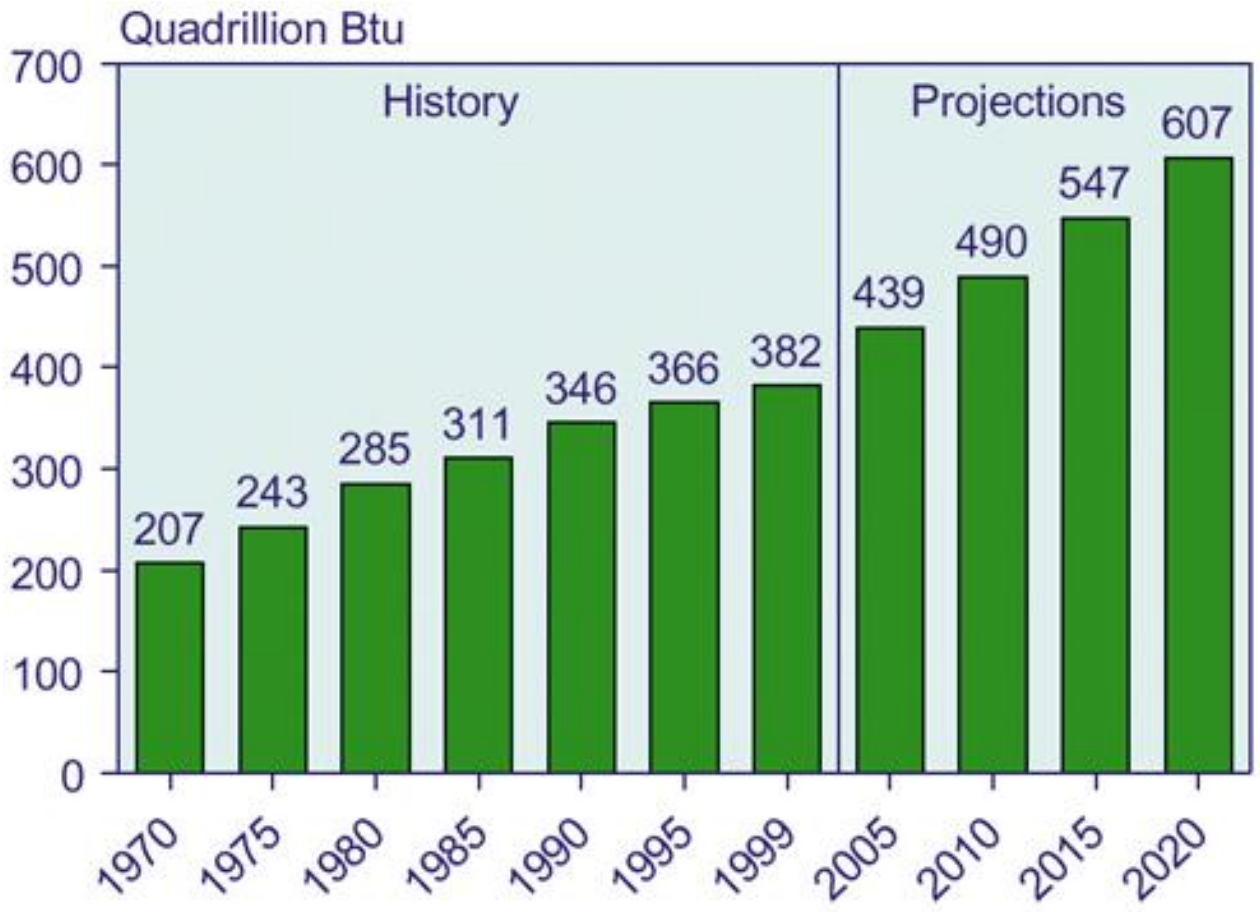
- **Depletion of Natural Resources and Energy Crisis**
- **Global Warming Issue**
- **Water Shortage, Poverty, Biodiversity, etc.**

World Footprint



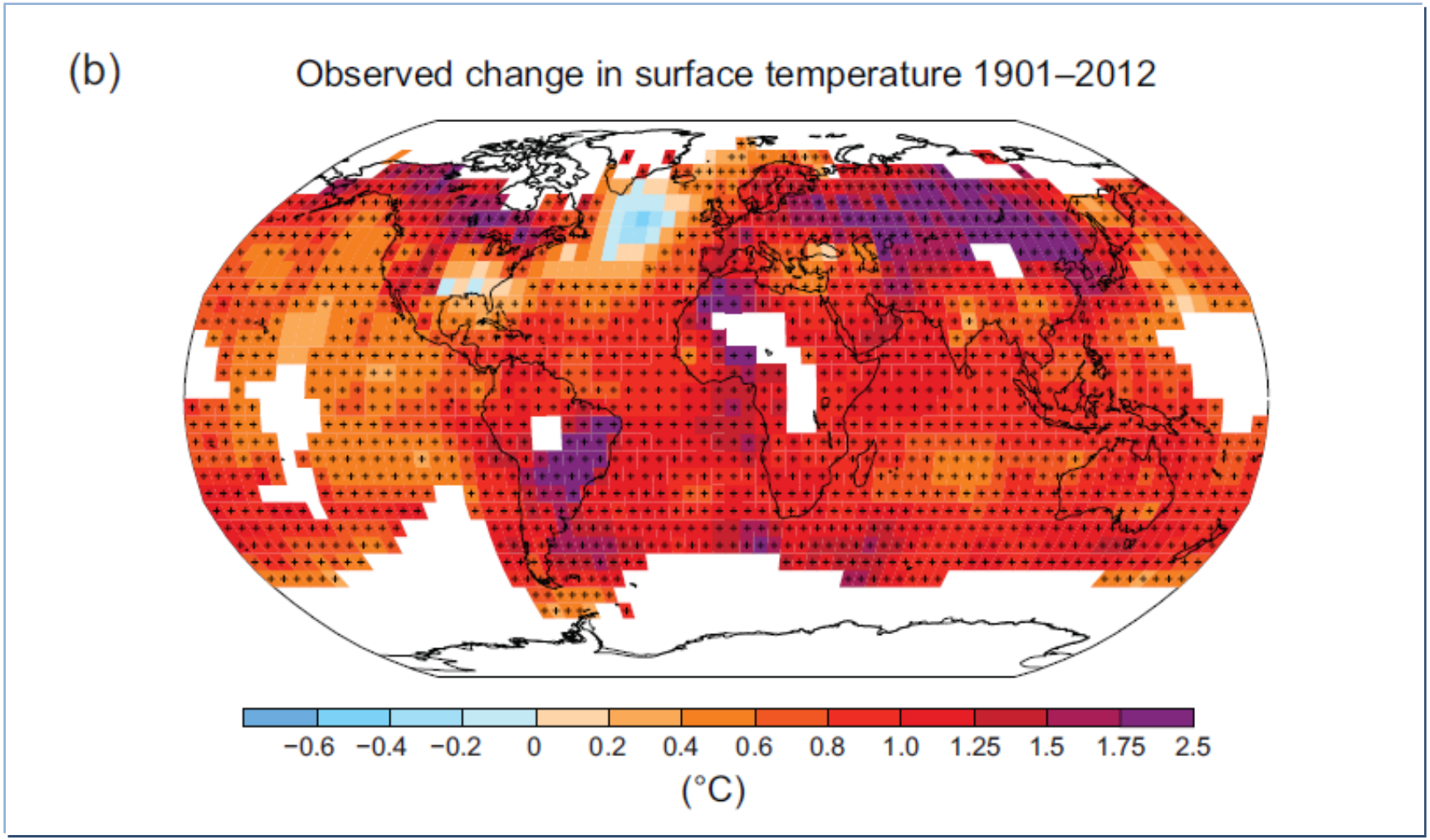
Source: Global Footprint Network

World Energy Consumption



Source: International Statistics Database and International Energy Annual 1999

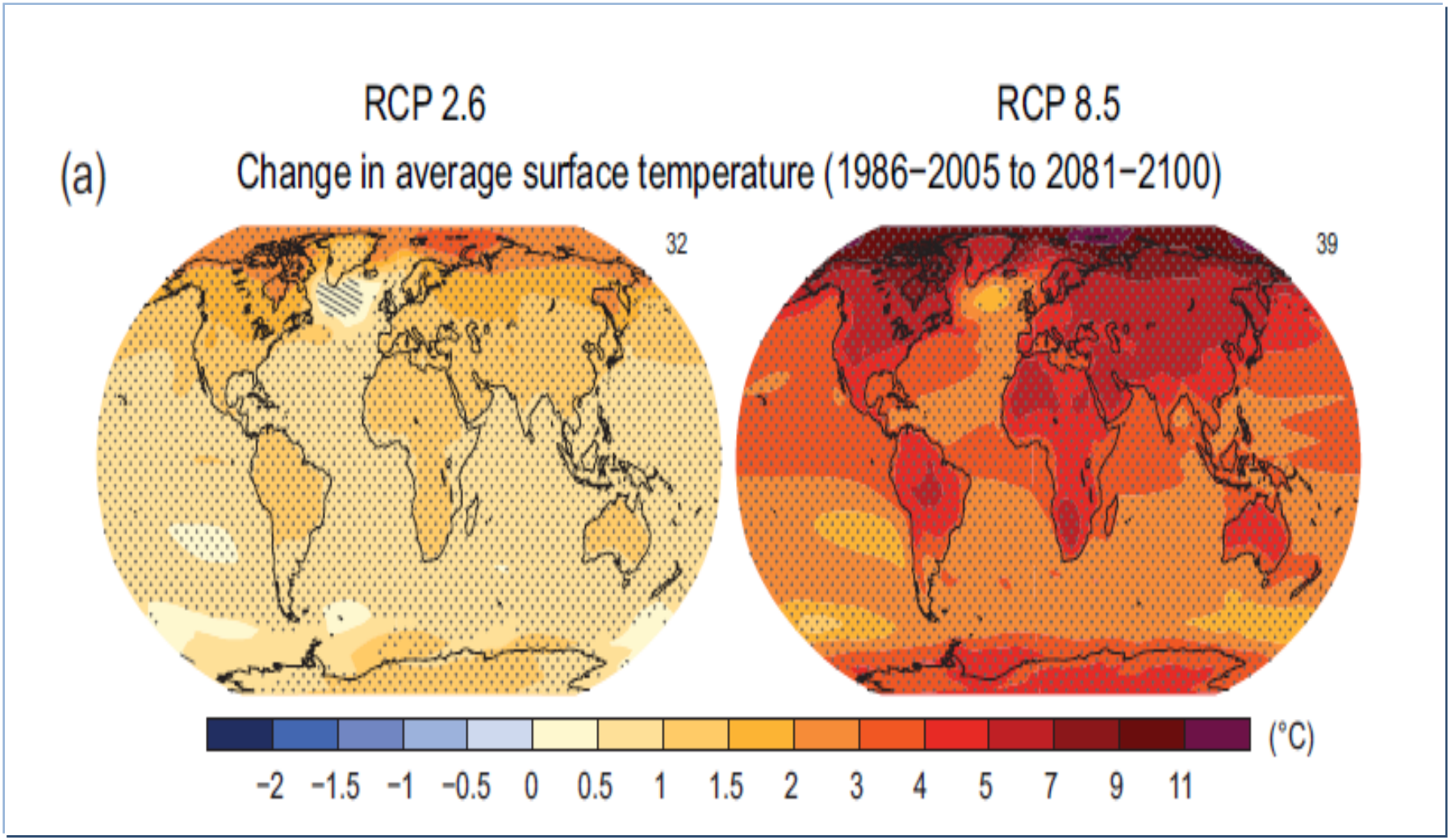
Map of the observed surface temperature change



The globally averaged combined land and ocean surface temperature data as calculated by a linear trend, show a warming of 0.85 [0.65 to 1.06] ◦C, over the period 1880 to 2012

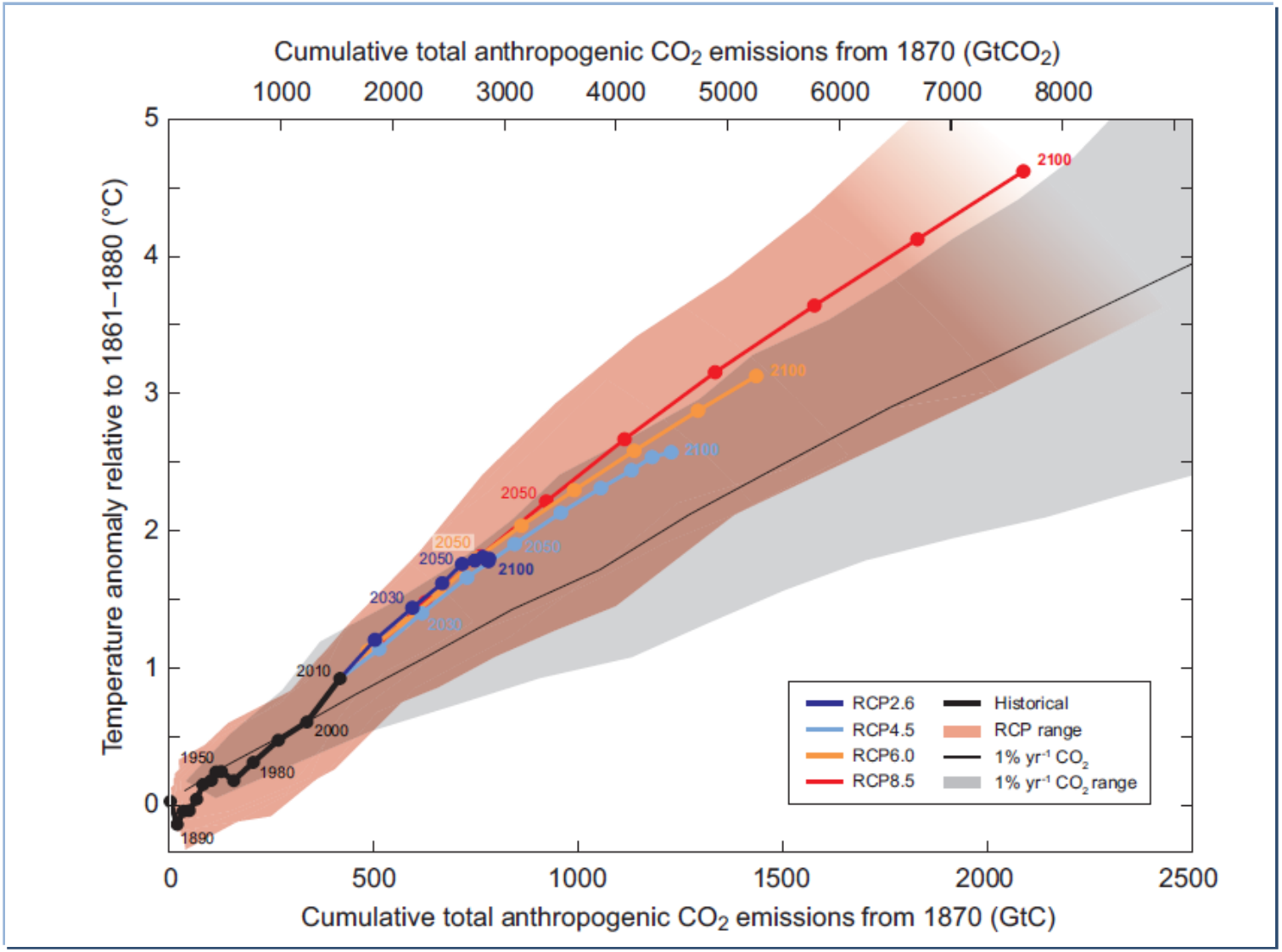
Source: IPCC AR5 WG I

Annual mean surface temperature change



Source: IPCC AR5 WG I

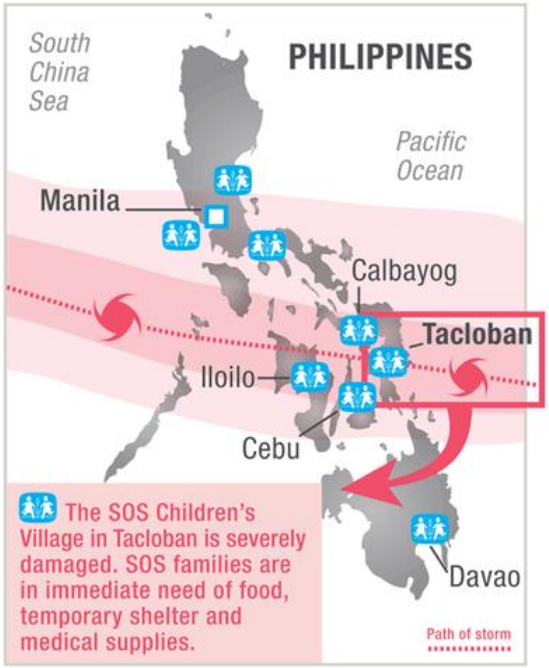
Global mean surface temperature increase as a function of cumulative total global CO_2 emissions



Source: IPCC AR5 WG I

SOS CHILDREN'S VILLAGES

TYPHOON YOLANDA (HAIYAN)
DEVASTATION IN THE PHILIPPINES



Nearly **7 million people** are affected.

Nearly **600,000 people** are displaced.

More than **150,000 homes** either partially or completely **destroyed.**

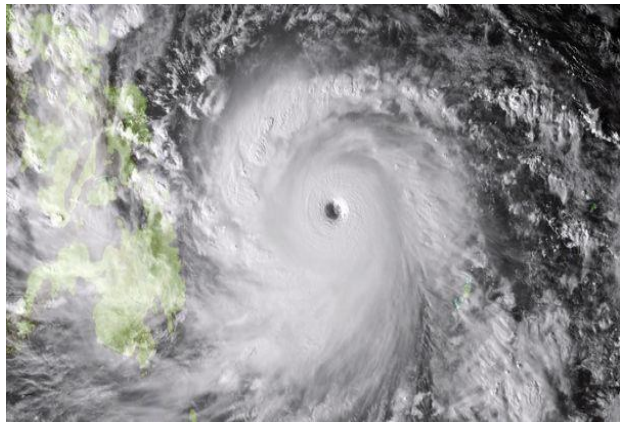
Water systems are damaged and non-operational in many areas.

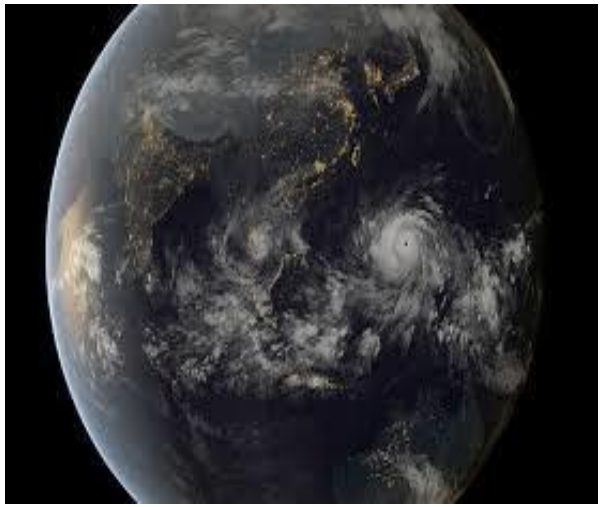
2.5 million people in need of **food.** Scavenging has already been witnessed.

More than **95,000 pregnant women** and **190,000 breastfeeding mothers** need specialized care.

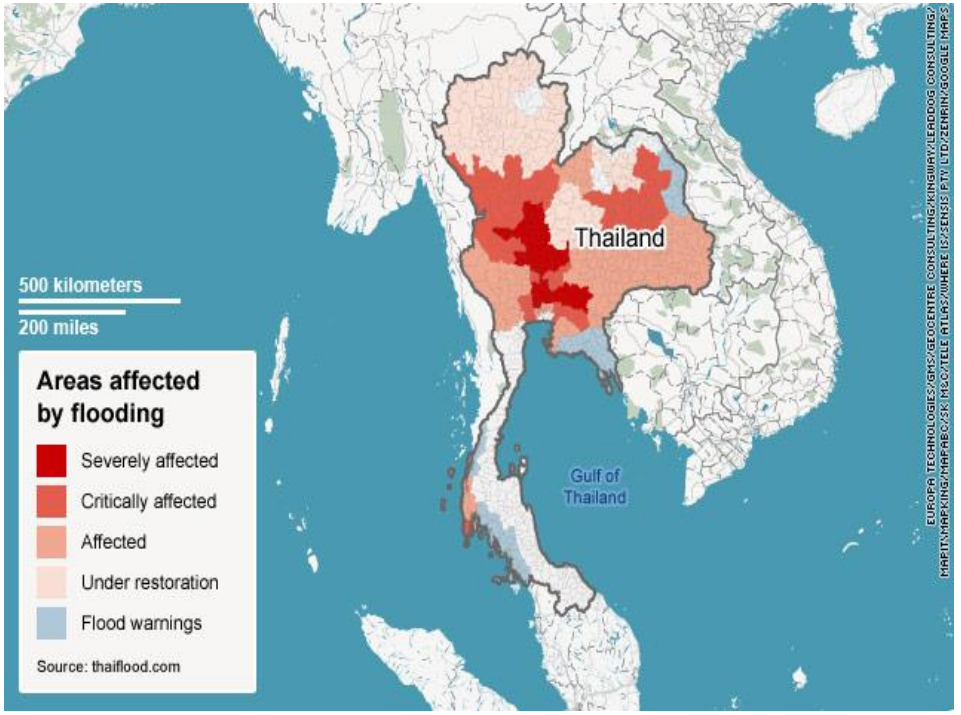
MOST URGENT NEEDS:

Food | Water | Clothes | Shelter | Medicine





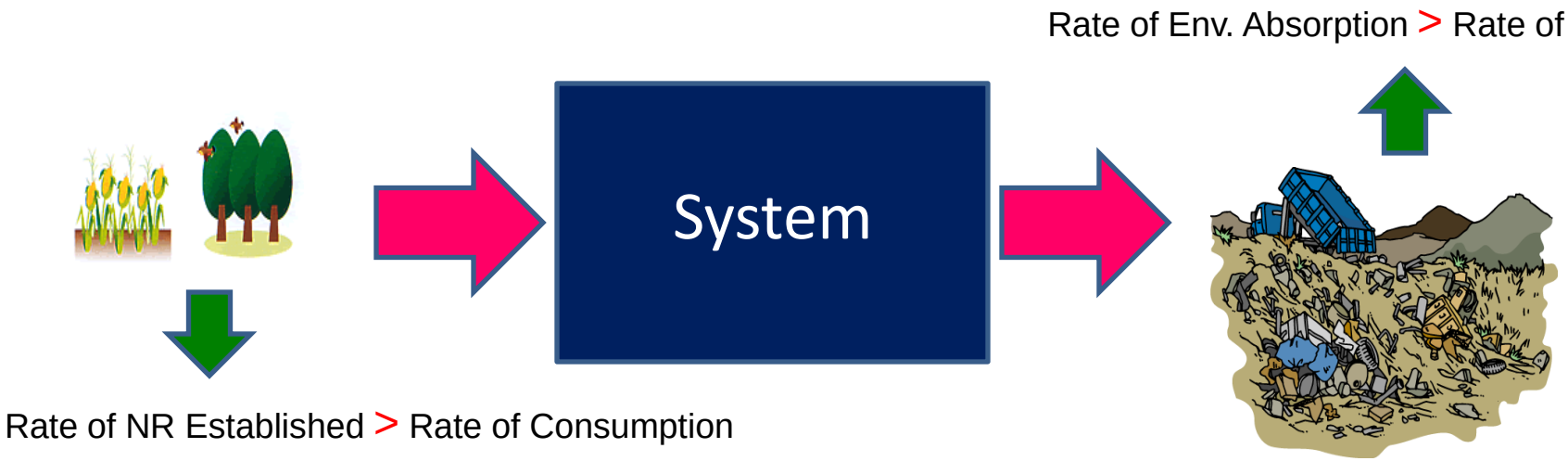

Pin Klao
Rama VII Bridge
Talling Chan
Phutthamonthon


Thailand
500 kilometers
200 miles
Areas affected by flooding
Severely affected
Critically affected
Affected
Under restoration
Flood warnings
Source: thaiflood.com
Gulf of Thailand

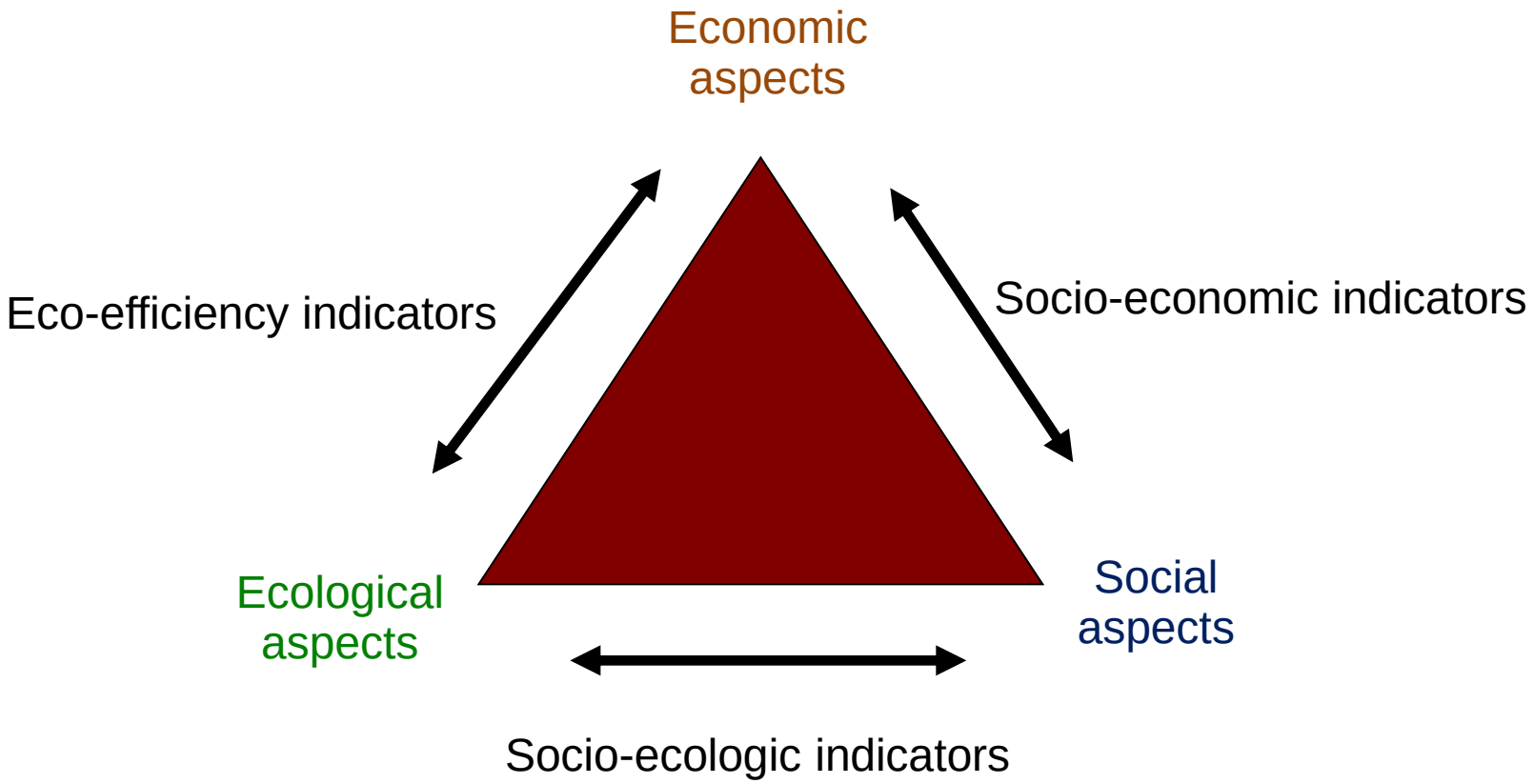
Sustainable Development

Sustainable Development (SD)
"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

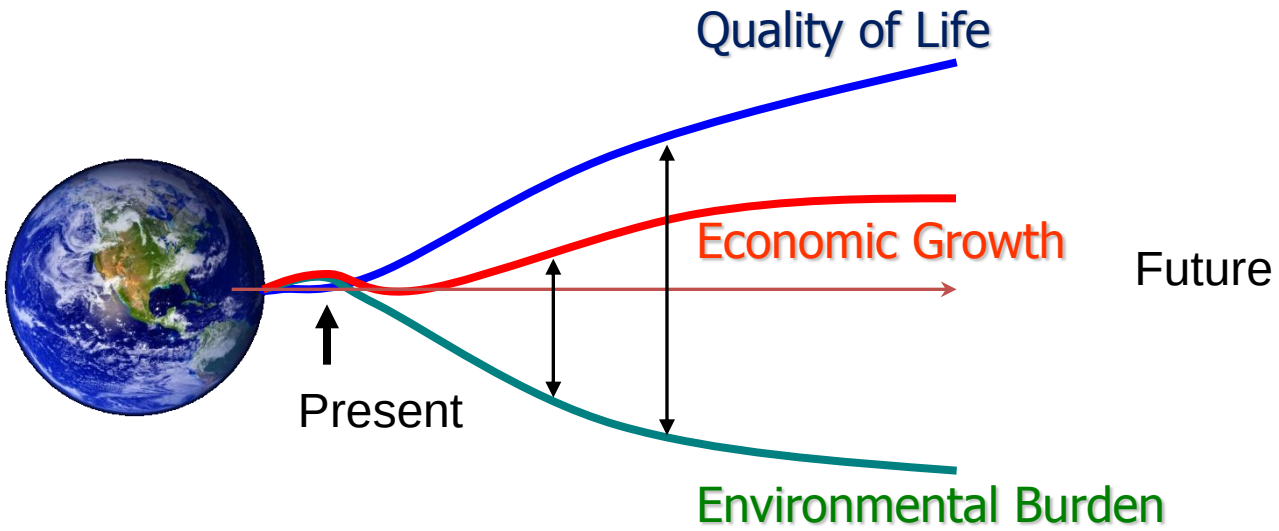
(Brundtland Commission, 1987).



TRIPLE BOTTOM LINES FOR SD

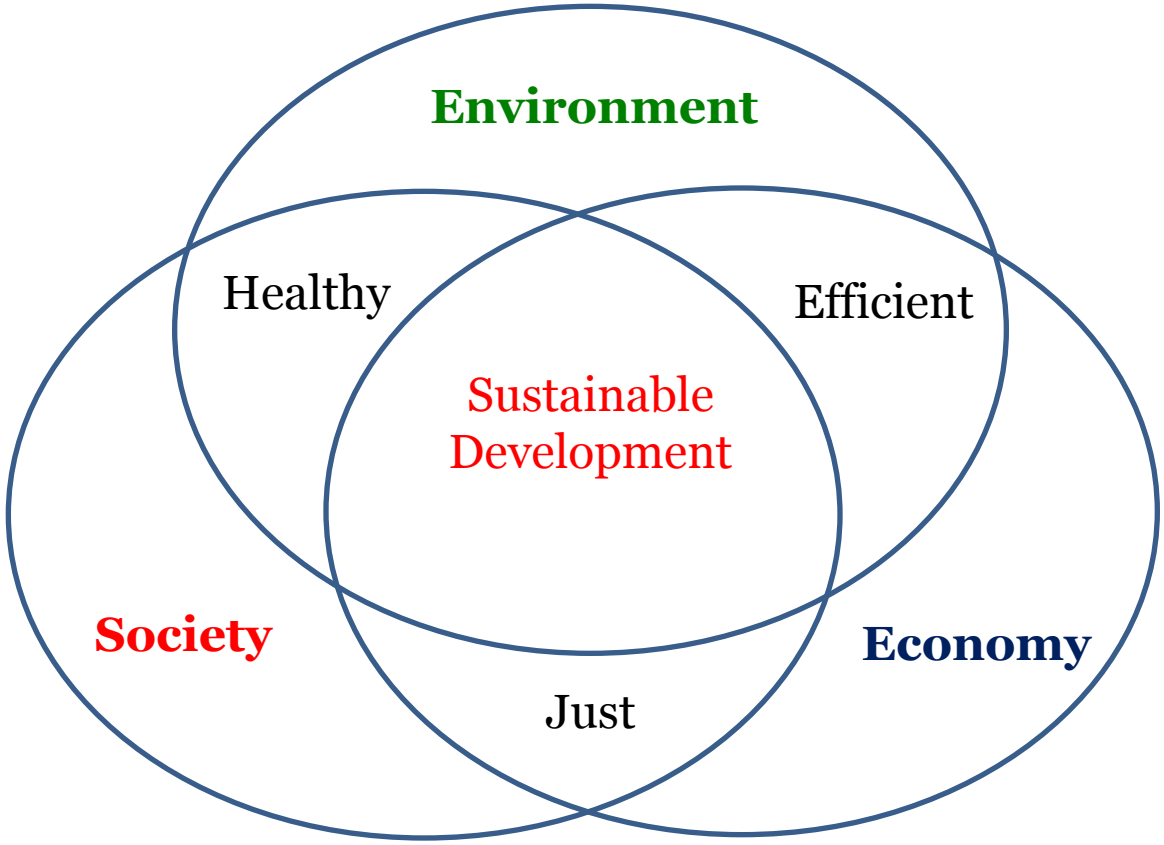


Sustainable Development



PPT. from Supply Chain in Agri-Food Sector, T.Ozawa, 2007

Venn Diagram of SD



Source: Sikdar, 2003

2 Important Movements of last 5 Decades

- **Environmental Movement**
- **Productivity Movement**

ECONOMIC MOVEMENT

Stage 1: Driven by cost saving

Stage 2: Quality aspect came into picture

Stage 3: Environmental consideration made the way

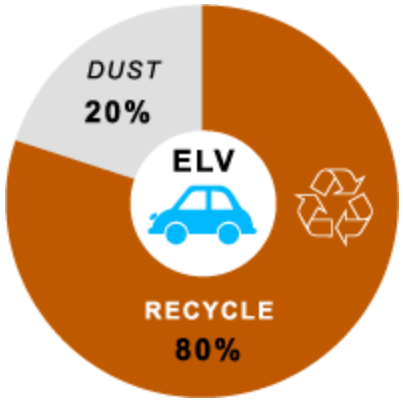
ENVIRONMENTAL MOVEMENT

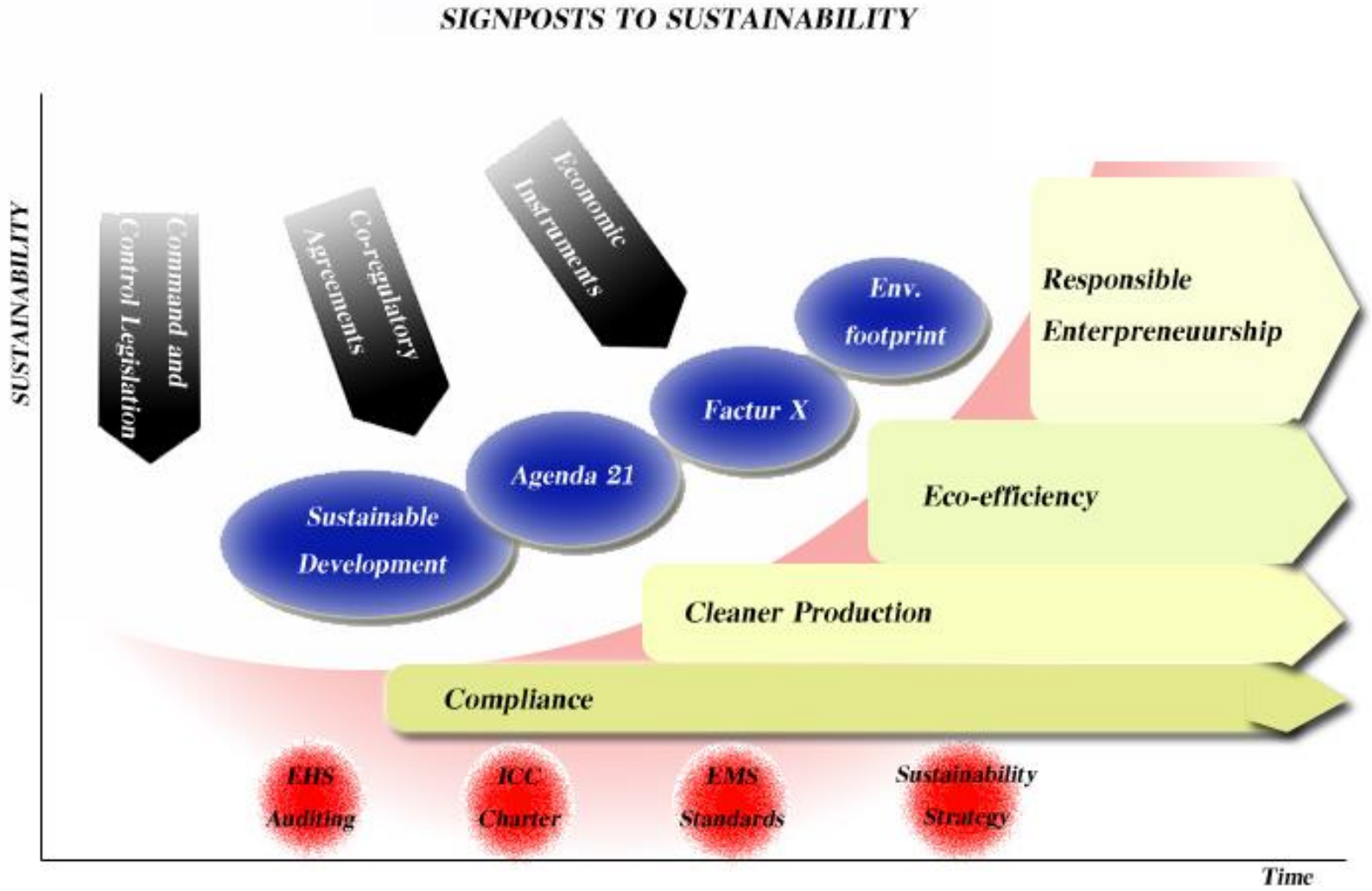
Stage 1: Driven by environmental activities

Stage 2: Political forces, planners and regulators joined the movement

Stage 3: Consumers joined the force

Environmental Commission





Source: Eco-Efficiency, WBCSD, 2000

What is Eco-Efficiency???

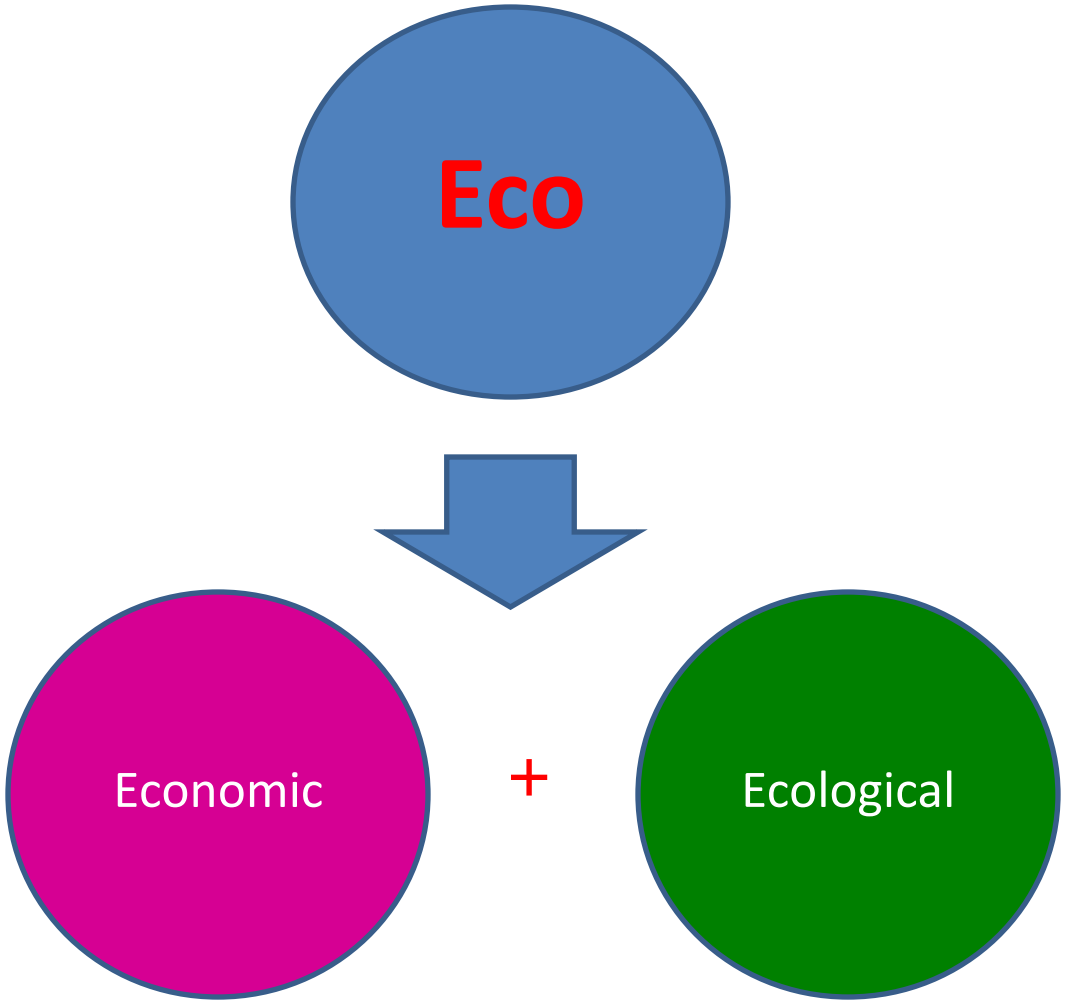
WHAT IS ECO-EFFICIENCY?

Eco-Efficiency is a management philosophy which encourages business to search for environmental improvements that yield parallel economic benefits

It focuses on business opportunities and allows companies to become more environmentally responsible and more profitable.

It fosters innovation and therefore growth and competitiveness.

World Business Council for Sustainable Development


Eco
Economic
+
Ecological

Efficiency

Efficiency is an economic term relating to process performance

Efficiency = output /input

World Business Council for Sustainable Development

Eco - Efficiency

Economic & Ecology

Input/Output

Eco-Efficiency

Eco-Efficiency can be considered as a subordinate of the efficiency, which combines economic and environmental performance

History of Eco-Efficiency

- The term of eco-efficiency was proposed in 1990 by 2 swiss researchers, Schaltegger and Sturm.

- 1991s, the concept of eco-efficiency was developed by the World Business Council for Sustainable Development (WBCSD)

- Eco-Efficiency has now become established as a concept for policy on the macro-level for industrialized countries. (OECD, PCSD, EC)

Definitions of Eco-Efficiency

- The term of eco-efficiency, was formally defined and adopted by the WBCSD as

"the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with the earth's carrying capacity"

"Creating more value with less impact or doing more with less"

Definitions of Eco-Efficiency

- European Environment Agency

"Creating more welfare from less nature"

- Atlantic Canada Opportunities Agency (ACOA)

"Creating quality products and services while reducing resource use, waste and pollution along the entire value chain"

- Environmental Finance Group-International Finance Cooperation

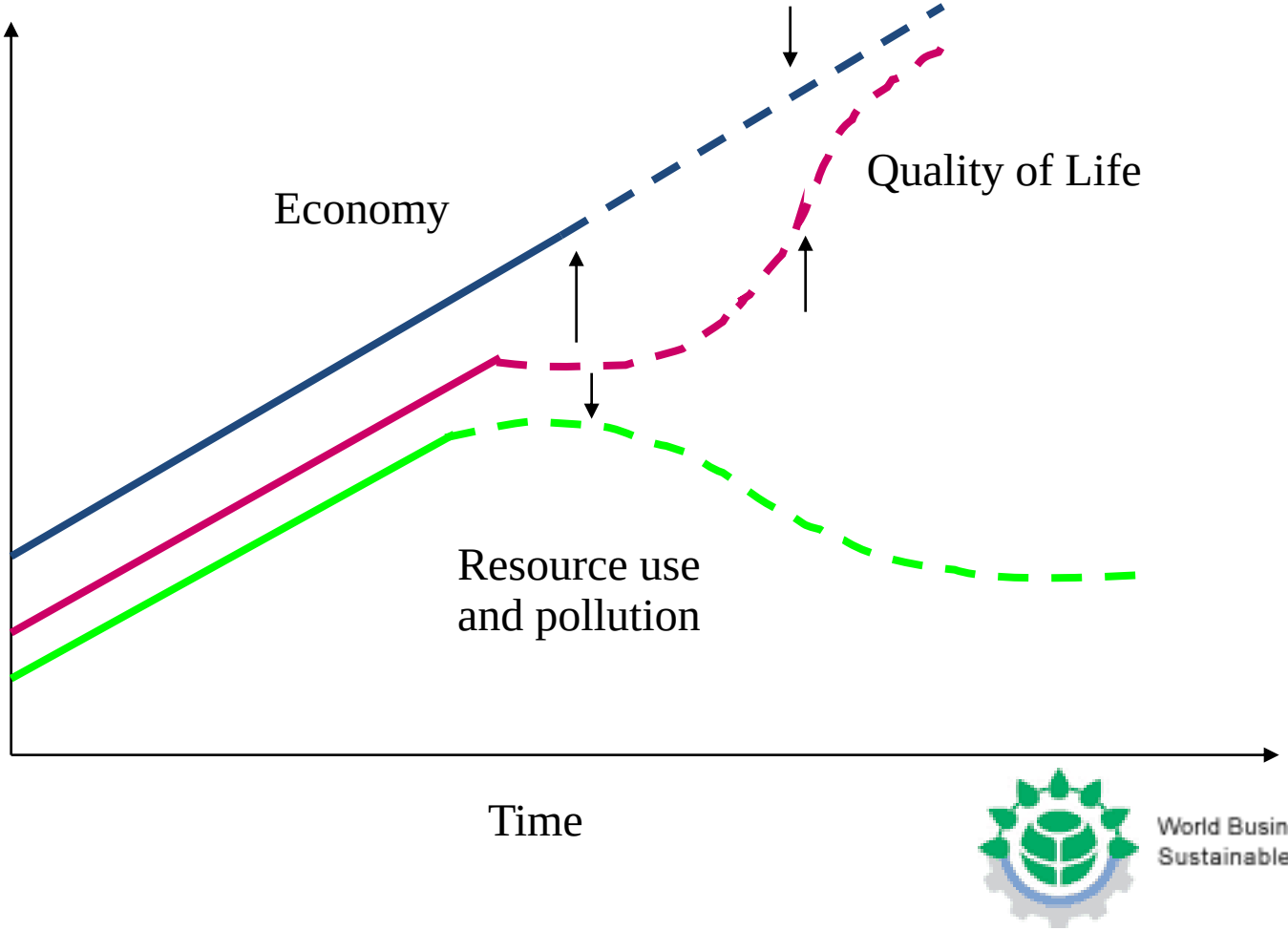
"Increasing sustainability of resources use through more efficient production methods"

Eco-Efficiency is a share zone

- Eco-Efficiency is a key concept for helping companies, individuals, government and other organization to become more sustainable.

- Eco-Efficiency was called the share zone between the economic and environmental bottom line

Economy and quality of life up- resource use and pollution down



World Business Council for Sustainable Development

Characteristics of Eco-Efficiency

- The WBCSD has identified 7 elements that businesses can use to improve their eco-efficiency

1. *Reduce material intensity*
2. *Reduce energy intensity*
3. *Reduce dispersion of toxic substances*
4. *Enhance recyclability*
5. *Maximize use of renewables*
6. *Extend product durability*
7. *Increase service intensity*

Objectives of Eco-Efficiency

- The 7 elements may be thought of as being concerned with three objectives

1. Reducing the consumption of resource

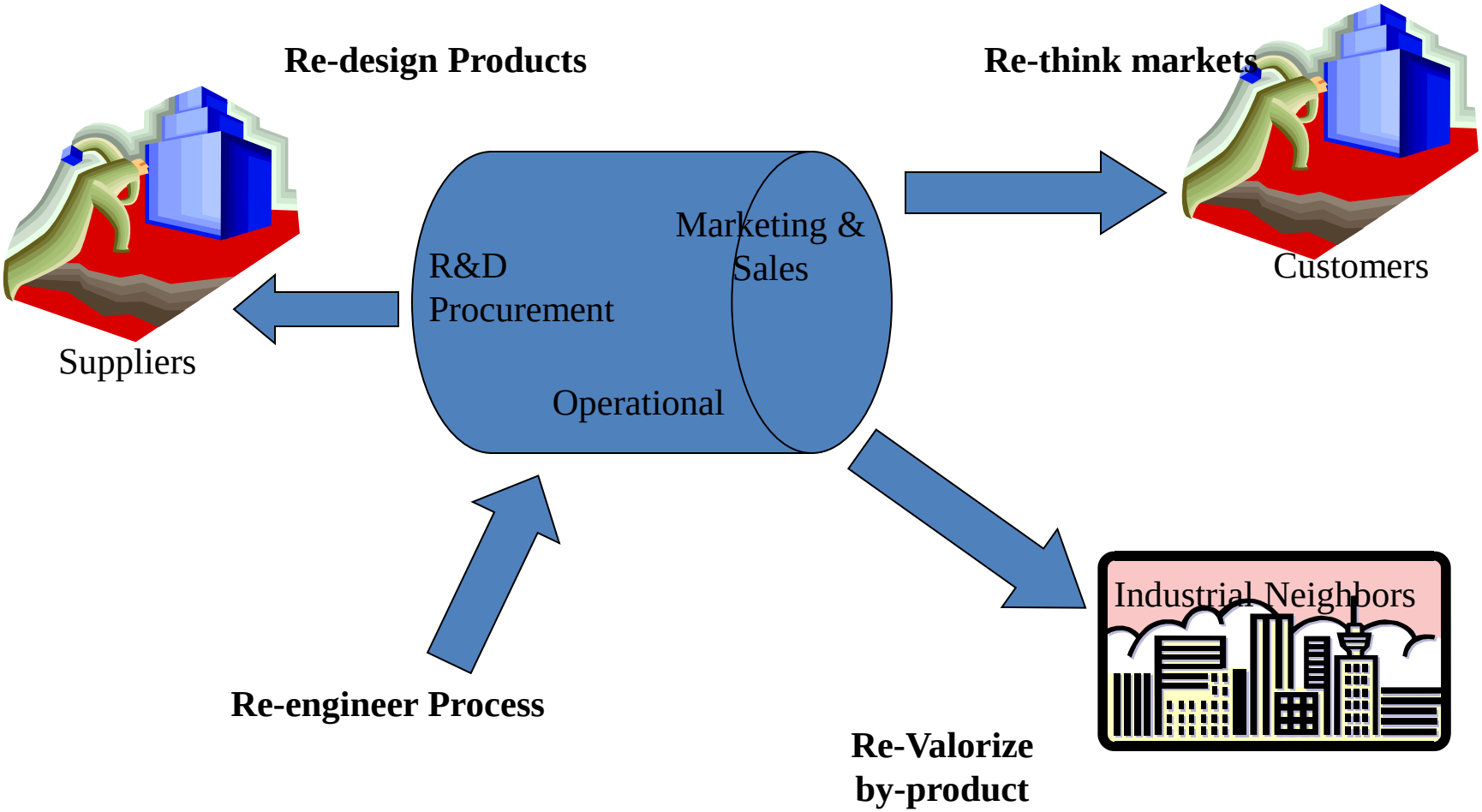
2. Reducing the impact on nature

3. Increasing product or service value

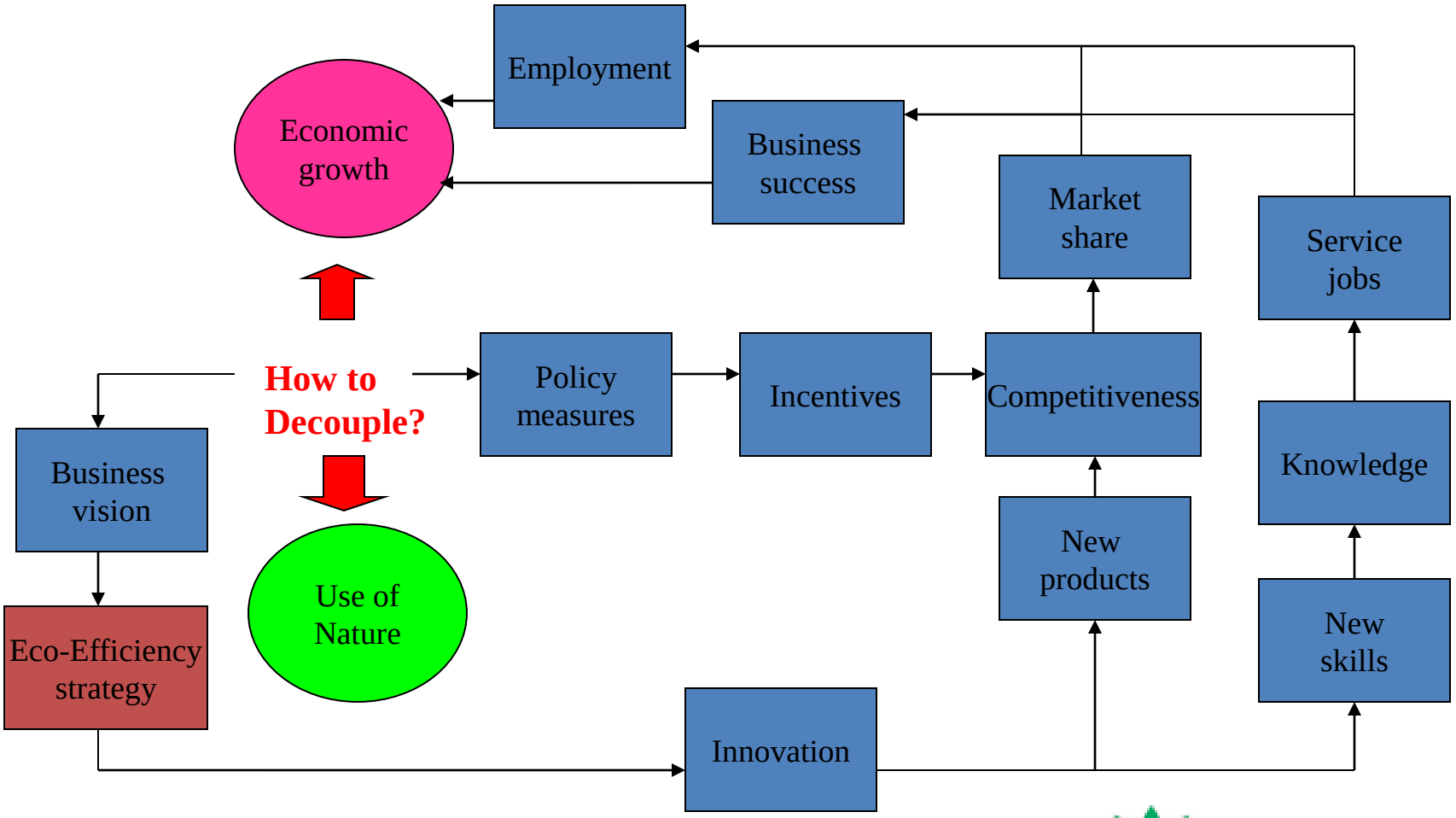
Many company have a fourth objective*,*

4. Implementing an environmental or sustainability management that is integrated with their existing business management systems

Navigating for Eco-Efficiency Opportunities

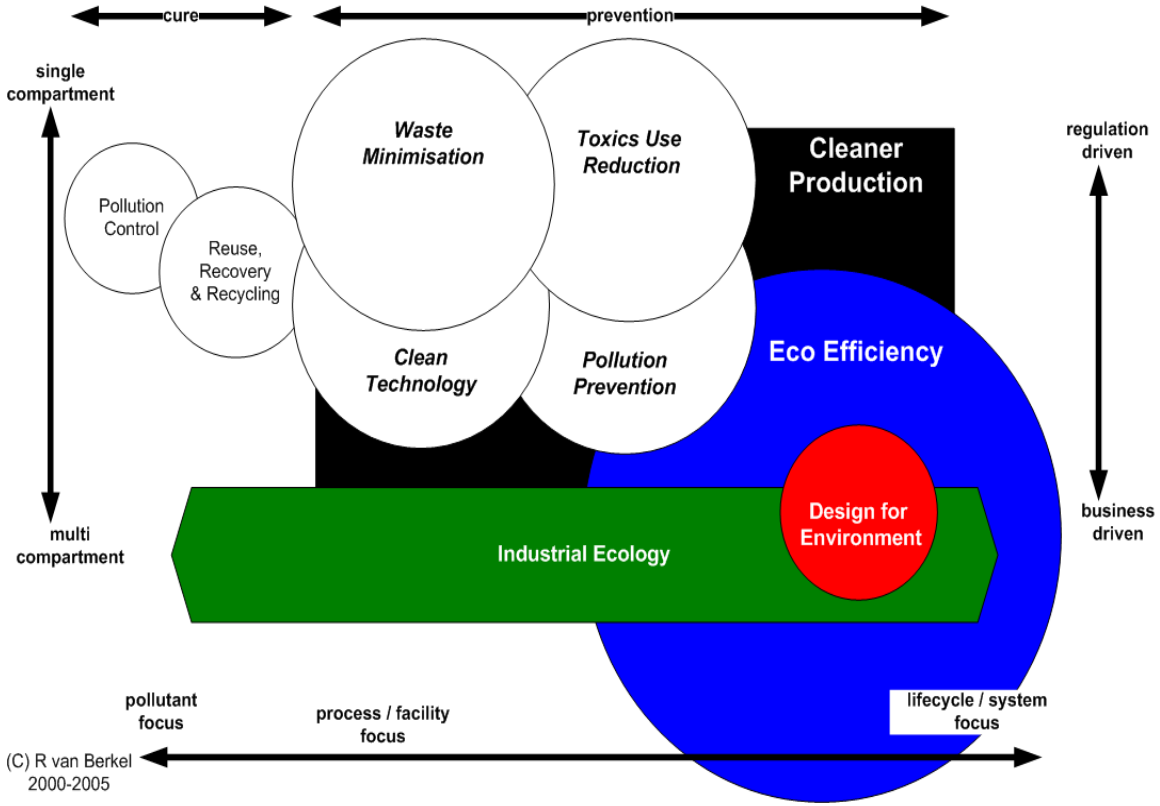


Channels for Eco-Efficiency



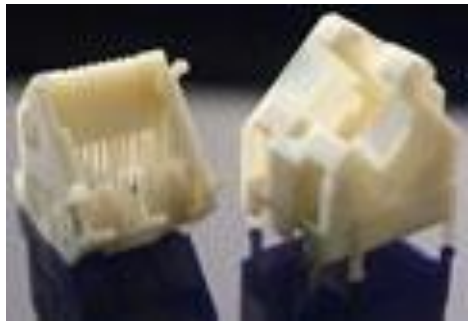
World Business Council for Sustainable Development

Cleaner Production & Eco-Efficiency



Reference figure: van Berkel, R. 2006. Cleaner Production and Eco-Efficiency. in D. Marinova (ed) Handbook on Environmental Technology Management. Edward Elgar Publications, Cheltenham, UK.

Ultradur® (PBT, PBT+PET)

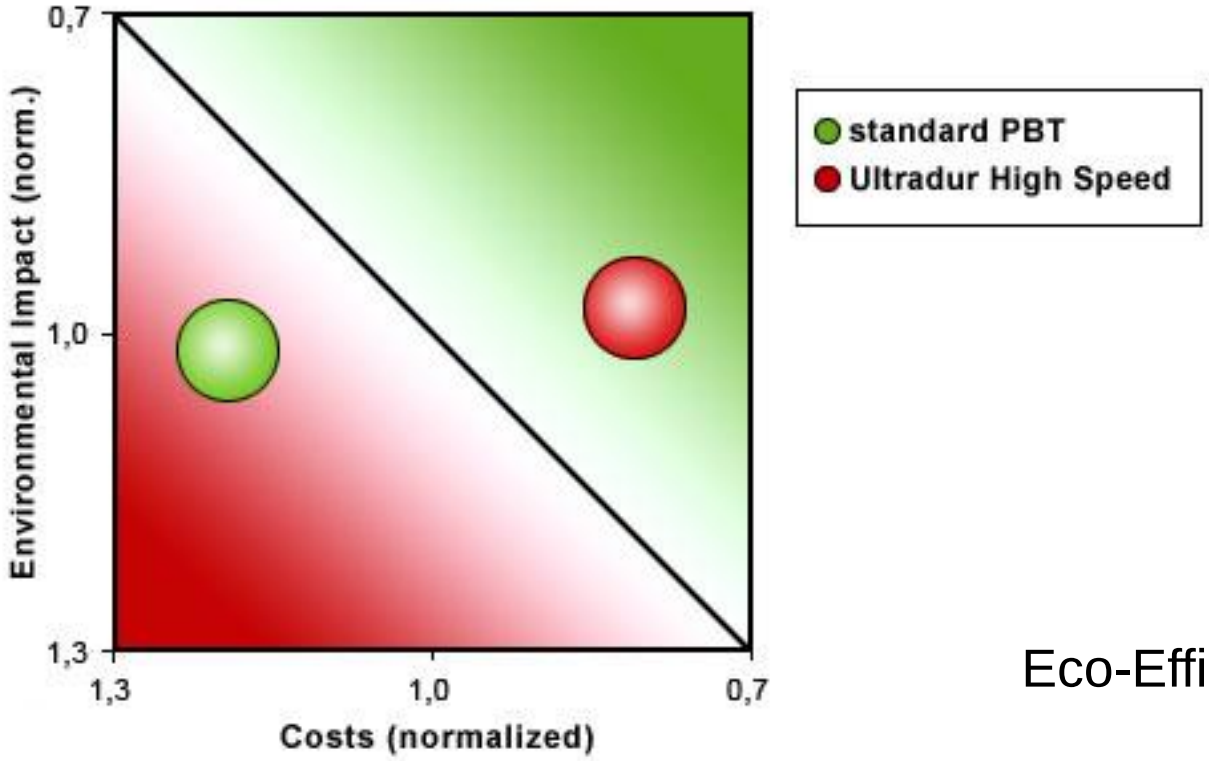


Electrical plug-in connector

Automotive connector

Fiber optic cables

Source: www.BASF.com



Eco-Efficiency Label, BASF

Source: www.BASF.com

FUJI xerox

Environmental Efficiency in an Office (Eco Efficiency)

$$\text{Eco Efficiency} = \frac{\text{Utility/Value (Productivity, etc.) of Solution}}{\text{Environmental impacts Produced by the Office}}$$

Use of space

Use of paper
(materials)

Installation of equipment
(Equipment manufacturing)

Use of equipment
(Amount of electrical power consumption)

Other
(transportation of people, transportation of goods)

Source: www.fujixerox.com/.../office/solution/index.html

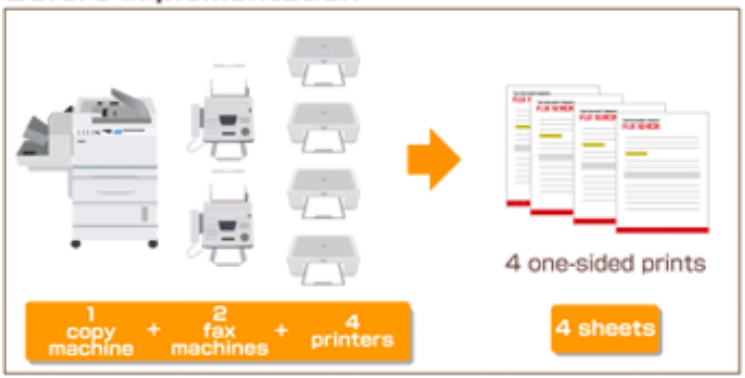
FUJI xerox

At Customers' Offices

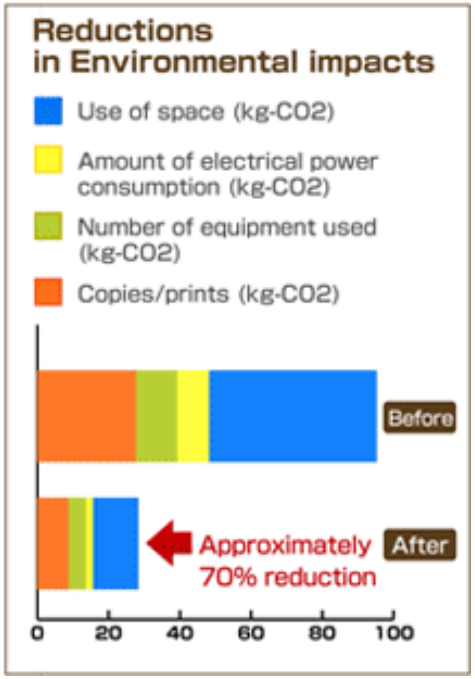
Eco Solution

Environmental impacts Coming from an Office (Denominator)

Before Implementation



Before Implementation



Solution's Utility and Value (Numerator) and Eco Efficiency, Progress Rate of Eco Efficiency

Workload (yearly) converted into 132,000 A4 sheets worth of information (11,000 sheets/month)

Before Implementation

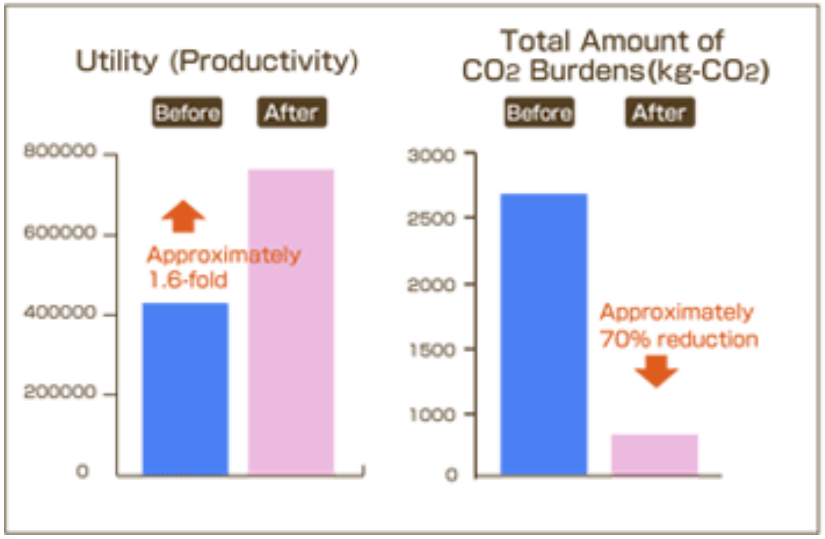
Processing time:
1,650 minutes
(Number of sheets output/ output speed of machine)
Number of sheets output:
132,000 sheets

Management of output equipment
Management and maintenance of consumables x 7 machines
Information sharing
Managed in cabinets using file folders, etc.

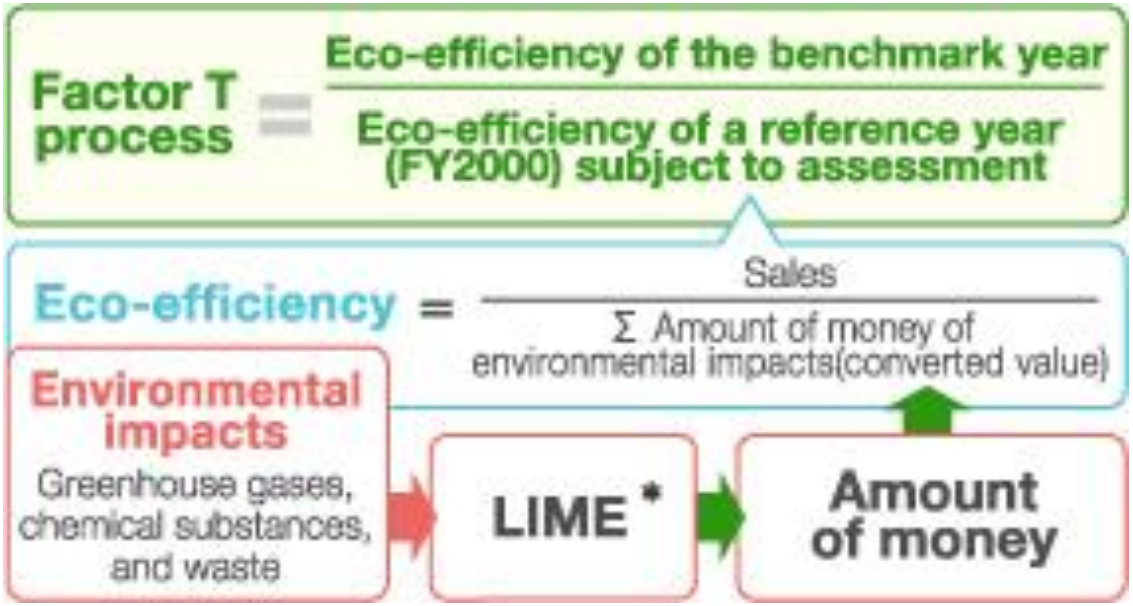
After Implementation

Processing time:
1,009.8 minutes
(Number of sheets output/ output speed of machine)
Number of sheets output:
40,392 sheets

Management of output equipment
Management and maintenance of consumables x 1 machine
Information sharing
Shared electronically



TOSHIBA
Leading Innovation



Source: www.toshiba.co.jp/env/en/industry/index.htm

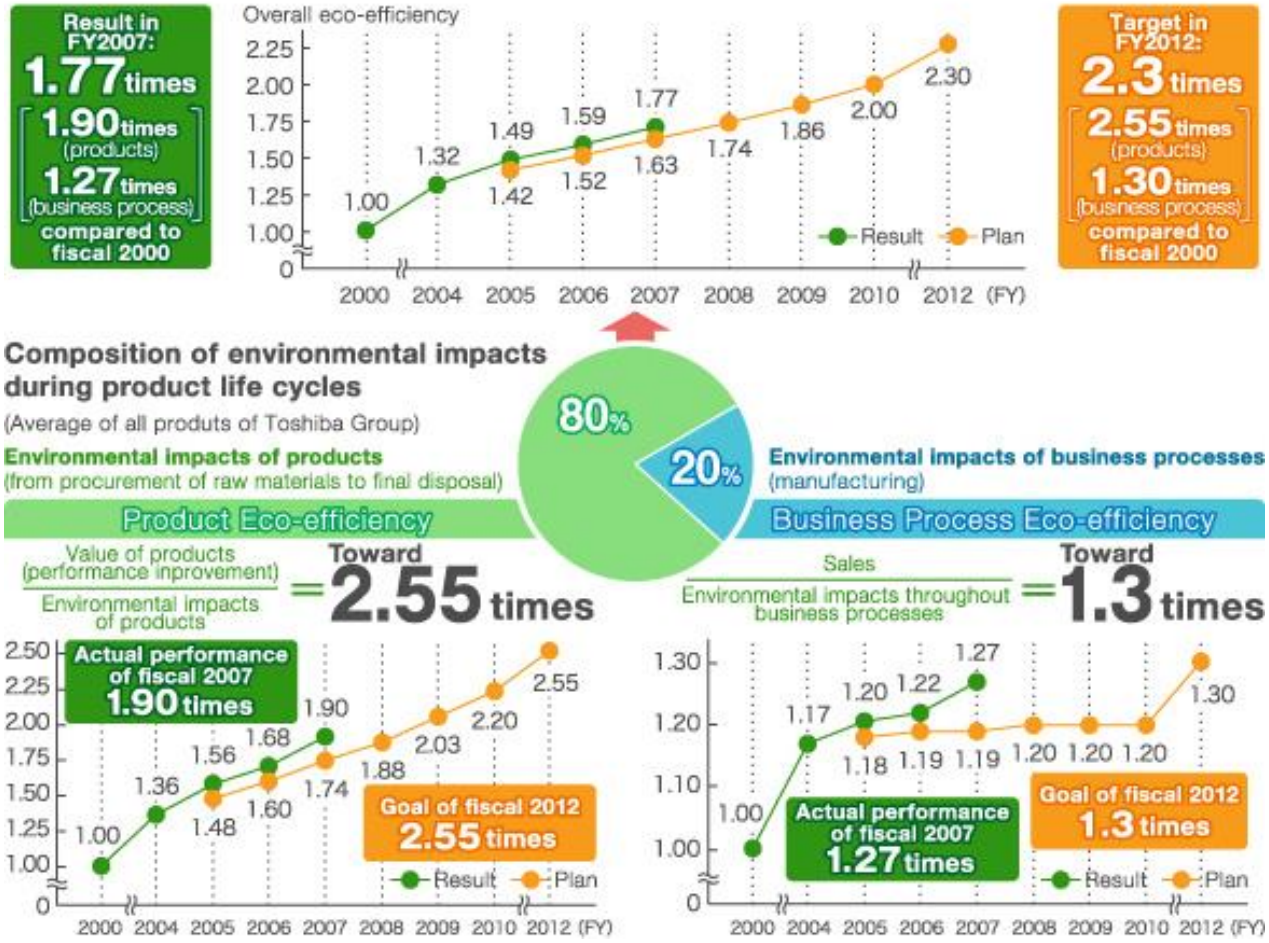
TOSHIBA
Leading Innovation >>>

	Factor 2.37(in 2007 relative to 2000)	Factor 2.60(in 2007 relative to 2000)
Product name/model name	 Digital MFP e-STUDIO167	 Electronic Cash Register MA-2055
Main improvement in value	Value factor 1.58 • Paper to be reused with erasable toner • Large buttons and icon display introduced on the control panel	Value factor 2.88 • Improved visibility • Improved operability • Promptness
Main improvement in environment	1/Environmental impact factor 1.50 • Reduced power consumption • Reduced weight	1/Environmental impact factor 0.90 • Reduced standby power • Reduced hazardous substances

Source: www.toshiba.co.jp/env/en/industry/index.htm

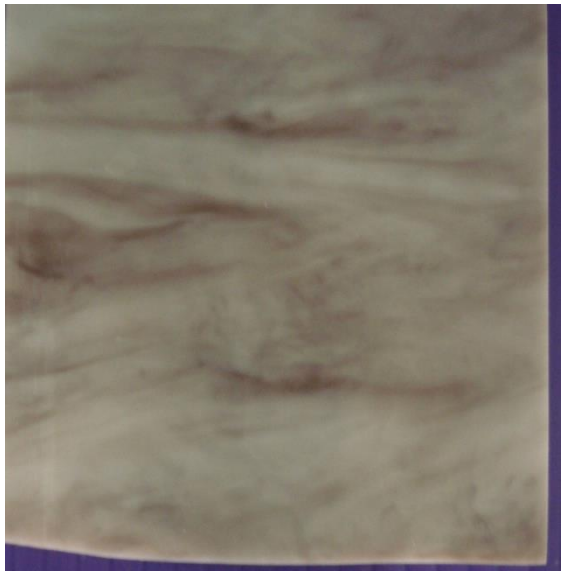
TOSHIBA
Leading Innovation

Toward 2.3 times in "FY2012 Overall Eco-efficiency"



Source:www.toshiba.co.jp/env/en/management/plan.htm

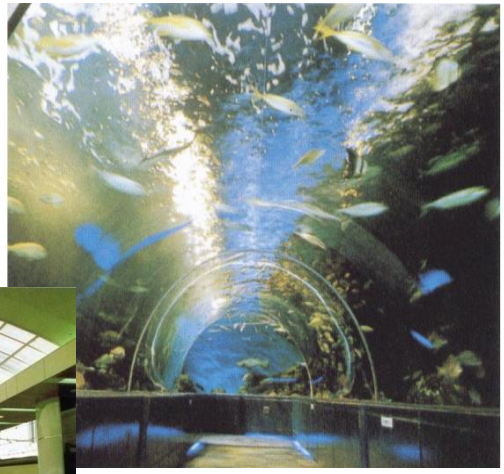
Eco-Efficiency of PMMA Cast Sheet Process

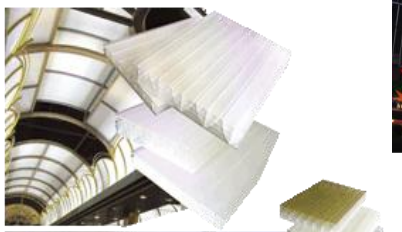


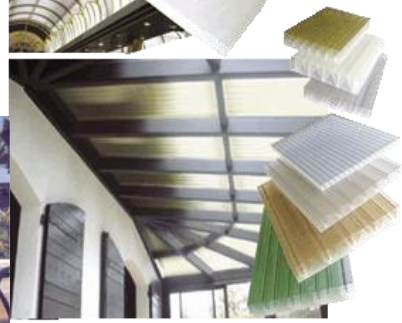
PAN Asia Industrial Co., Ltd.

Funding by the Thailand Research Fund

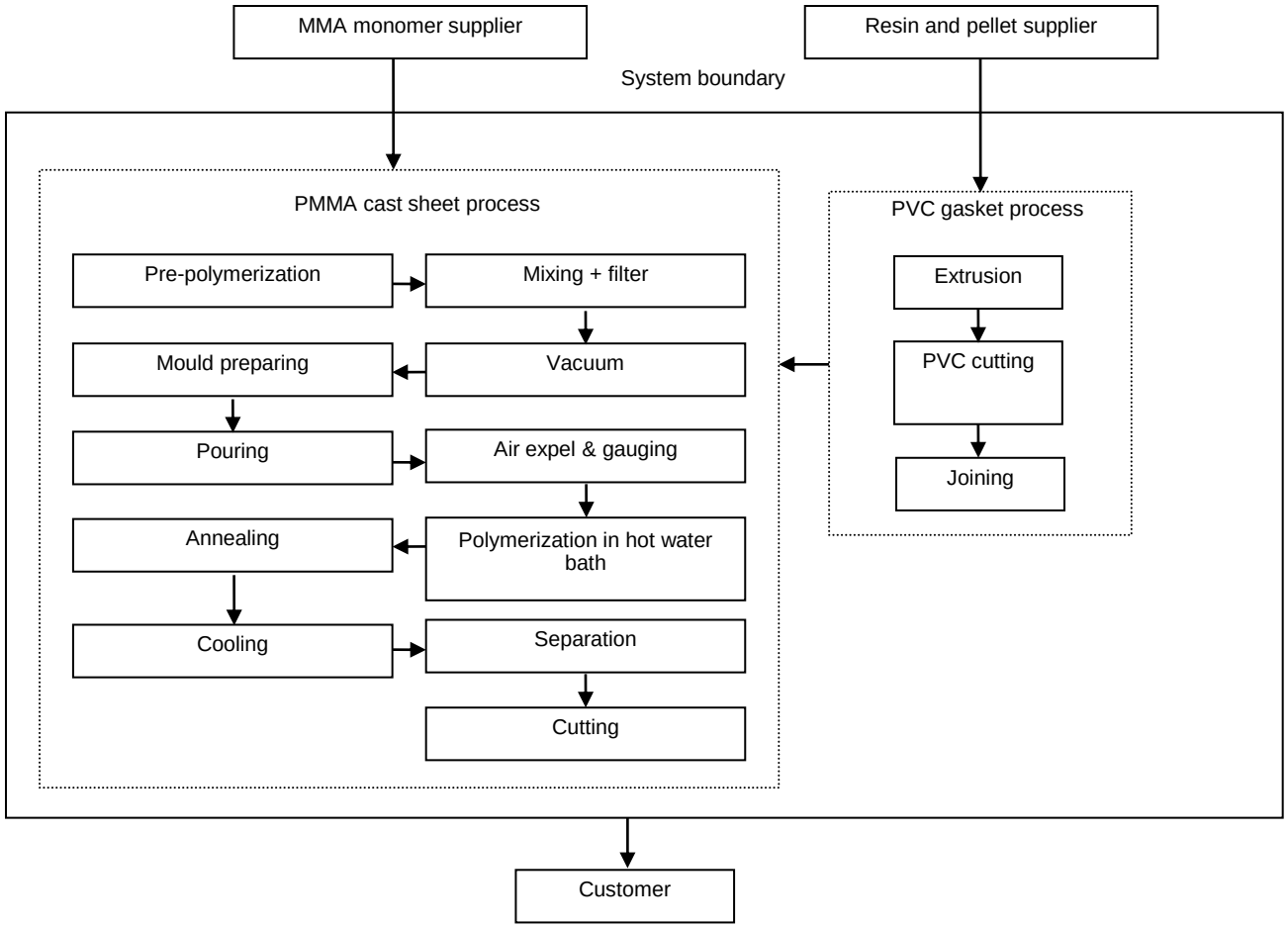
Applications of PMMA Cast Sheet





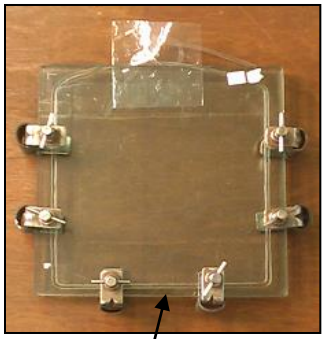


PMMA Cast Sheet Process



Bulk Polymerization

- **Quiescent Bulk Polymerization (Monomer Casting)**



PVC gasket 3 mm

PMMA prepolymer (syrup)

Curing in water batch

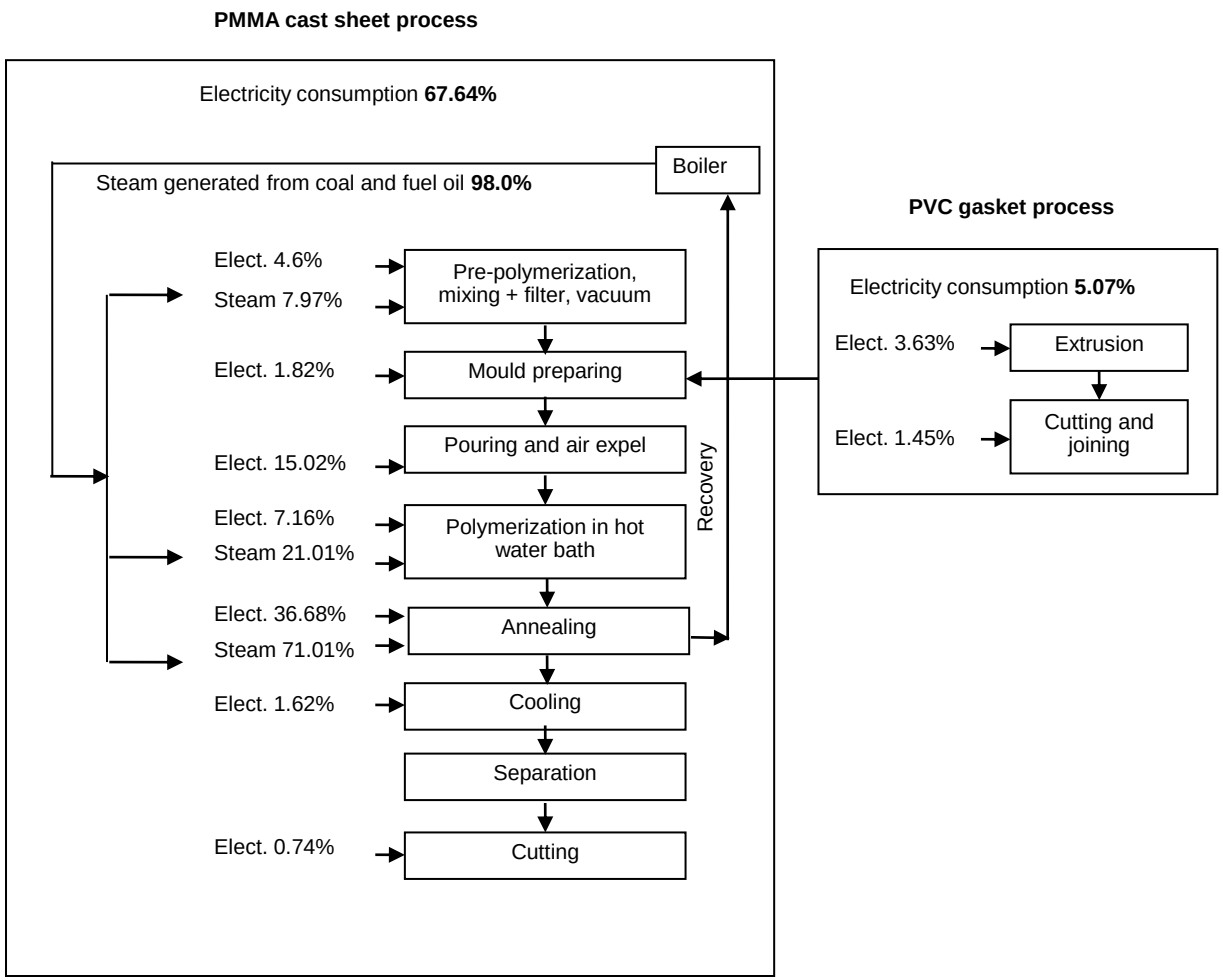
- Temp 60 °C
- Time 2 hr.

Bake in oven

- Temp 110 °C
- Time 2 hr.

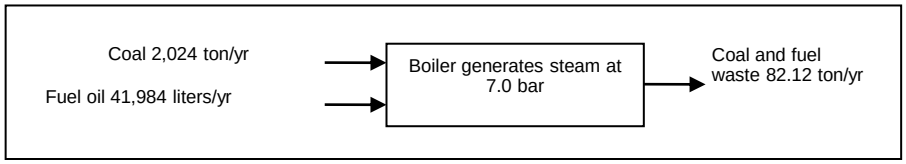
PMMA Sheet

PMMA Cast Sheet Process

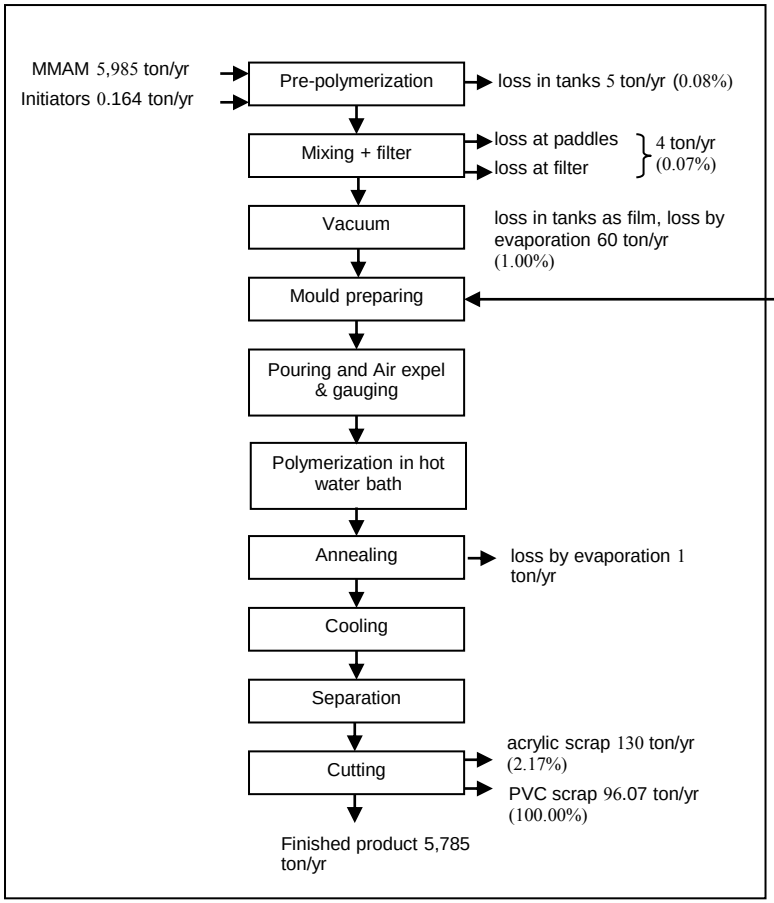


PMMA Cast Sheet Process

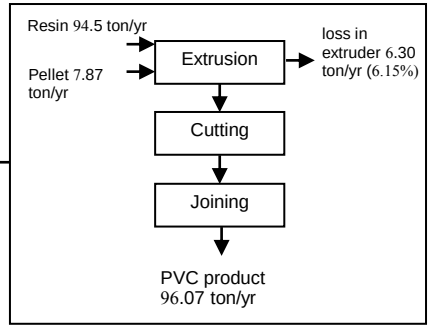
Boiler



PMMA cast sheet process



PVC gasket process

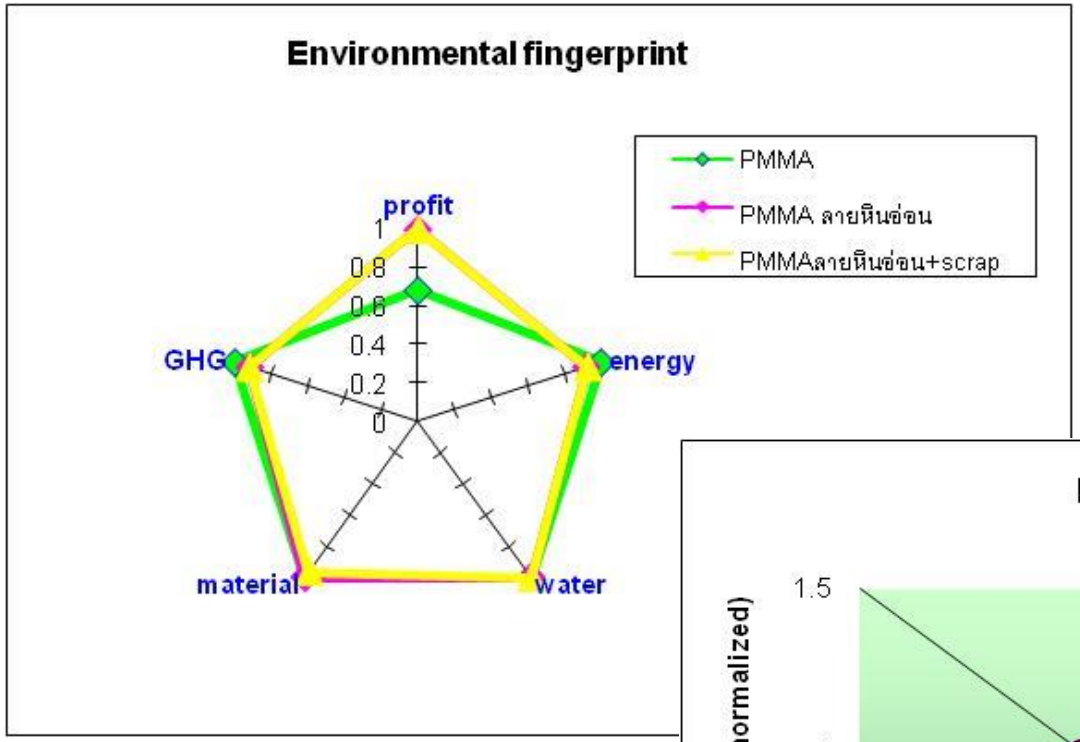


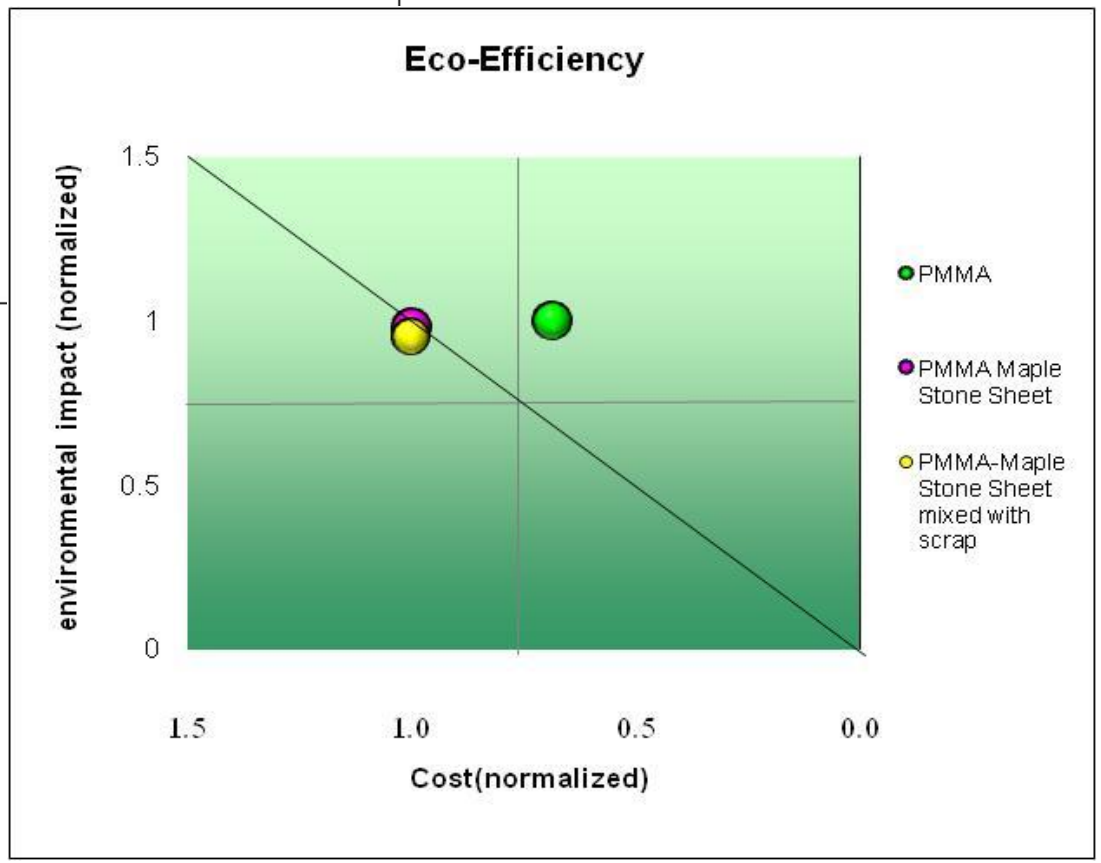
PMMA Cast Sheet (GP Grade)

Recycled PMMA Cast Sheet

PMMA Mable Sheet

Recycled PMMA Mable Sheet





Eco-Efficiency Analysis

Section Break