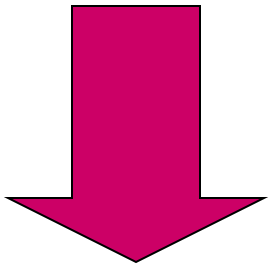
Evaluation of Eco-Efficiency Indicators

Reporting System

Traditional Environmental Report



Eco-Efficiency Report & Sustainability Report

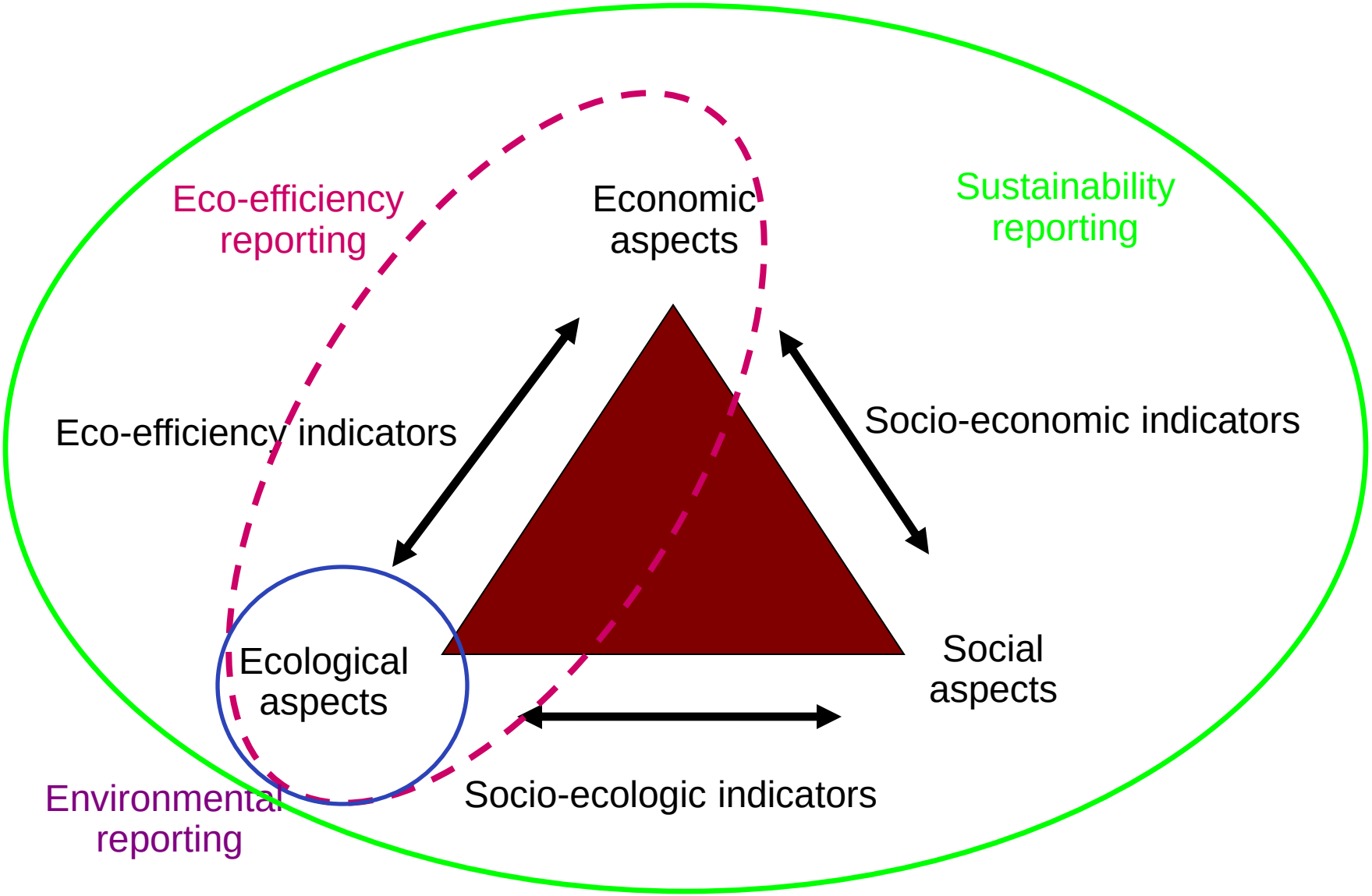
Global Reporting Initiative (GRI, UNEP2002)

Integrated performance

Systematic indicator that relate the activity of an organization to the larger economic, environmental, and social systems of which it is a part

Cross-cutting indicators that directly relate two or more dimensions of economic, environmental, and social performance as a ratioemi

Sustainability Reporting



IE Management Tools and ISO 14001

Evaluation &Auditing Tools

Environmental Performance Evaluation (EPE)
ISO 14030 guidelines

Environmental Auditing (EA)
14010 general principles

14011 audit procedures

14012 qualification criteria for environmental auditors

Management Systems

ISO 14004 (EMS)
on principles, systems & support techniques

ISO 14001 (EMS)
specification with guidance for use

Life Cycle Assessment (LCA)
14040 LCA Principles & framework
14044 Requirements & guidelines (revision: 2006)

Environmental Labels (EL)
14020 General principles
14021 Self-declared (Type II)
14024 Type I- Principles and procedure
14025 Type III- Principles and procedure

ISO/TR 14062:2002 environmental aspects in product design and development

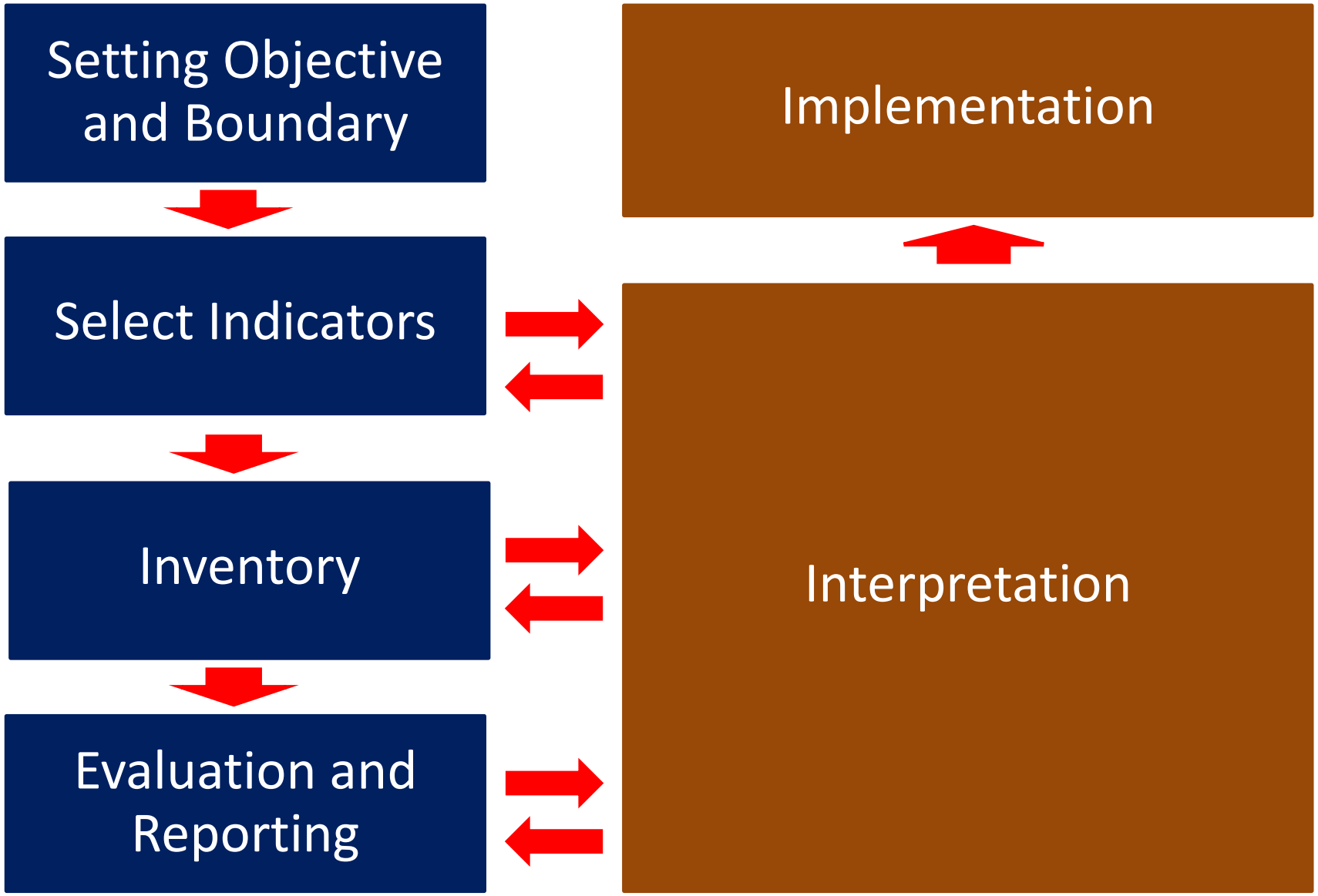
ISO 19011 Guidelines for Quality and Environmental Management Systems Auditing

ISO 14045 Eco Efficiency
ISO 14046 Water footprint
ISO 14051 Material Flow Accounting

ISO 14064 Greenhouse Gas (part 1-3)
ISO 14065 GHG Validation & Verification
ISO 14066 GHG Validators & Verifiers

ISO 14067 Carbon Footprint of products
ISO 14069 Carbon footprint of organization

Evaluation of Eco-Efficiency Framework



Setting Objective and Boundary

- Setting goal and objectives
- Setting working team
- Setting boundary
- General information and specific information

Select Indicators

- Define process flow diagram, input and output
- Select indicators

Indicators

- Generally applicable indicators

indicators can be used virtually all businesses.

- Business specific indicators

indicators are more likely to be individually defined from one business or one sector to another. The judgment will depend on the nature of an individual business.

Generally Applicable Indicators

3 criteria for generally applicable indicators

- *Indicator is related to a global environmental concern or business value*
- *It is relevant and meaningful to virtually all businesses*
- *Methods for measurement are established an definitions accepted globally*

All other indicators which do not meet these 3 criteria have been termed business specific

Generally Applicable Indicators

- Product/service value

  Quantity of goods or services produced or provided to customers

  Net sales

- Environmental influence in product/service creation

  Energy consumption

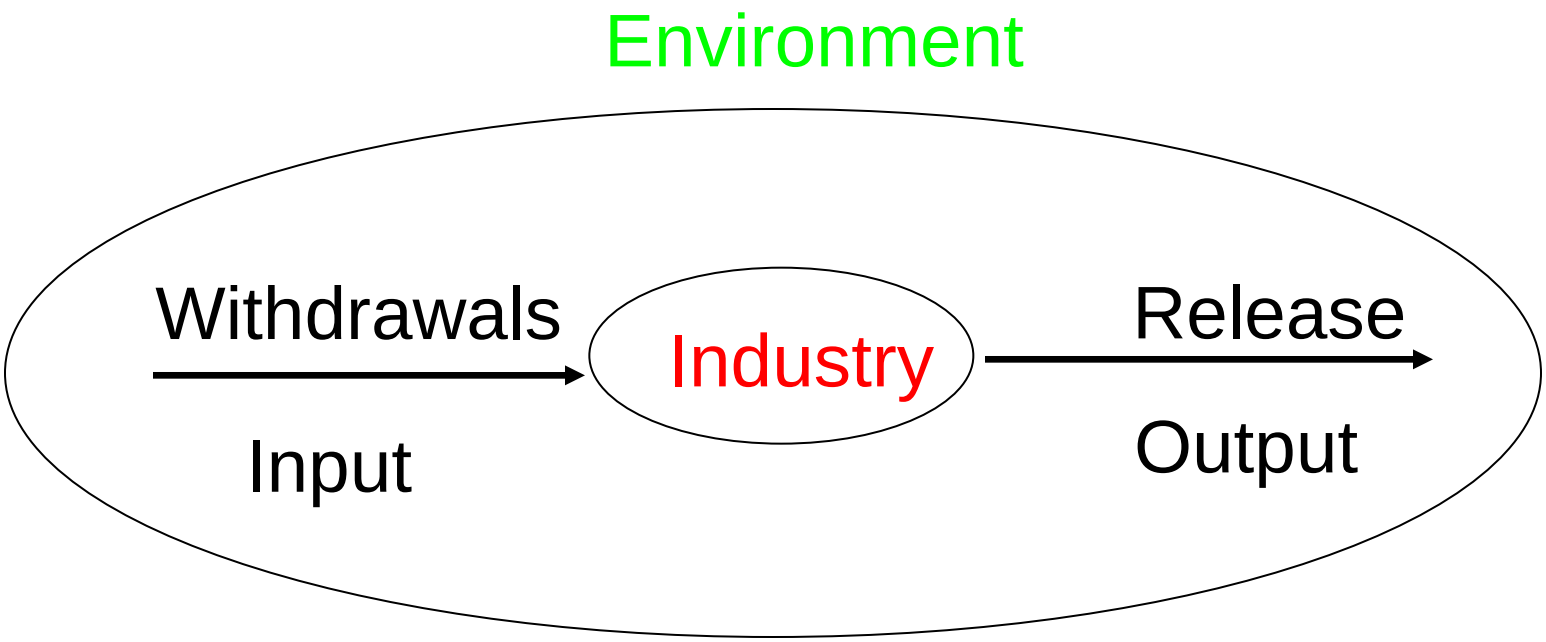
  Material consumption

  Water consumption

  Greenhouse gas emissions

  Ozone depleting substance emissions

Environmental performance indicators



Environmental indicators

Input Environment withdrawals	Output Environment releases
Use of energy Use of natural resources Use of other materials Land use	Pollutant Waste generation/ By-products

Business Specific Indicators

- Product/service value
  - *EBIT (profit before interest expense and income tax)*
  - *Gross margin (net sales-costs of goods and services sold)*
  - *Value added (net sales-costs of goods and services purchased)*
- Environmental influence in product/service creation
  - *Priority heavy metal emissions to surface water*
  - *Wasted to landfill and incineration*
  - *Photochemical oxidation creation*
  - *Eutrophication emission to surface water*
  - *Packaging*
  - *COD to surface water*
  - *GHG emissions from purchased electricity*

Inventory Data

- Select reference year
- Data management system
- Develop Inventory data sheet
- Inventory data
- Data monitoring

Energy intensity indicator

	A	B	C		D	E	
Energy source	**Applicable to me?**	**Numerical value ove reporting period**	**Units**	**Multiply**	**Conversion factor (to convert to MJ)**	**Converted value over reporting period**	**Units**
Electricity							
Electricity				X			MJ
Petroleum products							
Heavy fuel oil				X			MJ
Light fuel oil				X			MJ
Diesel				X			MJ
Kerosene				X			MJ
Gasoline				X			MJ
Petroleum coke				X			MJ
Other				X			MJ
Natural Gas							
Natural gas				X			MJ
Propane				X			MJ
Butane				X			MJ
Other				X			MJ
Coal							
Anthracite				X			MJ
Bituminous/sub.				X			MJ
Lignite				X			MJ
Coke				X			MJ
Other				X			MJ
Biomass							
Wood				X			MJ
Hog fuel				X			MJ
Black liquor				X			MJ
Other				X			MJ
Other							
Steam				X			MJ
Hot water				X			MJ
Inherent energy				X			MJ
Other				X			MJ
Total energy							
					Total energy =		MJ

Waste intensity indicator (mass balance approach)

A	B	C		D	E	
Materials used	**Numerical value ove reporting period**	**Units**	**Multiply**	**Conversion factor (to convert to kg)**	**Converted value over reporting period**	**Units**
Raw Materials						
			X			kg
			X			kg
			X			kg
Packaging						
			X			kg
			X			kg
			X			kg
Office supplies						
			X			kg
			X			kg
			X			kg
Indirect materials						
			X			kg
			X			kg
			X			kg
			X			kg
Total material taken in						
				Total material taken in =		kg

Waste intensity indicator (mass balance approach)(cont'd)

A	B	C		D	E	
Amount of product and co-product	**Numerical value ove reporting period**	**Units**	**Multiply**	**Conversion factor (to convert to kg)**	**Converted value over reporting period**	**Units**
Product						
			X			kg
			X			kg
			X			kg
			X			kg
Co-product						
			X			kg
			X			kg
			X			kg
			X			kg
			X			kg
			X			kg
			X			kg
			X			kg
Total amount of product and co-product						
				Total amount of product and co-product =		kg

Waste intensity indicator (waste output approach)

A	B	C		D	E		F	G	
Waste generated	**Numerical value ove reporting period**	**Units**	**Multiply**	**Conversion factor (to convert to kg)**	**Converted value over reporting period**	**Units**	**Waste used?**	**Quantity**	**Units**
Waste end points									
Landfill			X			kg			kg
Incineration			X			kg			kg
Recycling			X			kg			kg
Reuse			X			kg			kg
On-site composting			X			kg			kg
On-site energy generation			X			kg			kg
Hazardous waste disposal			X			kg			kg
Air			X			kg			kg
			X			kg			kg
			X			kg			kg
			X			kg			kg
			X			kg			kg
Water			X			kg			kg
			X			kg			kg
			X			kg			kg
			X			kg			kg
			X			kg			kg
Others			X			kg			kg
			X			kg			kg
Total wastes generated									
				Total wastes generated =		kg	Total wastes used =		kg

Water intensity indicator

	A	B	C		D	E	
Water source	**Applicable to me?**	**Numerical value ove reporting period**	**Units**	**Multiply**	**Conversion factor (to convert to m^3 if necessary)**	**Converted value over reporting period (if necessary)**	**Units**
Water body (ies)				X			m^3
Wells				X			m^3
Municipal supply				X			m^3
Other				X			m^3
Total water taken in							
					Total water taken in =		m^3

Measuring Eco-Efficiency

Eco-Efficiency is represented by:

$$\text{Eco-Efficiency} = \frac{\text{Product or Service Value}}{\text{Environmental Impact}}$$

Four basic types of eco-efficiency

	Product or production primary	Environmental improvement primary
Economic divided by Environment	Production value per unit of environment impact, or environmental productivity	Cost per unit of environmental improvement or environmental improvement cost
Environmental divided by Economy	Environmental impact per unit of production value, or environmental intensity	Environmental improvement per unit of cost, or environmental cost--effectiveness

Eco-Efficiency Report

5 elements for a summary eco-efficiency profile

- *Organization profile*
- *Value profile*
- *Environmental profile*
- *Eco-efficiency ratios*
- *Methodological information*

Eco-Efficiency Report

• Organization profile- This will provide a context for the eco-efficiency information. It should include:

- The number of employees

- The business segment involved

- Primary products and major change in the structure of the company

Eco-Efficiency Report

- Value profile- Indicators from the value portion of the WBCSD framework, including:

  - *Financial information*
  - *The quantity of products*
  - *Functional indicators for specific products*

Eco-Efficiency Report

- Environmental profile- This will include:

- Generally applicable indicators of environmental influence

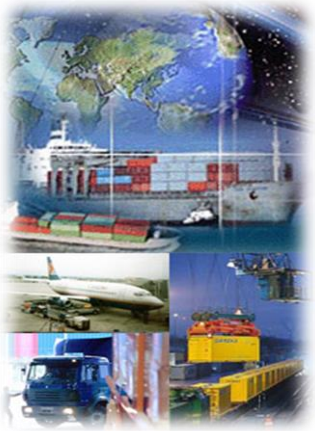
- Business-specific indicators relating to product/service creation and use

Eco-Efficiency Report

- Eco-Efficiency ratios

- provide basic numerator and denominator data for estimating eco-efficiency.

- provide calculations of the eco-efficiency indicators that most relevant and meaningful for business



Eco-Efficiency Report

- Methodological information

- Describe the approach used to select indicators, data collection methodologies and any limitations on use of the data.

Example eco-efficiency profile

The following is an illustrative "straw model" of how a company might apply the WBCSD framework. It illustrates the concepts set out in chapter 2 of this report and focuses particularly on the generally applicable indicators described in chapter 3.

The eco-efficiency profiles of several pilot companies are posted on the WBCSD website (www.wbcsd.org). These real profiles exemplify how companies chose to publish their eco-efficiency profiles as part of the pilot.

Organization Profile

Company name: **Exemplis Inc.**
Business segments: Pharmaceuticals (list of primary products)
Report for: **Fiscal Year 1999**
System boundaries: includes all consolidated units of Exemplis Inc., excludes joint ventures and minority activities
Number of employees: 2,500
Internet: Website, hyperlink to web-based sustainability report
Contact for additional information: Name, telephone, e-mail address

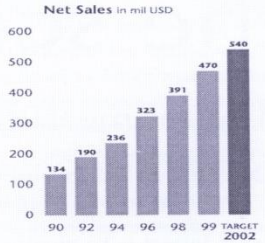
Methodological Information

ISO 14,031 was used to identify relevant aspects of our business activity and to select respective meaningful indicators.

Our data collection and use methodologies are available for review.

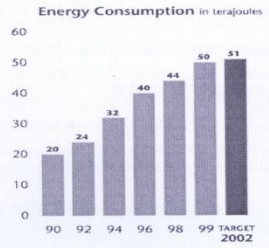
Value Profile

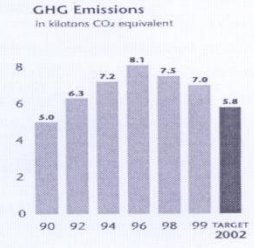
Mass of product sold = 300,000 kg
Net sales = 470 million USD
Value added = 220 million USD
Gross margin = 45 million USD
EBIT = 45 million USD



Environmental Profile

Energy consumed = 50,000 gigajoules
Material consumed = 4,500 tons
Water consumed = 60,000 m³
GHG emissions = 7,000 tons CO_2 equiv.
ODS emissions = 25 tons CFC11 equiv.
Electricity consumed = 35,300 gigajoules
GHG from upstream
electricity gen. = 4,600 tons CO_2 equiv.
Natural gas consumed = 11,500 gigajoules
Acidification emissions = 400 tons SO_2 equiv.
VOC emissions = 230 tons
COD effluents = 86 tons
Total waste = 1,450 tons
Waste to landfill = 650 tons

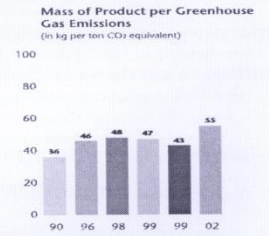


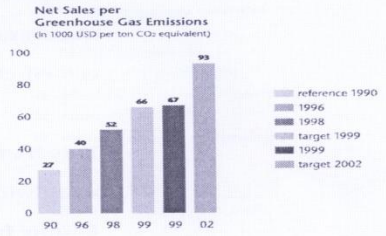


Eco-efficiency Ratios

Mass of product sold per:
Energy consumption = 6.0 kg per gigajoule
Material consumption = 66.7 kg per ton
GHG emissions = 42.9 kg per ton CO_2 equiv.

Net sales per:
Energy consumption = 9,400 USD per gigajoule
Material consumption = 104,000 USD per ton
GHG emissions = 67,100 USD per ton CO_2 equiv.





Factor X

$$\text{Factor X} = \frac{\text{Recent Eco - Efficiency}}{\text{Reference Eco - Efficiency}}$$

- Factor X by individual indicators
- Factor X by total indicator

Contact Address

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