I. Introduction

Simply because Environmental risks and uncertainties may heavily impact the business of companies, influence investment decisions or affect consumers or stakeholders' behaviour, there is now an increasing demand for accurate and reliable information about the Environmental performance of companies and products.

Companies that truly analyse, measure, manage and report the environmental performance of their organization or products are now inherently well placed, they clearly understand and monitor how to improve their processes, comply with stakeholders' expectations and regulations, reduce their costs and increase their overall efficiency.

In this respect, the definition of key performance indicators (KPIs) that may be capable of reflecting either the environmental performance of companies or of their products, as well as expressing improvements achieved during a defined period of time, shall be considered of major importance.

Environmental indicators might be established to meet several objectives:

- Management of the Environmental performance and/or of the business of a company according to ISO 14001 EMS
- Communication to stakeholders (shareholders, consumers, rating agencies, employees, authorities…)

Several sets of regulations in various countries as well as international standards have been defined to set up a general framework and guidelines for reporting practices. However, there is still a wide margin for interpretation, and difficulties and limitations in company results currently occur.

These guidelines intend to briefly present the various Environmental indicators a company may use to report on the environmental performance of its organization or of its products, as well as the process to be set up to ensure the reliability and the completeness of the exercise.

This guideline will focus on the requirements of the ISO 14001 standard and aims to provide an overview of what might be required to build an Environmental performance dashboard, within the scope of the Environmental Management System.

The ISO 14001 requirements / EMAS (In Eco. Management and Audit Scheme)*

ISO 14001-2004 Standard, on Monitoring and Measurement (Chapter 4.5.1) states:

The organization shall establish, implement and maintain a procedure(s) to monitor and measure, on a regular basis, the key characteristics of its operations that can have a significant environmental impact. The procedure(s) shall include the documenting of information to monitor performance, applicable operational controls and conformity with the organization's environmental objectives and targets.

The organization shall ensure that calibrated or verified monitoring and measurement equipment is used and maintained and shall retain associated records.

An important step for an organization when establishing an Environmental Management System is to conduct an environmental analysis of its operations. This will provide information on the level and amount of environmental impact and system requirements, including operational control requirements and the setting of objectives and targets for the system.

An organization that has determined its major environmental impacts should be able to evaluate its evolution and follow the objectives and target that address these impacts.

The ISO 14001 standard does not give precise indications on the process of establishing, implementing and maintaining a process for monitoring and measurement. Evaluating environmental performance has been taken further.

A specific standard has been established to develop such indicators, the ISO14031 that develops three kinds of indicators to describe the EPE (Environmental Performance Evaluation):

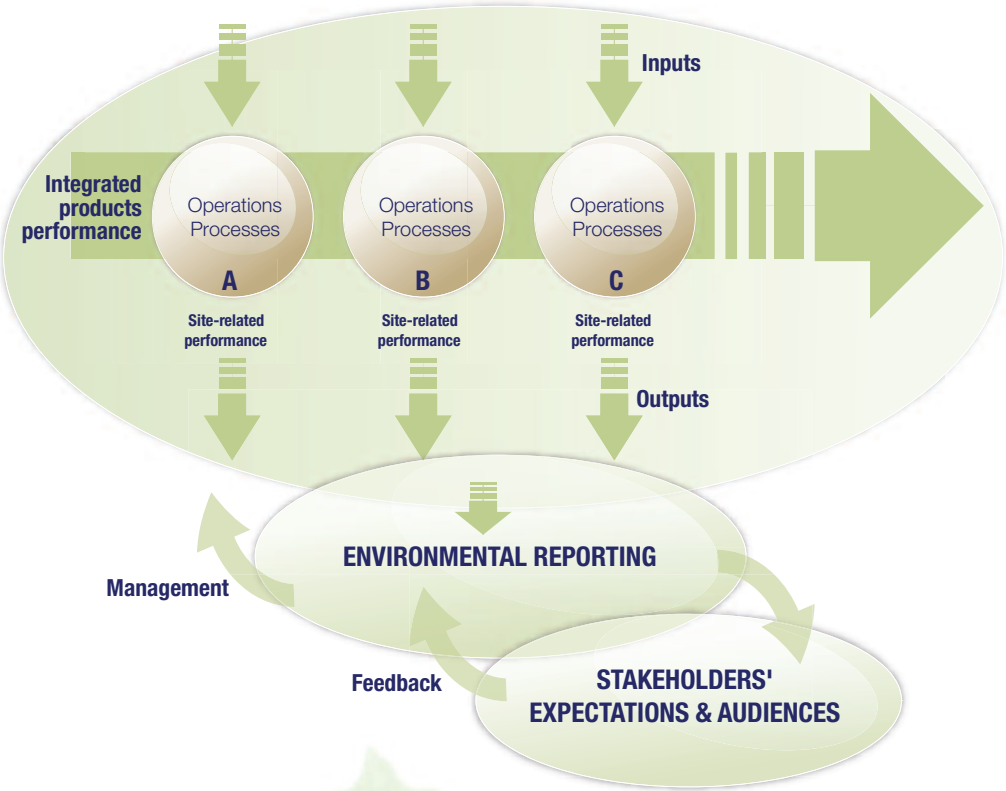
- OPI(s) (Operational Performance Indicators) that give information on the environmental performance linked with the operation
- MPI(s) (Management Performance Indicators) that give information on the performance of the management system implemented to influence the environmental performance
- ECI(s) (Environmental Condition Indicators) that give information on the situation of the environment in the area where the organization is located

* ISO 14001 gives you indications how to follow internally your environmental performance.
Then, to be compliant against EMAS, you have to follow and report your environmental performance so for this you can use the data you have collected to fulfill the ISO 14001's 4.5.2 chapter.

II. Reporting principles and frameworks

Reporting on the environmental performance of a company or its products shall not be seen as a one-off, isolated process prepared by a single manager.
It shall be considered as a major structuring process of the business that involves all areas of the organization.

Reporting on the environmental performance of a company, an organization and/or its products cannot be achieved with the required level of accuracy without implementing an Environmental Management System.



Global Reporting Initiatives Guidance *(GRI - Sustainability reporting Guidelines)*

The GRI Reporting framework aims to provide a generally accepted framework for reporting on an organization's environmental performance, amongst other information. The framework consists of the sustainability Reporting guidelines, the Indicator Protocols, Technical protocols and the sector supplements.

For more information see: www.globalreporting.org

EU European Pollutant Emissions Register *(EPER)*

Reference:

Council Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC) - September 1996 - JOEC L257/26.

Commission Decision 2000/479/EC on the implementation of an European Pollutant Emission Register (EPER) July 2000, JOEC L192/36.

The EPER constitutes a publicly accessible register (similar to the OIA TRI) that enables the Commission, the public and governments to monitor the trends in annual emissions of large industrial activities covered by annexe 1 of the IPPC Directive.

As Reporting emission according to the EPER format will require additional efforts for the companies, it is recommended that the companies concerned implement the corresponding guidelines within the scope of their Environmental Management System to avoid any duplication of the workload.

Other links and frameworks:

- 1998 UNECE Aarhus Convention on
  "Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters"
- NRE Law (Nouvelle Regulation Economique)
- Environmental Product Declarations (EPD) and eco Labels

III. Types and selection of indicators

An Environmental Indicator is a variable or measure that provides information of what impacts the environment. The indicator could include physical, chemical, biological measures as well as data collected from departments within the organization.

Environmental indicators also serve to evaluate the progress of the environmental performance and to see if the assigned objectives have been met, compare the changes in an organization or communicate to the general public. The choice of indicators shall be influenced by the various stakeholders' expectations:

- Conformity with the regulations (e.g. NRE law in France, EPER - European Pollutant Emission Register)
- Publication for external parties such as clients, suppliers, neighbours, etc
- Creation of a dashboard for management committees
- Etc.

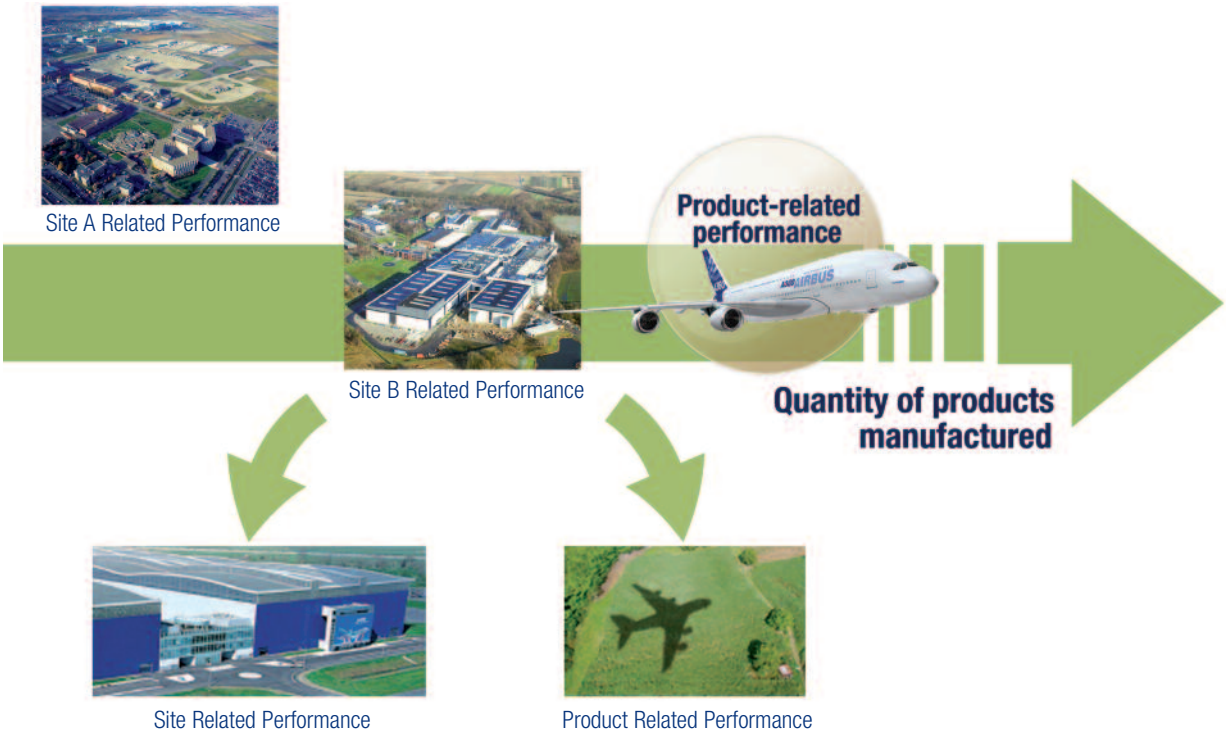
Indicators shall be based on the following principles:

- Simplicity: information shall be easily provided at low cost
- Objectivity: indicators should be calculated from the measures
- Relevance: indicators shall perfectly describe the phenomena and be significant of what is studied
- Sensitivity: indicators shall not change significantly even if the phenomena described evolves considerably
- Accuracy: indicators shall be defined with a margin of error acceptable with respect to the measure
- Auditability: a third person shall be able to understand and verify the indicator and associated measures and processes
- Completeness

Selection of the indicators can be based on the guidelines given by ISO14031 to evaluate the environmental performance of an organization with three kinds of indicators (OPI, MCI, ECI).

When establishing Environmental performance indicators, careful attention shall be paid to the objectives of the current reporting exercise. In particular, it is worth determining whether reporting shall be limited to site-related Environmental performance or shall be further extended to product environmental performance.

In this case, consistency between the various information gathered from the sites will be a key factor.

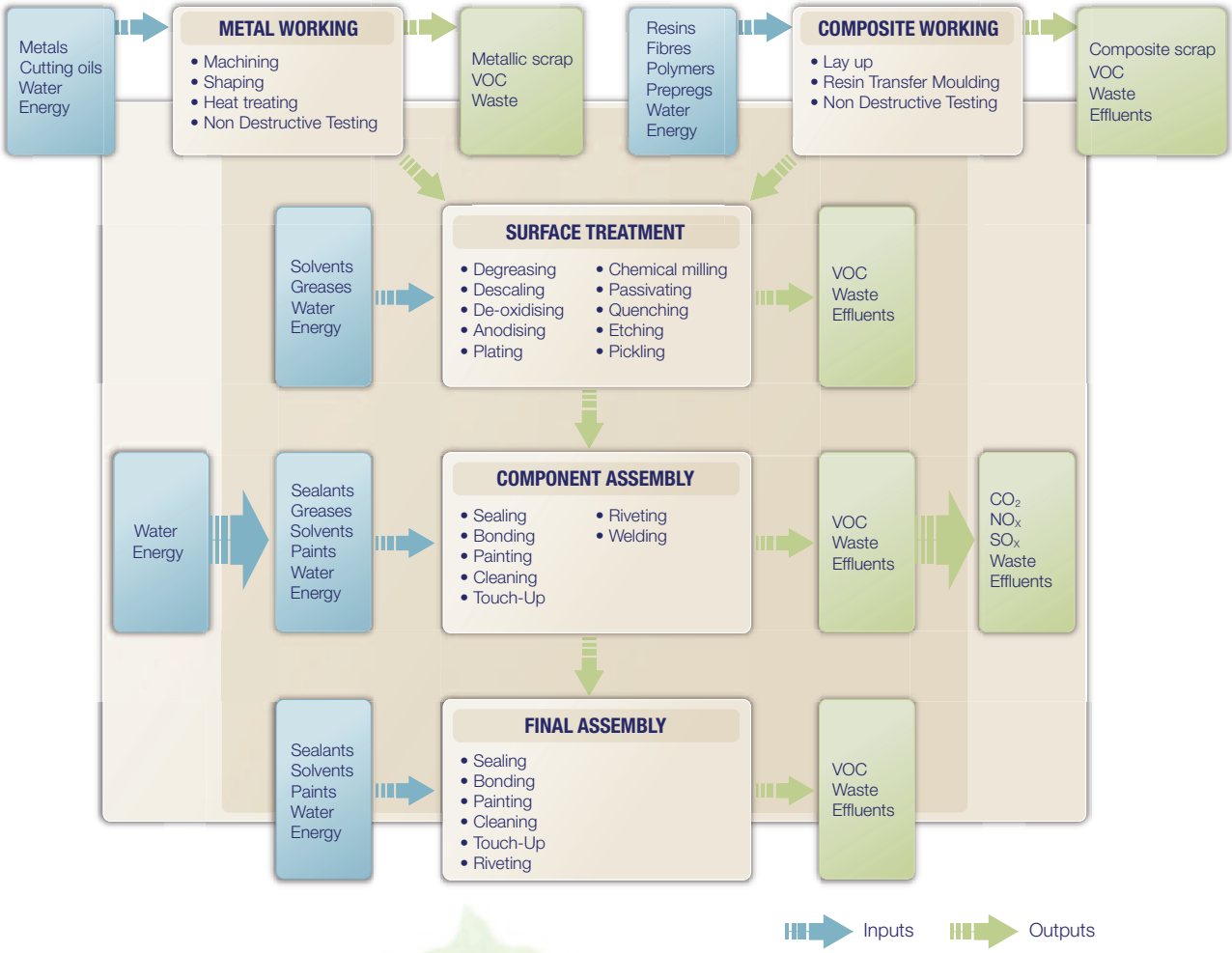


When reporting on the environmental performance of products, it is essential to gather all the relevant data from the site and to allocate them to normalised quantities of manufactured products (kg of products…).

1. Operational Performance Indicators

Operational Performance Indicators should be based on the input and output of an organization and on environmental aspects/impacts that matter for the concerned organization.

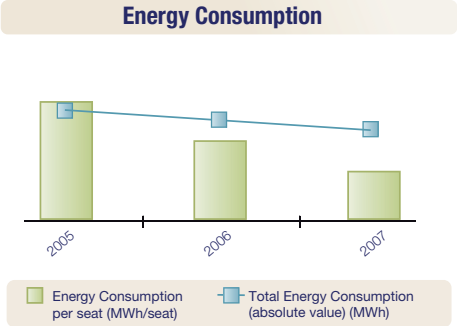
Example of input/output:



Example of OPI:

Energy Consumption

Direct energy consumption such as gas, fuel, coal, wood
Indirect energy consumption such as electricity
Renewable energy consumption

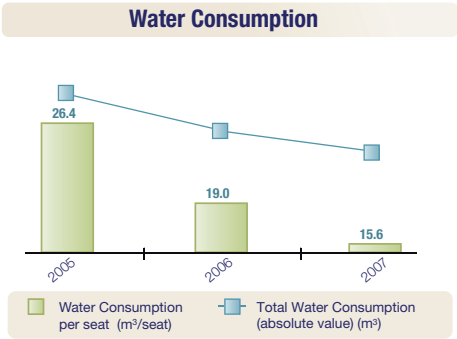


Transport

Energy used by vehicles on sites such as oil, kerosene, fuel, electricity
Energy used by vehicles outside the sites such as oil, kerosene, fuel, electricity
Emissions
(e.g. greenhouse gas emissions, ozone-depleting substances, NO_x, SO_x, and other air emissions)
Effluents (e.g. different kinds of chemicals)
Waste (e.g. different types of packaging material)

Water consumption

Total water withdrawal by sources such as purchased water, abstracted water, rainwater in tonnes or volume



Material consumption

Raw material consumption (metal, plastics, etc.) in tonnes or volume
Solvent consumption in tonnes or volume
Sealant consumption in tonnes or volume
Semi-manufactured material in tonnes or volume

Waste production

Total waste production in tonnes or volume
Hazardous waste production in tonnes or volume
Non-hazardous waste production in tonnes or volume
Metallic scrap in tonnes or volume
Liquid waste in tonnes or volume
Waste by disposal method (Composting, reuse, recycling, recovery, incineration (or use as fuel), landfill, deep well injection, on-site storage other) in tonnes or volume

Air emission

VOC emission in tonnes or volume
CO_2 emission from direct emission (energy produced on site) in tonnes or volume
CO_2 emission from indirect emission (energy produced outside the site as electricity) in tonnes or volume
Other GHG emission in tonnes or volume
Ozone-depleting substances emission in tonnes or volume
NO_x / SO_x emission in tonnes or volume

Water pollution

Quantity of water discharged in the natural environment
Water pollution measures

Data could be retrieved from: bills or inventory of suppliers, measurements performed on site by relevant on-site sensor, inventory of production, etc.

2. Management Performance Indicators

Management of the environmental organization includes:

Creating and maintaining an organization
Defining the policy and associated objectives and targets
Informing and training people to maintain skills on environmental matters
Conducting regulatory surveys
Defining procedures and manuals at all levels of the organization

The Management Performance Indicators should provide information on the capability of the organization to implement such a system and to maintain it. These indicators should measure the implementation, running and maintenance of all the Environmental Management System processes as regards both their strengths and weaknesses.

Example of MPI:

Training and awareness performance

Number of persons that follow basic environmental awareness training
Percentage of the organization's population that have followed awareness training
Number of persons that follow specific environmental training
Number of persons trained versus number of persons to be trained

Implementation of policy, objectives and targets

Number of environmental programs implemented in the organization
Number of objectives and targets reached

Material consumption

Raw material consumption (metal, plastics, etc.) in tonnes or volume
Solvent consumption in tonnes or volume
Sealant consumption in tonnes or volume
Semi-manufactured material in tonnes or volume

Legal compliance

Compliance status with legal and regulatory requirements
Number of environmental prosecutions

Financial costs and benefits

Costs linked to the environmental aspects of a process or product
Environmental fines savings

Stakeholders' requests / Communication

Number of requests for environmental information made by interested parties
Number of supplier or client queries made on environmental issues
Number of environmental events organised for suppliers

3. Environmental Condition Indicators

Environmental Condition Indicators give information about the state or conditions of the environment where the organization is physically implemented (for example: status on air pollution, water pollution of nearby rivers, noise near the factory, etc.)

It could be in the organization's interest to monitor environmental parameters, especially if activities could interfere with the environment.

Moreover, understanding the environmental condition could contribute to improved management of environmental performances, by knowing the parameters on which an organization should focus its activities.

Example of ECI:

Air

Concentration of specific contaminant in the atmosphere
Ambient temperature at locations within a specific distance of the organization's facility
Opacity levels upwind or downwind of the organization's facility
Frequency of photochemical smog events in a defined local area
Weighted average noise levels at the perimeter of the organization's facility
Odour measured at a specific distance from the organization's facility

Water

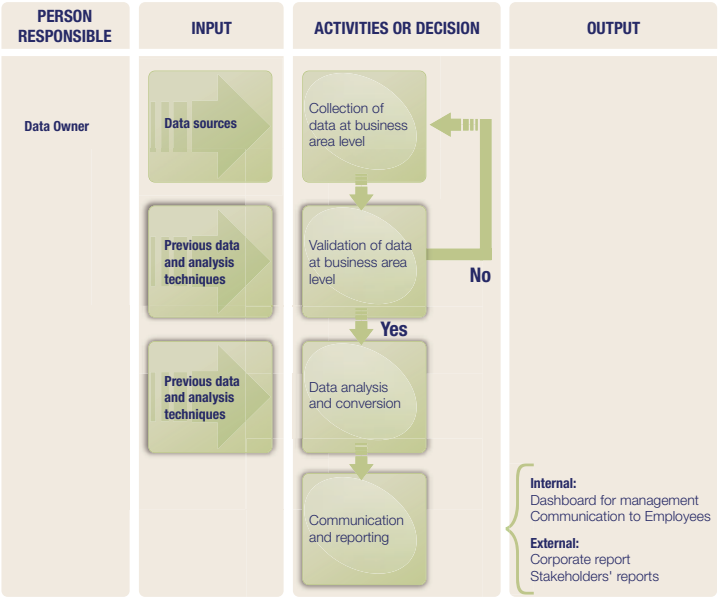
Concentration of a specific pollutant in groundwater or surface water
Dissolved oxygen in receiving waters
Water temperature in a surface water body adjacent to the organization's facility
Change in groundwater level

Soil

Concentration of a specific contaminant in surface oils at selected locations of the organization's facility
Area rehabilitated in a defined local area

IV. Organization of reporting

Selection and implementation of a reporting system and dedicated indicators should follow a Plan-Do-Check-Act management mode, because the impact of an organization may change in time or because the management information supplied should reflect new organizational changes.



Steps of the reporting organization

Business areas should be understood as the relevant unit within the organization that owns data (e.g. manufacturing site, procurement department, sales department, environmental department of a site, etc.)

1. Organization of data collection

The organization shall establish an infrastructure to collect the data. At each level where data is to be collected, the relevant data owner shall be identified.

The process and tool used for reporting shall ensure:

- The reliability and accuracy of the data. Care shall be taken to ensure that systematic errors are avoided, that random errors are minimised through effective checks and that uncertainties are quantified as far as practicable
- That the data allows a period-to-period comparison

Data collection is done on an environmental Reporting Tool specifically dedicated to the environment. The tool is filled at site level and follow the validation process defined on the procedure.

It is advised to conduct at least two reporting exercises a year on the major OPIs and EMIs that evaluate the main environmental impact of the organization. This will allow greater anticipation and management of the environmental performance and their associated objectives and targets.

The organization should use a variety of sources to collect the data from:

- Monitoring and measuring
- Purchasing records
- Supplier or subcontractor records
- Financial and accounting records
- Inventory and production records
- Interviews and observations
- Training records

2. Data validation and analysis

The data shall be carefully analysed and validated to avoid any mistakes in reporting by controlling the uniformity of the units, the conversion factors and the specific data used for calculations.

The data collected shall be compared with previous periods in order to differentiate between a major deviance and a mistake in the reporting exercise. Notes appended to data should explain large deviations in the collected data.

The collected data should be converted into information that describes the environmental performance and become indicators for Environmental Performance Evaluation.

3. Communicating and reporting

The indicators now have to be published and communicated to the various stakeholders both inside or outside the organization.

3.a. Internal reporting

The indicators can be represented on a dashboard that will clearly present the environmental performance to managers who have to take decisions that influence environmental performance.

The dashboard should be a simple way of presenting the indicators and environmental performance trends on a timeline basis.

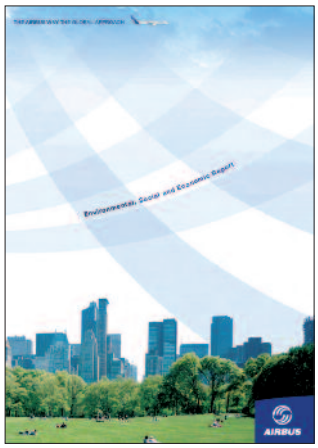
The dashboard is a useful tool for assisting management reviews implemented within a management system when reviewing objectives and targets.

3.b. External reporting

The organization may choose to communicate its environmental performances to external parties.

This communication could be mandatory, because of regulatory constraints, and in a continuous improvement process they may evolve on the basis of an environmental management system.

The organization should identify its communication needs with respect to the external parties involved.



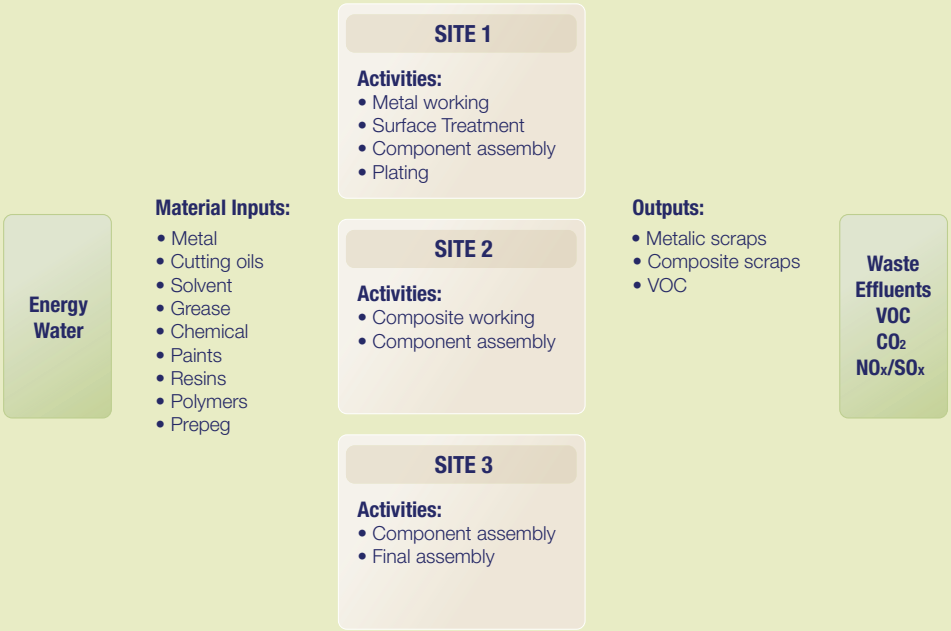
2006 Airbus ESE Report

4. Exercise

Exercise

Example:

Our example will be based on a company that produces aircraft on three different sites and that has set up an Environmental Management System.



The following indicators have been chosen for the three sites:

Operational Performance Indicators:

Energy: Electricity consumption in MWh
Gas consumption in MWh
Fuel consumption in MWh

Water: Purchased water in m^3
Abstracted water in m^3

Raw materials: Metal per sort in tonnes
Polymers per sort in tonnes
Paint in tonnes
Solvent in tonnes

Waste: Hazardous waste in tonnes
Non-hazardous waste in tonnes

Waste by disposal method (Composting, reuse, recycling, recovery, incineration (or use as fuel), landfill, deep well injection, on-site storage; other) in tonnes

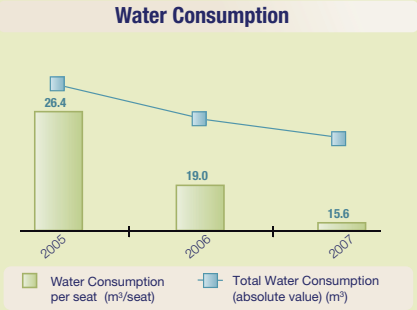
Exercise

Liquid effluents:

- Treated water on an on-site treatment facility in m^3
- Treated water on a treatment facility outside the site in m^3
- % of recycled water in m^3

Air effluents:

- CO_2 from direct energy sources (gas and fuel) in tonnes
- CO_2 from indirect energy sources (electricity) in tonnes
- VOC emissions in tonnes
- NO_x and SO_x emission from direct sources in tonnes



Management Performance Indicators:

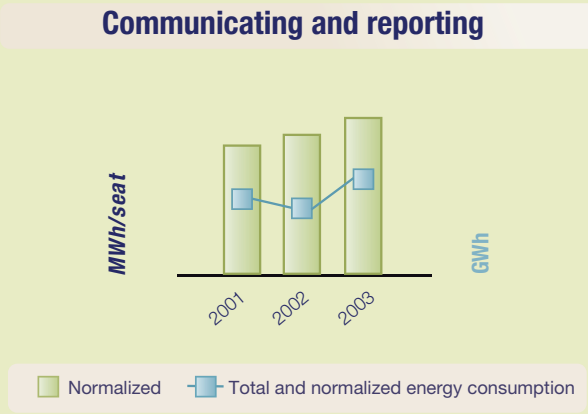
Number of persons that follow basic environmental awareness training
Percentage of the organization's population that have followed awareness training
Number of persons that follow specific environmental training
Number of persons trained versus number of persons to be trained
Number of environmental programs implemented in the organization
Number of objectives and targets reached
Compliance with legal and regulatory requirements
Number of environmental prosecutions
Costs linked to the environmental aspects of a process or product
Environmental fines
Number of requests for environmental information made by interested parties
Number of supplier or client queries about environmental issues
Number of environmental events organised for suppliers

Environmental Condition Indicators:

Organization of the reporting exercise:

- Reporting is organised twice a year. The two defined periods for reporting are: January to June and July to December
- The units of each indicator shall be kept identical on each site so that data can be consolidated at organization level

Exercise



Example of graph showing the total energy consumption and the total energy consumption normalised to the production factor, ready for external communication.

Recommendation: In order to easily produce the appropriate reporting and dashboard, an Environmental Management and Information Tool (EMIT) is generally of major help. Several service providers offer these kind of reporting tools such as, ENABLON, INDICIA, ...

V. Glossary

EMS - Environmental Management System.

Environmental aspect - an element of an organization's activities, products or services that can interact with the environment.

Environmental impact - any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

Scope - description of the areas of business covered by the EMS.

ISO 14001 - International Organization of Standardization environmental management standard.

Operational Control - steps implemented to reduce/control an environmental impact.

ETS - Emissions Trading Scheme. An EU trading scheme allowing companies to emit CO_2 to an agreed level.

EMP - Environmental Management Programme. A central management process of an organization's objectives and targets.

CFRP - Carbon Fiber Reinforced Plastics.

VOC - Volatile Organic Compounds.

SOx - Sulfur Oxides.

HC - Hydrocarbon.

kWh - kilowatt hour.

LCA - Life Cycle Assessment.

SLCA - Streamlined Life Cycle Assessment.

WEEE - Waste of Electrical and Electronic Equipment.

RoHS - Restriction of Hazardous Substances.