



Manual on environmental decision making

Part I

- what you can find on www.dantes.info



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READING INSTRUCTIONS

This “Manual on environmental decision making” describes the results from the EU funded project DANTES and consists of two documents.

Part I, this document, describes the structure and content of the DANTES public website as well as one example of how a question can be answered by using the DANTES web site.

Part II of the manual describes the context, background and methodology as well as the thoughts behind what is presented on the DANTES web site, for example, the strategies.

This manual can be used to find out what the web site can offer and what the DANTES partners had in mind when creating it.

ABOUT DANTES

DANTES was a project co-funded by the EU Life Environment programme with Akzo Nobel Surfactants, ABB, Stora Enso and Chalmers University of Technology as partners. The purpose of this programme is to bridge the gap between research and development results and their large-scale application. The dissemination of results is essential for ensuring that innovative procedures for protecting the environment are widely applied. DANTES is an acronym for “Demonstrate and Assess New Tools for Environmental Sustainability” and the aim was to show how existing tools and methods are being used within the participating companies and experiences of using them.

The motivation for the project was that many different types of sustainability tools have been developed, such as Life Cycle Assessment (LCA), Environmental Risk Assessment (ERA), Life Cycle Cost (LCC) and Environmental Product Declarations (EPD), but it is not easy to apply these tools in order to find the correct answers or to know in what types of decisions the different tools are suitable. One of the overall goals of the DANTES project was therefore to assess and demonstrate how and when sustainability tools can be used in order to find the correct results for decision making and also tools for communicating these results.

The experiences and case studies made by the participating companies have been structured and described in strategies for eco-efficiency evaluation. The tools, case study results, strategies and other findings are published on the web site www.dantes.info. The web-platform can be used as a general information source on sustainability methods and tools or for finding guidelines and tools for answering specific environmental questions.

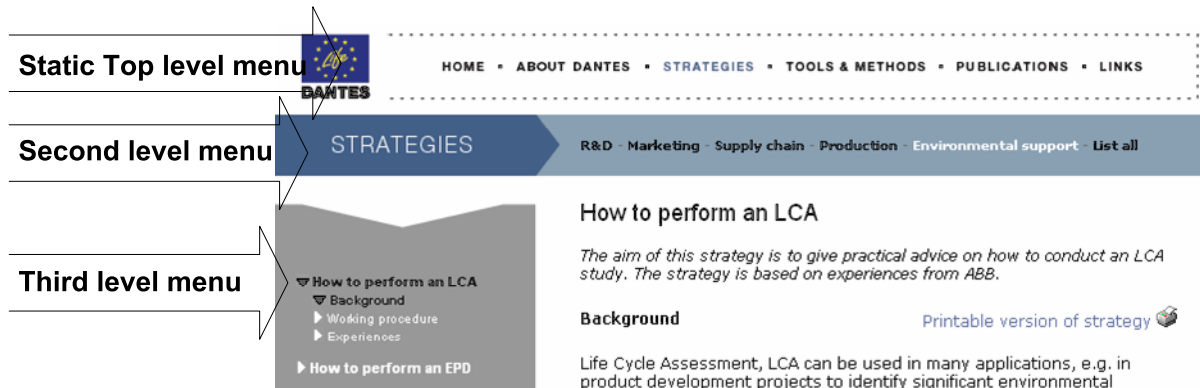
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1. STRUCTURE AND CONTENT OF WWW.DANTES.INFO

This section describes how the www.dantes.info web site is structured and the content of the different sections of the site.

1.1 Site navigation



The picture above is taken from the DANTES strategy on Life Cycle Assessment and shows the three different levels of menus on the web site.

The top level menu is static, i.e. it stays the same on all of the pages on the site, and shows links to the different sections of the site:

DANTES logo – EU LIFE program

HOME – first “Welcome to DANTES” page

ABOUT DANTES – information about the project

STRATEGIES – practical guidelines for environmental work, based on experiences of the participating companies

TOOLS & METHODS – descriptions of the tools and methods that are mentioned in the strategies

PUBLICATIONS – all of the publications made within the project

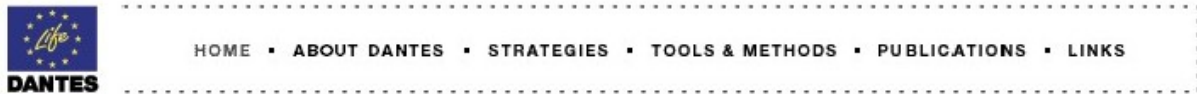
LINKS – links to different environmental information sources

Each of these sections will be described further below.

The second level menus stay the same within each of the mentioned sections and present further sub-sections within each section.

The third level menus present further alternatives within each sub-section.

1.1.1 Top level menu



DANTES logo

The logo is a link to the EU LIFE (Financial Instrument for the Environment) program. The program aims to implement Community policy and legislation on the environment in the European Union and candidate countries. This approach enables demonstration and development of new methods for the protection and the enhancement of the environment.

Home page

This is the home page of www.dantes.info and it presents:

- a Search engine – possibility to search the dantes.info web site
- link to a Site overview – description of the content of the site
- link to a Site map – map of the structure of the site
- link to Contact information – send email to the DANTES group
- link to a User’s guide – a two page document about the dantes.info web site
- link to a Manual – the Manual of which this is the first part.

Section “ABOUT DANTES”



This section presents information about the DANTES web site and the DANTES project. The second level menu presents links to the following pages:

- “Site overview” describes the content of the DANTES web site
- “The DANTES project” describes the mission and the goals of the project as well as presenting links to information about the participants and the main results of the project.
- “Information material” lists presentations and brochures about the DANTES project
- “Glossary” explains terms that are frequently used in the texts on the site
- “Search” presents a possibility to search all of the pages as well as the documents on the dantes.info site.

Section “Strategies”

STRATEGIES

R&D - Marketing - Supply chain - Production - Environmental support - List all

This section presents the DANTEs strategies. The “STRATEGIES” page gives a short introduction to the strategies presented in this section as well as a search engine, where the strategies can be searched for by a keyword. The second level menu presents links to all of the DANTEs strategies, which are divided into the following categories:

- “R&D” (Research and Development),
- “Marketing”,
- “Supply chain”,
- “Production” and
- “Environmental support”.

These categories have been identified as the company functions most likely to benefit from the strategies.

- “List all” displays all of the strategies in a list.

For more information about the strategies, see chapter 5 in this document and read about the strategy concept in Part II of the manual.

Section “Tools & Methods”

TOOLS & METHODS

Management tools - Assessment tools - Communication tools - Other info - Software

This section presents the tools and methods for sustainability assessment that are used in the DANTEs strategies. The “Tools and Methods” page gives a short introduction to the tools and methods and the second level menu presents links to the tools and methods divided into the following categories:

- “Management tools”,
- “Assessment tools”,
- “Communication tools”.
- “Other info” presents information about legislation, international standards and conventions.
- “Software” presents free-to-use software and databases as well as links to sites with useful software.

For more information about the tools and methods, see chapter 4 in this document

Section “Publications”

PUBLICATIONS

List of all publications - Sorted by topic

This section presents all public reports generated in the DANTES project (85 publications). The second level menu presents two alternatives to display the publications:

a list with all of the publications in chronological order

by the seven topics:

1. LCA, Life Cycle Assessment
- 9 Life cycle assessment reports and 9 LCA related publications
2. EPD, Environmental Product Declaration
- 37 Environmental product declarations and 3 EPD related publications
3. ERA, Environmental Risk Assessment
- 5 *publications*
4. SPI, Sustainability Performance Indicator
- 3 *publications*
5. SDS, Safety Data Sheet
- 1 *example of a SDS*
6. LCC, Life Cycle Cost
- 10 *publications*
7. Other publications
- 8 *publications of surveys and 3 publications on environmental management*

Section “Links”

LINKS

This page presents a collection of links to useful pages regarding for example:

- Life Cycle Assessment
- Environmental Risk Assessment
- Life Cycle Costing
- Environmental Performance Declaration
- Sustainability Performance Indicators
- Safety Data Sheets
- Product stewardship
- Standards
- Labels

- Corporate Social Responsibility
- Environmental Management Systems
- Product development

2. TOOLS AND METHODS DESCRIBED

Many types of tools and methods for sustainability are available. In this section you can find short descriptions of various types of sustainability tools divided into three categories based on their applications. The categories are; Management tools, Assessment tools, Communication tools, Other info and Software. Each category is described below.

Management tools

TOOLS & METHODS

Management tools - Assessment tools - Communication tools - Other info - Software

The main purpose of management tools is to measure, monitor, control and communicate the environmental performance of a company or an organization.

Four different management tools are described in this sub-section:

Life Cycle Management, LCM

LCM can be regarded more as a philosophy rather than an operational management tool but it could be useful in structuring and developing the environmental activities in a company

Product stewardship

Product stewardship is about responsibly managing the health, safety and environmental aspects of a product throughout its life cycle

Environmental Management Systems, EMS

An EMS is a systematic approach to deal with the environmental aspects of an organization

Gate model

A Gate model is a framework for better management of projects and it is used to ensure that important success factors of a project, e.g. environmental aspects are considered during the project

Corporate Social Responsibility, CSR

CSR is about managing the business processes in order to produce an overall positive impact on society

Assessment tools

TOOLS & METHODS

Management tools - Assessment tools - Communication tools - Other info - Software

Environmental assessment is a systematic method aiming to identify, analyze and evaluate the environmental effects of a product or an activity.

Assessment tools are used for evaluating the environmental impact or the sustainability performance of a product or service. The assessment is often made from a life cycle perspective, which means that the product or service is followed from the extraction of raw materials, through the production and use phase to disposal or recycling.

Three different assessment tools are described in this sub-section:

Life Cycle Assessment, LCA

LCA is a tool to assess the potential environmental impacts of product systems or services at all stages in their life cycle

Environmental Risk Assessment, ERA

An ERA is a tool for predicting whether there may be a risk of adverse effects on the environment caused by a chemical substance

Life Cycle Cost

An LCC is a tool to calculate the economic costs caused by a product or a service during its entire life cycle

Communication tools

TOOLS & METHODS

Management tools - Assessment tools - Communication tools - Other info - Software

Communication tools assist companies in communicating the environmental performance of products, services or organizations to stakeholders in a comprehensive way.

Six different communication tools are described in this sub-section:

Environmental labeling

The International Organization for Standardization (ISO) has developed standards for environmental labeling

Environmental Product Declaration, EPD

An EPD is a standardized and LCA based tool for communicating the environmental performance of products and activities

Sustainability Performance Indicator, SPI

SPIs present the performance of an organization in economic, environmental and social terms and can be used as a basis for decision making

Safety Data Sheet, SDS

An SDS presents information about a chemical product, e.g. its physical and chemical properties, safe handling and human and ecological toxicity

Material Declaration

A material declaration is a disclosure of the types and amounts of materials that a product contains

Recycling description

A recycling description describes how a product can be dismantled into different components and how these components should be handled

Other Info

TOOLS & METHODS

Management tools - Assessment tools - Communication tools - Other info - Software

The sub-section “Other info” describes tools and guidelines that can be useful, but does not fit in any of the other sub-sections.

Three different types of information are described in this sub-section:

ISO standards

Standards related to environmental issues

EU legislation

A number of different directives and recommendations related to environmental issues within the EU

Conventions

Agreements for cooperation between countries in order to reduce different environmental impacts

Software

TOOLS & METHODS

Management tools - Assessment tools - Communication tools - Other info - Software

The sub-section “Software” lists links to web-based and other software tools that facilitate using the methods and strategies.

15 different tools are available under Calculation tools and Database tools. The types of tools available are:

LCA calculation tools

Three web based tools for facilitating the calculations needed in an LCA

LCC tools

One simple spreadsheet tool for calculating life cycle costs

LCI data tools

Three web based tools for finding Life Cycle Inventory data

Transport calculation tools

Four web based tools for calculating the environmental impact of transportation

ERA tools

One PC program for conducting risk assessments

Interpretation keys for EPD

One spreadsheet tool for interpreting an EPD

Toxicological tools

Three search portals for toxicological information

3. STRATEGIES

STRATEGIES

R&D · Marketing · Supply chain · Production · Environmental support

A structured and systematic environmental work at all levels in a company is essential to fulfill the environmental goals. The strategies described within DANTEs are based on the experiences of the participating companies and show how such work can be conducted efficiently. The strategies are guidelines on how the methods and tools described within DANTEs can be used in order to find information needed for environmentally related decisions and how the resulting information can be communicated to the decision-makers in a comprehensive way.

The strategies all have the same layout:

The **background** explains what type of question the strategy can answer as well as why this question is relevant, who may be asking the question and who may benefit from the answer. contains for example a general description of the aim of strategy and the identified targets groups.

The **working procedure** is a description of how the question can be answered and reported and which tools that can be useful. for conducting a study according to the strategy follows and finally,

The **experience** part presents thoughts and experiences gained by using the working procedure as well as the potential business values of using the strategy.

The strategies are divided into five different company functions that they mean to support. Descriptions of the aim of the related strategies are presented below.

Research and Development, R&D

The strategies for eco-efficiency evaluation in research & development aim to ensure that sustainability objectives and plans become an integrated part of product and process development.

Marketing

The strategies for “Marketing” functions deal with the communication of information related to the environmental performance of products and services to stakeholders of the company.

Supply chain

The strategies for “Supply chain” functions deal with the analysis and communication of the environmental impact of the supply chain.

Production

The strategies for “Production” aim to ensure the use of environmentally sound production processes, materials and chemicals.

Environmental support

The strategies aimed for “Environmental support” functions deal with specific environmental issues that are not usually a part of the normal operations of other company functions and which are usually handled by support departments.

More information about the strategy concept used, target groups, company roles and the development of strategies within DANTES can be found in “Manual on environmental decision making – Part II”, where all of the strategies are presented in full in the Appendix.

3.1 R & D strategies

STRATEGIES

R&D - Marketing - Supply chain - Production - Environmental support - List all

Strategies for research & development should ensure that sustainability objectives and plans become an integrated part of product and process development. There are three strategies briefly described below, which are aimed for R & D oriented company functions.

Sustainability aspects in a gate model for product development

It is often much more cost-efficient to take sustainability actions (here we mainly mean environmental actions) already in a product development process than it is to correct potential environmental problems after the product has been launched. Sustainability requirements and aspects should therefore be integrated in the normal operational procedures and toolboxes in the product development process. One commonly used approach in product development projects are Gate models. The Gate model is an approach aimed at ensuring that product development projects are driven by business objectives and executed professionally with full management commitment. This strategy explains how sustainability requirements and aspects have been integrated in a company’s product development process in the same way as technical, economic and other requirements.

Using this strategy can lower the production costs due to more efficient use of materials and energy. The process or product will also be safer and more energy efficient, which will benefit the customer.

R&D managers, project leaders and R&D personnel are the main target groups for this strategy.

Design for Environment

Including environmental aspects and requirements in product development and design processes supports industry in developing safe, energy- and resource efficient products. This increases the customer value for a product under the presumption that the benefits are communicated to the customers in a credible and understandable way.

This strategy describes how market requirements can be included in the product design phase and how to design products with lower environmental impact. The strategy explains how to work with Design for Environment (DfE), in terms of a method based on Environmental Performance Indicators (EPIs), a common material list and material property data for each material in the list. The strategy provides comprehensible and verifiable communication of environmental requirements from the customer, through different company functions and all the way to the designer in terms of EPIs.

The intended users of the strategy are designers, environmental coordinators and decision-makers at management level.

Environmental aspects in a gate model for the chemical industry

There are many environmental, health and safety requirements on a chemical product and costs connected to these requirements. It is therefore beneficial to know in advance how well a new product fulfills these requirements in order to avoid unnecessary costs and also to find advantages for the customer compared to competing products.

This strategy deals with the assessment of health, safety and environmental aspects for chemical products and processes within the Gate model procedure.

The strategy is intended mostly for the project manager or environmental support people who are assigned to fulfill the criteria concerning these aspects.

3.2 Marketing strategies

STRATEGIES

R&D - Marketing - Supply chain - Production - Environmental support - List all

Information related to environmental performance of products and services have to be communicated comprehensively to relevant stakeholders in order to achieve competitive advantages on the market. There are four strategies briefly described below, which are aimed for communication and marketing oriented company functions.

Use of EPD in marketing

It is not enough to develop and produce environmentally sound products. The performance must also be communicated in a credible and understandable way to customers and other stakeholders to build a competitive edge for the product and increase its market share. An EPD provides customers and the market in general with third party, verified and comparable information regarding the environmental performance of products and services.

The strategy presents a clear and structured approach to using EPDs in marketing. Since the development of an EPD can be a resource demanding undertaking it is important to be clear about the purpose of communicating an EPD.

The market and communication staff as well as the environmental support organization is the primary intended user of this strategy.

Use of sustainability tools to answer questions from customers

Answering questions and questionnaires from customers can be time consuming and not being able to answer may impair the position and relation with the customer. A lot of time can be saved by making often requested information easily available and answering the customers' questions in a language that is understandable to them. It is therefore beneficial to communicate different kinds of information by using the appropriate tools for such information.

The aim of this strategy is to show how companies can handle environmental questions from customers and other stakeholders as well as how they can communicate environmental information and which tools that can be used.

The target group for this strategy is people that have direct contact with customers.

SPI in market communication

Sustainability reporting is a process for publicly disclosing an organization's economic, environmental, and social performance in the form of Sustainability Performance Indicators, SPIs. The business value of a good environmental ranking is high and a well made Sustainability Reporting can give high rankings in reputable sustainability performance indices, which translate into tangible customer benefits and may distinguish the company from many of its competitors.

The basis for the sustainability reporting presented in this strategy is the guidelines presented by the Global Reporting Initiative (GRI). This strategy shows how the data collection process and the continuous improvement process have been implemented and the value of having these processes implemented.

Managers, market communication staff as well as the environmental support organization are the intended users of this strategy.

Marketing tools for products

Marketing information gives the answer to many questions often asked by customers. It could be questions about material content, hazardous materials, emissions, waste, efficiency, recycling and environmental management systems. Different marketing documents give answers to different questions. The aim of this strategy is to demonstrate how different environmental product information tools, e.g. material declarations and environmental product declarations, can be used in marketing.

Based on common questions from customers marketing people can decide what type of marketing material that is relevant to develop for a product. It is a bad return on investments to produce marketing material that answer questions that no customer is asking.

Marketing personnel as well as customers are the main target groups for this strategy. The background information necessary for compiling the marketing material is provided by R&D personnel and/or different experts within the areas of environment, quality, design etc.

3.3 Supply chain strategies

STRATEGIES

R&D - Marketing - Supply chain - Production - Environmental support - List all

A supply chain is defined as all parties involved in the in- and outflows of goods, services and transport to and from a certain company or production site. A supply chain strategy may consider the whole supply chain or selected parts of it, like raw material transportation or first level suppliers. Evaluating suppliers' fulfillment of sustainability demands is a main component of a complete supply chain strategy. There are three strategies briefly described below, which are aimed for logistics and purchasing departments.

Supply management

An analysis of the supply chain of the company can show that raw materials, services and transports play an important role for the environmental profile of the end products. It can therefore be advantageous or even necessary to involve the suppliers in the environmental improvement work of the company, so that the impact on the environment can be minimized. The purpose of this strategy is to show how a company in a systematic way has involved its suppliers in the environmental improvement work of the company by developing a supply management system.

The foremost business value of the strategy is that the company through this work have been able to keep and in certain cases even gain new customers. The supply management system prevents different parts of the company from approaching the same supplier with different environmental demands through questionnaires. The mutual system also makes it possible to share relevant supplier information within the company. It puts environment on the agenda among other purchasing criteria and probably also helps the environmentally responsible of the suppliers, since they can show explicit environmental customer demands to their organization.

The main target groups for this strategy are purchasers and persons responsible for environmental issues in logistics departments.

Analysis of the environmental impact from transportation

The demands on companies regarding environmental issues have increased and now concern not only the direct impact from the production site but also other activities like transportation related to the company. Authorities have, at least in Sweden, begun to ask about the environmental impact connected to transports in relation to license applications. The purpose of this strategy is to show a working procedure used to identify and minimize the environmental impact from transportation of raw materials and products to and from a production site.

Studies have shown that the environmental impact for transportation can be in the same range as for production sites. By analyzing the environmental impact of transportation, sub optimization can be avoided as it becomes clear where improvements make the largest difference. Otherwise, the focus of improvements might be placed on activities that do not have as much impact on environment as transportation does. Furthermore, if the demands of authorities are satisfied and reasonable measures are taken; unreasonable demands and high costs for lawyers can be avoided. Being one step ahead of legislation and demands from authorities decreases the risk of costly surprises, because you are well-prepared for coming changes. Finally, a company earns goodwill by working with the entire supply chain.

The target groups for this strategy are logistic departments or environmental support functions, who can conduct this type of study at the request of the site management. Using this strategy provides a basis of the decision whether transport represents a significant share of the total environmental impact caused by the company.

Use of EPIs in supply chain communication

This strategy describes how environmental requirements and targets can be communicated between different companies in the supply chain, and how the fulfillment of these requirements and targets later can be verified. Using the strategy enhances the communication of environmental requirements and performance between different companies in the supply-chain. Furthermore, it effectively provides the important connection between market requirements and the product design. The communication in this strategy is based on quantifiable and measurable Environmental Performance Indicators (EPIs).

The intended users of the strategy are persons involved in the purchasing process.

3.4 Production strategies

During the production phase it is important to ensure that environmentally sound production processes, materials and chemicals are used. Other requirements related to sustainability must also be fulfilled, for example occupational health and safety demands. A commonly used tool for environmental assurance of production activities is Environmental Management Systems (EMS) according to ISO 14001 or EMAS. There are three strategies briefly described below, which are aimed for production site managers and environmental support people.

Implementing an Environmental Management System, EMS

An environmental management system (EMS) is a systematic approach to achieve the environmental goals of a organization. An environmental management system includes concrete objectives, plans of action and a clear division of responsibility for environmental issues. The main idea of environmental management is that a company's environmental aspects are managed in the same way as production, quality and finance. An EMS will deliver three key outputs: legal compliance, continuous improvement, and a program reflecting the views of interested parties. This strategy lists a generic working procedure on how to implement an environmental management system in a company.

The strategy describes a generic implementation of an EMS, but additional expertise and information is needed for a successful implementation. The experiences gained from implementing EMS in companies and on over 500 production sites could however be valuable when planning and executing an EMS implementation project.

Anyone involved in the implementation of an environmental management system are potential users of this strategy.

Analyzing and reducing energy use

The competition is continuously growing keener, especially for businesses for which the products are already balancing on the margin. Optimizing and reducing the uses of energy are therefore important tasks for industries that have large energy needs. Traditionally, the benefits in focus of energy savings are financial, but during the recent decades, the focus has widened to also comprise the environmental benefits of energy savings. With support from the Environmental Code in Sweden, authorities have begun to make demands on companies to better and more thoroughly monitor, follow up and decrease their use of energy. The purpose of this strategy is to illustrate the total energy situation at a certain production site and identify areas where it might be possible to save energy and reduce the environmental impact.

Project managers who co-ordinate the technical competence, collect data and draw up a complete picture of the energy situation can benefit and get ideas from this strategy.

Greenhouse gas emission trading

To achieve the goal that is stated in the Kyoto Protocol, the EU has a model to meet its obligations by trading emission allowances within the Community. The initial focus is on carbon dioxide, except for carbon dioxide from bio-mass, which is considered climate neutral and is therefore not a part of emission trading, but it has to be reported to the national authorities. Green House Gases (GHG) emissions permits will be required by all installations under EU ETS (EU Emission Trading Scheme). To meet these challenges the Emitter (a whole industry Group/Company or a single Carbon dioxide emitting production unit depending on the circumstances) must estimate the impacts both from a national and a business perspective. From a business perspective the most important issue is to develop a model for facilitating emission calculation and planning for short and long terms, in the strive to minimize carbon dioxide emission costs while maintaining a high production level. Such a calculation model should serve as a base for dialogue between Emitters and Customers. This strategy aims to give ideas regarding Green House Gas Emission Trading impact calculations through the description of a preliminary model.

In the long run future verifiers and authorities might also benefit from a consequent model. The most evident business value for the company using this kind of calculation model is the possibility to at least make rough prognoses of future Carbon dioxide emission (allowances) costs. It enables the company to plan the future production and fuel mix in a cost-efficient way.

The main target group for this strategy is the accountants and environmental support people at Emitting companies that needs to keep track of the costs for their Carbon dioxide emission allowances.

3.5 Environmental Support strategies

STRATEGIES

R&D - Marketing - Supply chain - Production - Environmental support - List all

People or departments assigned to provide environmental support for different parts of the company are often needed, since most employees do not have the time or skill to work with these issues in addition to their normal assignments. The role of environmental support is to help different parts of the company in improving their environmental performance. There are ten strategies briefly described below, which are aimed for environmental support people.

Comprehensive environmental assessment of a chemical product

A comprehensive environmental assessment of a chemical product should preferably include all the possible detrimental effects on the environment that the chemical may give rise to during its life cycle. There is no single tool available that includes all of the different environmental aspects, but the combination of a Life Cycle Assessment (LCA) and an Environmental Risk Assessment (ERA) can present a good overview of possible detrimental effects of a chemical product.

Decreasing carbon dioxide emissions are closely related to energy savings and financial issues, e.g. through the GHG emission trading. Furthermore, many NGO's have specific demands regarding air emissions such as carbon dioxide, sulphur oxides and nitrogen oxides. LCA is a good tool to use in gathering the information that is required to correctly report these emissions.

Knowing whether the product may cause detrimental effects in the environment, in the short as well as the long term, helps in avoiding costly surprises later on. ERA is a good tool for determining this, because possible risks are clearly presented for all of the life cycle steps, from the production to the end use and the waste handling.

People working with environmental support within a company or are involved in research & development or marketing functions may benefit from a more holistic view in their environmental assessments of chemical products.

Eco-efficiency analysis of products or processes

In order to make sound decisions, it is important to consider many different types of aspects. To include environmental aspects in various types of decisions have become more and more critical. These environmental aspects embrace different issues, from an increased demand on inherent properties of chemicals to targets on the reduction of carbon dioxide emissions. Adding the economic dimension in an environmental assessment increases the complexity further, but also presents an aspect that is of utmost importance in business decisions.

The purpose of this strategy is to show how life cycle data for environmental impact and costs can be combined to compare products with the same function. The analysis can also be used for comparing different products or processes with similar customer benefit.

The target groups are managers and project leaders, who can use the method for guidance in decisions concerning strategy planning, investments or external communication. Another target group is environmental support functions, who might conduct this type of study at the request of the management. Using this strategy provides guidance on which products or processes that are worth developing in a long term perspective. Since the customer benefit is studied from a life cycle perspective, the study indicates how the customer will benefit from the compared products.

Handling and reporting environmental information

As society increases its focus on environmental issues, demand for environmental data from industry has also increased. The recent introduction of product related environmental information has placed new demands on industry to handle environmental data. Data needs to be easily used for different applications in order to respond to various stakeholder needs. Therefore, the possibility to reuse and verify data is essential to enable efficient yet credible data management.

This strategy describes how to efficiently handle and report environmental information for production systems, e.g. a production site, a part thereof, or parts of a product's life cycle. The results of this strategy can be implemented in the organization's management system, e.g. ISO 9001 and ISO 14001.

Environmental coordinators, persons working with environmental support and decision makers in companies can benefit from using this strategy.

How to perform an LCA

It is important to understand the environmental impacts of your product system since it facilitates cost efficient improvement actions and the selection of business relevant information for use in market communication.

This strategy describes how to perform a Life Cycle Assessment, LCA, which can be used in many applications, e.g. in product development projects to identify significant environmental aspects. The LCA results could then be used to provide a basis for decisions about product improvements. The LCA results can also be used in marketing to communicate the environmental benefits to customers, e.g. through the LCA based communication tool Environmental Product Declaration (EPD).

Environmental support and R&D personnel are the main target groups for this strategy. R&D personnel, marketing & sales departments as well as customers can benefit from the result of using this strategy.

How to perform an LCC

It is good business to understand the cost structure of your product system since efficient improvement actions could then be taken. Business relevant cost information could be selected for use in market communication.

LCC is a method to analyze the total cost of acquisition, operation, maintenance, and support of a product/system/service throughout its useful life, and including the cost of disposal. An LCC analysis can provide important inputs in the decision making process, for example in the evaluation and comparison of alternative design approaches as well as in an assessment of the economic viability of projects or products.

R&D personnel, marketing & sales department as well as customers benefit from the results of using LCC.

How to perform an EPD

It is important to communicate the environmental impact of your product in a comprehensive way, since it shows that you are working with product related environmental issues and this leads to reduced environmental risks of the product for your customer.

This strategy gives guidance on how to conduct an Environmental Product Declaration, EPD. EPD provides customers and the market in general with third party, verified and comparable information on environmental performance of products and services.

Environmental support and R&D personnel are the intended users of this strategy and marketing personnel and customers are the intended users of the EPDs.

How to perform application specific ERA

Chemical risk assessment is required for chemicals of particular priority by the regulatory framework of the EU and will also be required by the new chemicals policy REACH for chemicals of high concern. A chemical risk assessment determines the risk to human health, workers and the environment posed by a chemical and an environmental risk assessment considers the environmental part of a risk assessment. A site specific risk assessment can also be a part of an environmental impact assessment in an application for a production license. This strategy is based on two case studies; a mining application and an asphalt application and presents two approaches to ERA.

The strategy is intended for environmental support people who would like a framework and a guideline from which to start working with site or application specific initial ERAs.

Material declaration and recycling description

Material declarations and recycling descriptions are market communication tools. They are an indication to a customer that the company that issues them has a system in place that can handle questions on material content and recycling of its products. This strategy aims to describe how to design a material declarations and recycling descriptions for a product. A material declaration states which materials that are present or not present in a product and a recycling description indicates how a product should be recycled.

Developing and communicating material declarations and/or recycling descriptions for products can be a cost efficient way of showing that the company is working with product related environmental issues and it might be sufficient for answering environmental questions from customers, thereby reducing the costs for customer support.

The strategy is intended for someone who would like a framework and a guideline from which to start developing material declarations and recycling descriptions for products.

Policy controlled environmental management

This strategy aims at using the environmental policy as an operative tool in the environmental management system. The policy is a statement of the company's values and expresses the aim with its environmental work.

Using this strategy will improve the controllability of the environmental management system in companies as it can make all parts of the environmental work move in the same direction. The results will also benefit the management and other decision makers in industrial companies as it will facilitate the decisions by providing all information needed to make them.

The main intended users are persons working with environmental information management in companies with an implemented ISO 14001 environmental management system, e.g. environmental coordinators and people working in environmental departments.

Product stewardship implementation

The strategy describes how Product Stewardship was implemented in the management system of company and also how information was spread and people involved within the company. One person cannot make Product Stewardship work by themselves. Management has to be committed and every employee has to take an active part in the PS work.

This strategy is intended for people being assigned to implementing Product Stewardship in a chemical company, but can be used by anyone as a guideline for implementing similar systems.

All of the strategies are published in the Appendix of Part II of this manual.

4. EXAMPLE OF A CASE STUDY

The strategies are based on how tools and methods are being used within the businesses of Akzo Nobel, ABB and Stora Enso, but the results can easily be transferred to other businesses. The strategies can be described as a journey from question to answer, where relevant information is gathered, processed and communicated for decision making.

An example of a case study performed within DANTES illustrates how this journey from question to answer can be accomplished. First, the problem that the decision makers face is defined and then the working procedure and the results are described. In this case study, conducted by ABB, a strategy for transportation evaluation was used in combination with LCALight, a software available at www.DANTES.info.

The full case study (DANTES Transport comparison) is presented at www.DANTES.info.

4.1 Identified problem: Which transport option is the best alternative?

A logistics department at ABB needed to purchase a transport for 1000 kg of goods from Ludvika, Sweden, to New York, USA. There were six different transport options available, which are listed below. In addition to minimizing the cost there were also demands on minimizing the environmental impact of the transport.

Which transport option was the best alternative when including both economical and environmental aspects in the analysis?

Transport option	Means of transportation
Direct air	Lorry from Ludvika to Arlanda Air cargo Arlanda to New York
Consignment air	Lorry from Ludvika to Arlanda Air cargo from Arlanda to Frankfurt Air cargo from Frankfurt to New York
Consignment air and rail	Rail cargo from Ludvika to Frankfurt Air cargo from Frankfurt to New York
Consignment air and lorry	Lorry from Ludvika to Frankfurt Air cargo Frankfurt to New York
Lorry and ship	Lorry from Ludvika to Gothenburg Ship cargo Gothenburg to New York
Rail and ship	Rail cargo from Ludvika to Gothenburg Ship cargo Gothenburg to New York

Table 1. Description of the transport options for the case study

4.2 Working procedure

Under section “Strategies” on www.DANTES.info, there are three strategies for “Supply management”. The strategy called “Analysis of the environmental impact from transportation” was used to solve the environmental part of the problem.

The working procedure is described in ten steps and can easily be applied for solving similar problems. The ten steps are presented below, together with actions taken in each step in this case study;

1. Define scope and limitations of the study

The DANTES tool LCALight was used for the evaluation of the six transport options. The transport options were compared based on their Global Warming Potential, GWP (i.e. emissions of greenhouse gases e.g. CO₂).

2. Define a preliminary list of Environmental Performance Indicators, EPI

The transport options were evaluated based on the total emission of greenhouse gases, so called Global Warming Potential, GWP.

3. Prepare a questionnaire for transport companies

This was not relevant in this case study, since general data from LCALight was used.

4. Collect inventory data

This is required when data on emissions from a specific transport are needed, but in this case it was not required and general data from LCALight were used (in impact by ton*km).

5. Calculate transport distances

Distances for the different means of transportation were estimated by using internet tools available on www.DANTES.info.

Example of calculation tools used are;

- SAS emission calculator for air transports
- ViaMichelin or Emission calculation from Schenker logistics for land transport
- MariTimeChain.com for sea transport.

6. Collect data on energy use and emissions

This was not relevant in this case study, since general data from LCALight was used.

7. Calculate total emissions and energy use

The emissions were summarized for each transport alternative and calculated into GWPs by using LCALight.

8. Analyze and draw conclusions from the result

The analysis ended with an environmental ranking of the different transport option.

9. Prepare Environmental Performance Indicators

This was not relevant in this case.

10. Write a report

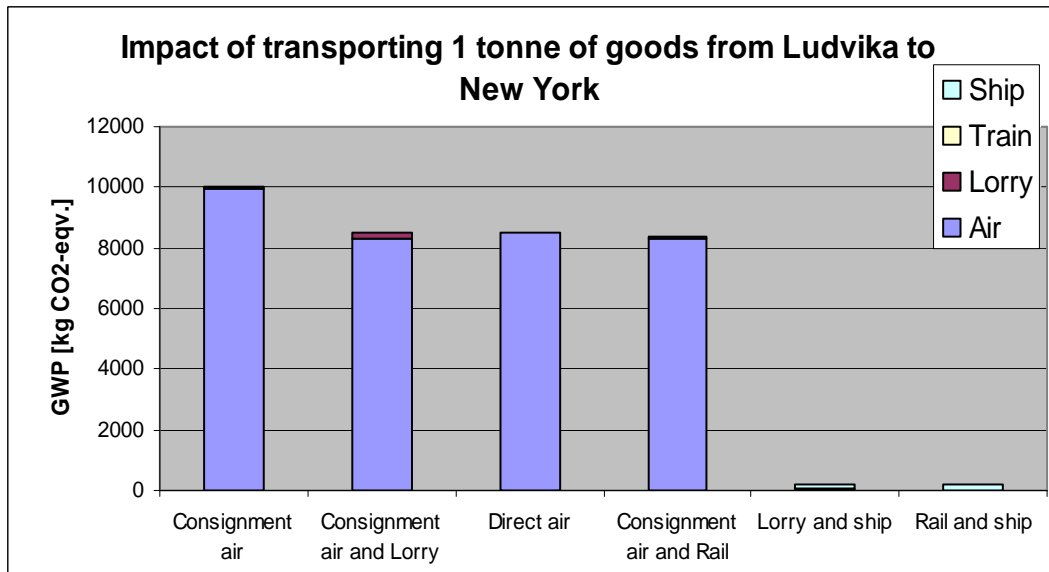
The report "DANTES Transport comparison" is found under Publications/LCA/ LCA comparison for transport chains - using DANTES strategy and LCALight on www.DANTES.info.

4.3 The result

The case study result showed that the difference in environmental impact between the transport options is substantial. The main conclusion of the study is that air freight should be avoided if possible. The transportation option Rail and ship (rail from Ludvika to Gothenburg and ship from Gothenburg to New York) had the smallest environmental impact when only considering the greenhouse gas emissions. Transport coordinators have been informed of this result and if delivery time allows it, it is recommended to use ship transport.

The impact ranking of the transport chains in order of increasing environmental impact is presented below.

Rank	Transport option	Environmental impact kg CO ₂ -equivalents
1	Rail and ship	190
2	Lorry and hip	227
3	Consignment air and Rail	8370
4	Direct air	8500
5	Consignment air and lorry	8510
6	Consignment air	10000



The figure above clearly shows the air freight overshadowing all of the other means of transportation in terms of global warming potential.

The strategy used in this example was developed by Akzo Nobel for evaluating the environmental impact of transportation to and from production sites. The case study was done by an Environmental Support department at ABB, on a commission from the logistics department. The flexibility of the strategies is illustrated by the fact that an ABB problem could be solved by using a strategy developed by Akzo Nobel..

Many more case studies are available on the www.dantes.info site.