

SMEs, micro-enterprises and environmental management tools

Environmental management poses specific problems for SMEs and micro-enterprises

Several million small and medium-sized enterprises (SMEs) and micro-enterprises in Europe have concrete problems managing the environmental impact of their activities. They do not have the necessary tools and resources. The greatest problem is however one of awareness and changing behaviour.

Markets are taking environmental issues into account and demanding EMAS and ISO 14001

Soon even the smallest companies will have to show customers, public administrations, non-governmental organisations, insurance companies, neighbours and professional associations, that they have implemented environmental management.

Tools exist but they are often over-complicated

The range of tools to help SMEs is constantly growing but a lot of these tools are considered to be too heavy and complicated by smaller companies and micro-enterprises. They are seen to represent a growing threat of bureaucratisation. To conform with or to use environmental management standards which are becoming prevalent throughout Europe at the moment, such as ISO 14001, or the EMAS regulation scares small companies.

Visual, simple and practical tools are needed to enable small companies to participate

Small structures function by adjusting as need demands and on the basis of an oral culture. The greatly varying and sometimes low levels of training within such structures and the existence of a visual culture with little emphasis on documentation must be taken into consideration. There is a need for appropriate tools and support. If you bring together and question employees of a site, a shopfloor, a workshop, etc. and ask for and use their knowledge, intuition and experience, they can give you an immediate picture of environmental management within your company.

The results of a quick and visual environmental review can be the equivalent of expensive scientific studies conducted by consultants. Eco-maps, which do not cost anything, are the Polaroid photograph of your environmental management - a scientific study provides the high resolution image. Both will enable you to take positive action.

The road map does not make up the whole country!

Eco-mapping is a visual and easy-to-use tool which enables employees to get involved in environmental management at your company. It is a road map of a site, a shopfloor, a workshop, etc., which can lead to improved environmental management and which can provide a solid basis for a more formal environmental management system according to ISO or EMAS.

What is eco-mapping? (or eco-maps) ?

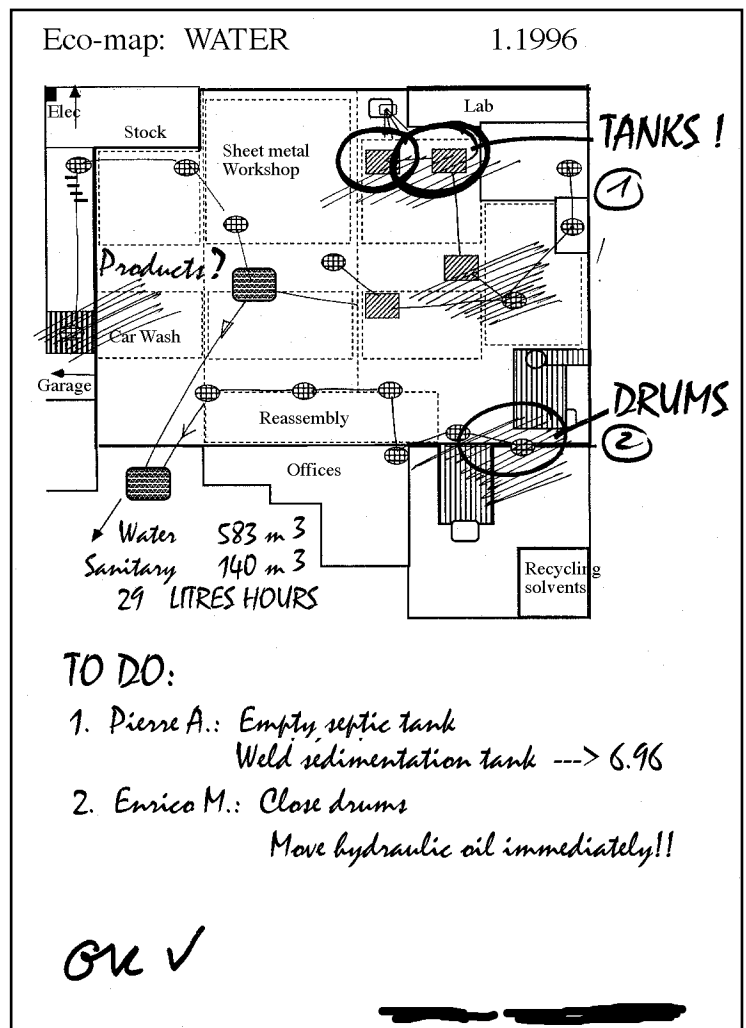
Eco-mapping is an original and simple tool which helps small companies when implementing environmental management and EMAS

- an inventory of practices and problems
- a systematic method of conducting an on-site environmental review
- a collection of information which shows the current situation using pictures
- a work and awareness-raising tool
- a do-it-yourself tool for SMEs
- a tool which allows employee involvement and participation

Eco-mapping is environmental management « light »

- a practical method for conducting an environmental review
- which helps in learning about and collecting data
- a support for training and communication
- the basis of environmental documentation for your company
- everyone in your company can use it as a support for their work and training
- everyone in your company can participate without having written procedures and instructions
- a method which allows your company to define and prioritise problems
- useful for all stakeholders

The development of eco-maps on water, soil, air, waste management, etc. is not a goal in itself. The main interest lies in the fact that it is a process which accompanies a review of environmental performance, and in the positive actions which result.



(N.B. The eco-maps presented here are from a car body workshop.)

How to use eco-maps

Indispensable materials

A4 -sized paper and a photocopy machine.

Time needed

Less than one hour of work for each map.

When to do it?

After the end of the accounting year.

How often should they be up-dated?

Once a year, or if you renovate the site, or extend your activities.

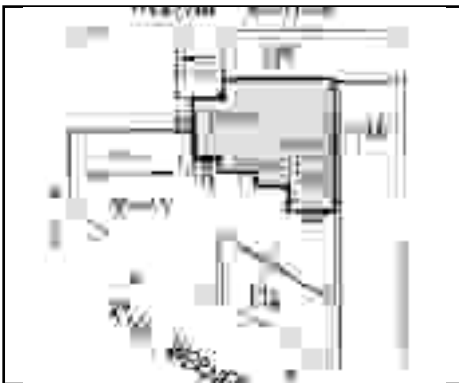
Filing

With documentation for your environmental management system, with your annual accounts.

Who can use them?

The maps can be used by many different types of companies: from small manufacturing and service companies to large structures and local authorities.

How to eco-map



1. Eco-map: urban situation

1. Map of the urban situation

Make a map of the site, seen from above, including car parks, access areas, roads and the surrounding environment. It should show the real situation. (2 copies)

2. Map of the site

Draw the outline of the site using a scale and showing the interior spaces. This map should be copied (6 times) and will be the basis for the work to be done.

The maps should show the real situation - they should be simple, recognisable and in proportion. They should have a date, a name and a reference. You will have to integrate one or two significant objects which will enable you to orient yourself straight away in the site (e.g. machines, boilers, etc.).

If your site covers very different areas, you can do a map of the different areas and then bring them altogether.



2. Eco-map: site

3. Symbols

Develop your own symbols, but use at least two:

Hatched lines: small problem
(area to be monitored, problem to be studied)

Circle: large problem
(stop, corrective action)

The more serious the problem,
the thicker the circle



In order to improve the quality of your eco-maps, you can use standardised pictograms.

Mini-audit: Environmental «Weather» Map

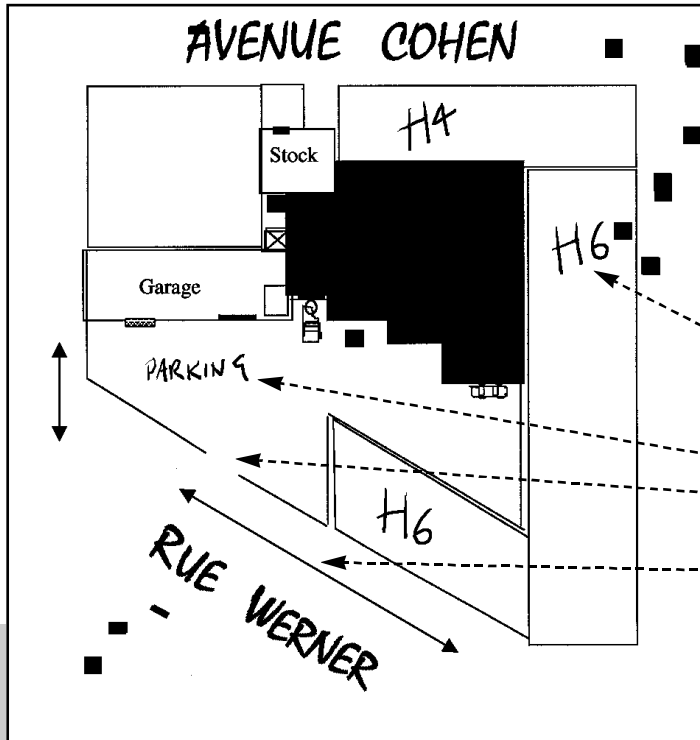
Before you begin to draw up your eco-maps do a mini-audit in a few minutes with different members of your staff. Ask them to give quick and intuitive responses: one cross per question. The correspondence between the results of this quick survey and those of more detailed work done with your eco-maps will surprise you.

120 seconds for the weather map of environmental management in your company:				
Use of raw materials				
Use and choice of energy				
Use of water and wastewater				
Prevention and reduction of waste				
Recycling and selective separation of waste				
Air pollution: dust and odours				
Storage of products				
Reduction and control of noise and vibrations				
Health and safety in the workplace				
Mobility and transport of employees and goods				
Prevention of environmental accidents				
Environmental information (internal and external)				
Communication with suppliers				
Green planning for goods and services				
Neighbourhood				
Motivation of managers				
Motivation of employees				
Administrative situation				
OVERALL CLIMATE				

(Source: Prépare Autriche)

1. Eco-map: urban situation

This map situates your site in its urban context.



- What are the areas of interaction between your site and its neighbours?
- What is the authorised use of the area covered (i.e. commercial, industrial)?
- What vehicle traffic is generated by your activities?
- What is the situation of your company in the neighborhood?
- Indicate the number of floors above ground (not including roofs) of the buildings around the company within a radius of 50 metres.
- Use of land (car park or building)
- Entrance and main points of access to the company
- Direction of traffic

Croissants and traffic

The most important direct environmental impact of a small company is often related to the traffic it generates. A small bakery in the city centre generates more than 350,000 movements of cars per year!



Do you want to calculate?

Count the number of vehicles in relation to your activities and estimate their number of movements within a radius of 1km. The table below will help you to calculate the pollution generated.

Emissions gr per km	Light vehicles, petrol	Light vehicles, diesel	Heavy vehicles, diesel
CO ₂ (Carbon dioxide)	250	133	837
NO _x (Nitrogen oxide)	2.53	0.55	19.2
CO (Carbon monoxide)	11.26	0.85	3.34

Draw

- Usage of neighbouring areas (residential, green areas, industrial)
- Roads and direction of traffic
- Consider importance of different types of traffic and size of roads

Document

- Cadastral survey
- Other administrative surveys of the area
- Recent permits for activity in question

Estimate

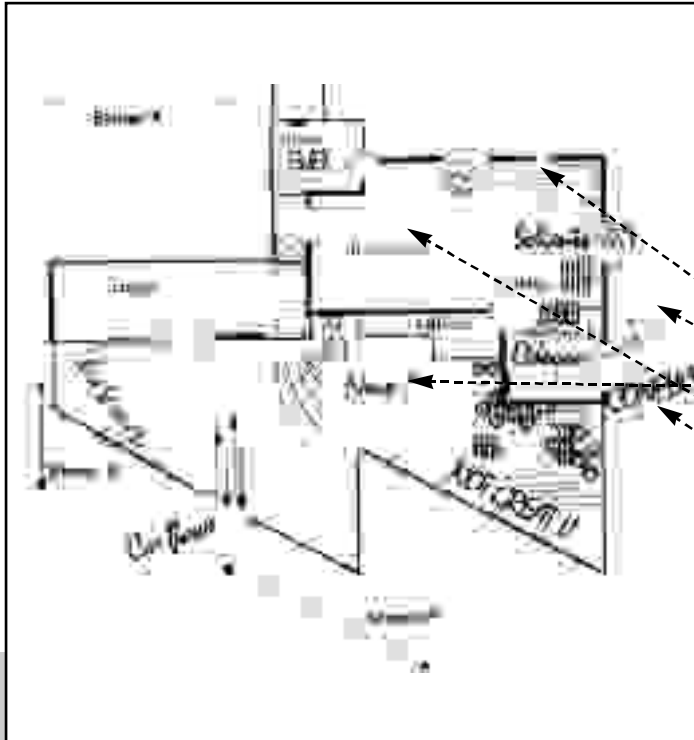
- Your fleet of vehicles (cars, trucks, etc.)
- Parking areas available
- Parking areas used
- In-coming and outgoing movements (suppliers, bin-men, employees' and customers' cars, etc.)

Data

- Surface in m²
- Date of establishment
- Number of employees
- Age of buildings
- Number of vehicle movements per unit of product / service

2. Eco-map: nuisances

This eco-map represents your first work plan (following on from eco-map no. 1).



It is the result of a quick evaluation (Environmental Weather Map) and of discussions. It should be completed with an input-output analysis of the material and energy flows in your company in physical terms (kg, kWh, m³, etc.).

- Chimneys and vents
- Containers and bins
- Noise
- Area of important activity
- Area of problem with neighbours

If you identify a problem of particular importance (such as noise) you should develop an eco-map especially for this problem.

All employees should be involved in this initial summary environmental review. Following this prepare a complete assessment of material

and energy flows using data available from your company's accounting records. You should relate the figures which you have to your activities. Develop your own indicators.

Examples:

- energy: x litres of heating oil/year/m² work area
- resources: x litres of water/kg of product
- waste: x kg of waste generated per unit of production or service

Comparison of indicators over the period of a year shows how your company is evolving.

Input	Output
• raw materials	• solid and liquid waste
• energy	• air pollutants
• water	• nuisances, noise, odours
• transport	• authorised use of land
• packaging	

Draw

- Points of discharge into air
- Sources of noise and odours
- Areas of storage of waste and hazardous products

Document

- Tax declaration
- Complaints from neighbours: letters, statements, legal proceedings
- Certificates re. machine maintenance
- Financial information

Estimate

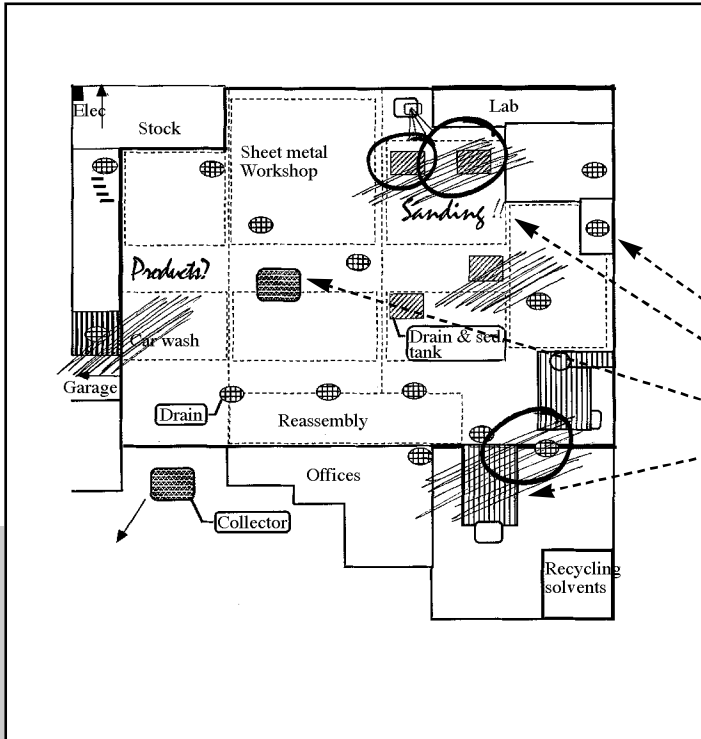
- First intuitive evaluation of your site
- Analysis of flows
- Materials assessment
- Environmental performance

Data

- Duration of permits (years)
- Taxes paid
- Taxes, charges, insurance
- Consumption
- Environmental costs

3. Eco-map: water

This eco-map looks at your consumption of water and discharge of wastewater.



- Where is there a high level of water consumption?
 - Where are hazardous products poured into the sewer?
 - Possibilities for product substitution
 - Possible accidents
 - Wastage and bad habits
 - Areas of cost-savings
- ↳ Drains
 - ↳ Areas of bad practice
 - ↳ Piping system
 - ↳ STOP! unallowable

One drop of water takes five years to go from a cloud to your tap.

Water is a resource which must be protected and must not be wasted. One person consumes on average 70 litres of water a day. How much does your company consume per year in comparison with a normal person? Which areas of activities are dangerous in terms of water pollution, e.g. cabin for painting or paint stripping? Check to see where all drains are situated. Don't forget that one drop of petrol products contaminates more than 5,000 litres of water.

Draw

- Areas where liquids are poured
- Piping and drainage system
- Treatment methods
- Major areas of consumption (washing machines,...)

Document

- Annual water bills
- Permits for discharge of wastewater and taxes
- Plan of sewage system
- If treatment methods are used, technical description from supplier

Estimate

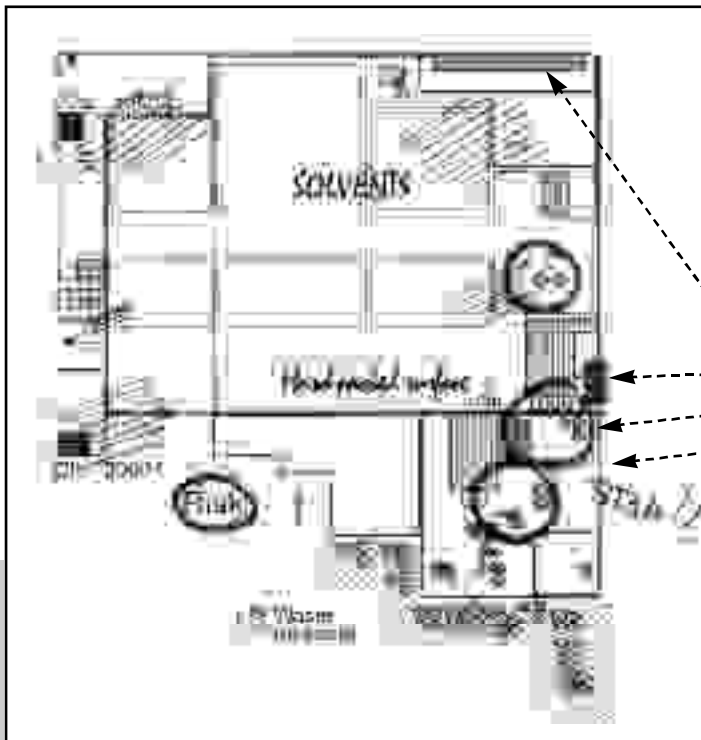
- Wastage
- Activities which require water
- Water charges
- Pollutants
- Bad practices
- Impact of pollutants

Data

- Consumption, m3
- Major sources of consumption, %
- Annual consumption of cleaning products, litres
- Other products
- Measurements of discharges

4. Eco-map: soil

This eco-map looks at the storage of flammable, dangerous or hazardous products in relation to groundwater.



- Is there a threat to groundwater in the case of accidents?
- Where are your old water tanks?
- Soil pollution?
- Procedures in the case of accidents?
- Do storage areas have concrete floors, are they partitioned off, are they ventilated?

- Storage areas
- Water tanks
- Vats and bins
- Areas of risk

1 litre of petrol which infiltrates the soil can contaminate 1,000 m³ of groundwater. For this reason it is very important to know the history of your site, the positioning of old water tanks, etc. Polluted soil will lower the value of your site. In certain European countries, when companies and the land upon which they are situated are being sold, lawyers require an attestation regarding soil quality. If the soil is polluted, it has to be decontaminated (costs at the moment average 125 ECU (\$138) per m²).

Draw

- Storage areas
- Water tanks
- "Suspicious" vats, containers, pallets

Document

- Safety labels on products
- Analysis of basements
- Layout of water tanks
- Areas of water collection

Estimate

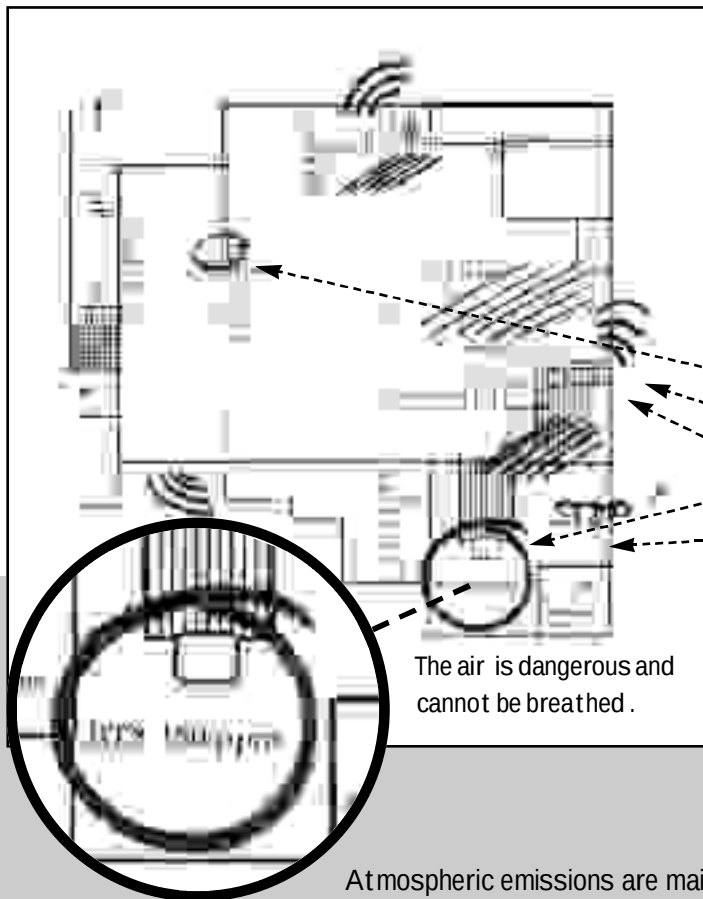
- Old water tanks
- Impermeability of soil
- Type of products
- Storage in tanks and vats
- Leakage

Data

- Watertight surfaces
- Permanent stock in litres
- Calculation of flows

5. Eco-map: air, odours, noise, dust

This eco-map looks at all the points of emissions and the functioning of machinery.



- What is air quality inside your company?
- Do you pay attention to sources of noise?
- Are filters replaced regularly?
- When was maintenance work last carried out on your boiler?

- Chimneys
- Extractors
- Noise
- Volatile products
- Areas of bad practice

If your company is located in an urban area you should pay particular attention to the problem of noise. Do a test. If at the edge of the site you can no longer have a conversation without raising your voice, you have exceeded 65 decibels.

Atmospheric emissions are mainly due to heating installations and generators.

Make an estimate:

	Natural gas (g/m ³)	Heating oil (g/litre)
Greenhouse effect: CO ₂	1,879	3,136.5
Photosmog: NO _x	3.01	3.35
Acid rain: SO ₂	0.027	3.6

Do a total calculation of CO₂ by multiplying the total calculated for your eco-map urban situation by 5.
Make a comparison: a person living in a developing country generates 1.8 tonnes of CO₂ per year.

Draw

- Openings in roofs and ventilators
- Main points of emissions

Document

- Certificates of maintenance
- Technical instructions
- Product safety instructions

Estimate

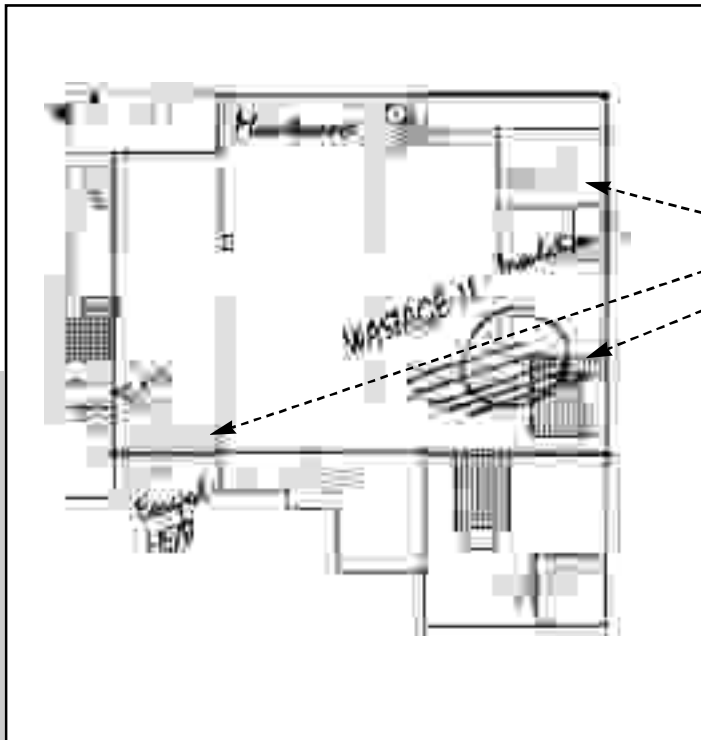
- Work procedures
- Product quality
- State of filters and pipes
- Disturbing odours

Data

- Volume of volatile pollutants, litres
- Regularity of maintenance
- Noise levels

6. Eco-map: energy

This eco-map looks at your consumption of energy and the impacts which it has.



- Where are areas of wastage?
- Compliant electrical installations
- Where do heat losses occur?

- Aggressive lighting
- Loss of energy
- Oversized machinery

Convert your energy consumption into kWh

Resources consumed	Energy generated (kWh)
Fuel: 1 litre (36MJ)	10
Gas: 1 m ³ (40,6MJ)	11.28
Propane: 1 tonne (46,4 GJ)	12880
Coal: 1 tonne (30,6GJ)	8500
Wood (broad-leaved tree): 1stere (5,6MJ)	1.56

Visualise the equivalent quantity of resources necessary to generate this energy.

Resources necessary to generate 1000 kWh

• Brown coal	1300 kg
• High energy-value waste	1500 kg
• Low energy-value waste	3500 kg
• Heavy fuel	220 l
• Solar panels	12500 m ²
• Uranium (Nuclear power)	0.022 gr
• Natural gas	270 m ³
• Water (dam of 10m height)	43200 m ³
• Anthracite coal	320 kg

Draw

- Location of machinery
- Useless lighting
- Areas of heat loss

Document

- Maintenance certificates
- Bills
- Technical instructions for machinery

Estimate

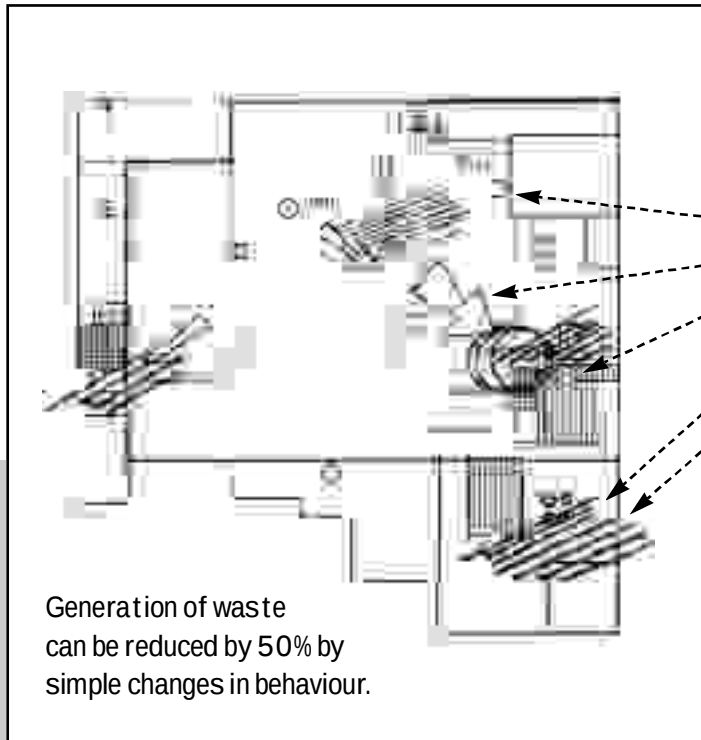
- Type and use of energy
- Insulation
- energy efficiency

Data

- Consumption kWh
- Energy efficiency

7. Eco-map: waste

This eco-map looks at management and prevention of waste.



- What is the level of recycling?
- What preventative measures have been taken?
- Are your suppliers obliged to take back materials?
- Bins
- Direction of disposal
- Mix of household /non-hazardous waste and toxic/hazardous waste
- Areas of bad practice
- Containers

Evaluate the level of waste management

1 to 5: more or less good management

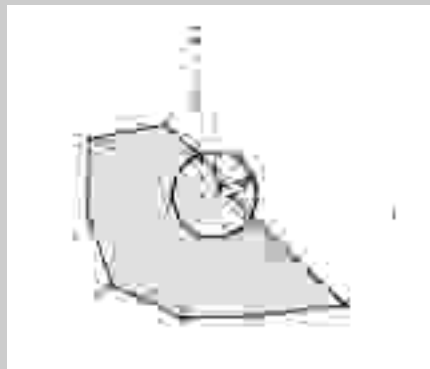
6 to 10: no management

11 to 15: lack of management is the source of problems

16 to 20: lack of management is the source of serious problems

Scoring from 0 to 20 takes different criteria into account. Dangerousness of products, potential of finding alternative solutions (recycling and others) or on the contrary lack of a specific solution for certain wastes, problems during storage, potential nuisances outside the site. Fill your figures into a table. Make a radar graph and the areas of poor or no management will be visualised immediately! (Put this up in the area of work in your company for everyone to see!). See the example given.

1 Paper and cardboard for packaging	3
2 Tyres	1
3 Non-metallic car body parts	5
4 Batteries	2
5 Waste from recycling	20
6 Empty oil filters	15
7 Aerosols	15
8 Packaging chemical products	16
9 Empty paint tins	15
10 Cabin filters	16
11 Scrap	10



Draw

- Bins and containers
- Direction of waste flows
- Areas of bad practice

Document

- Certificate from transporters
- Annual bills
- Assessment and evolution of flows

Estimate

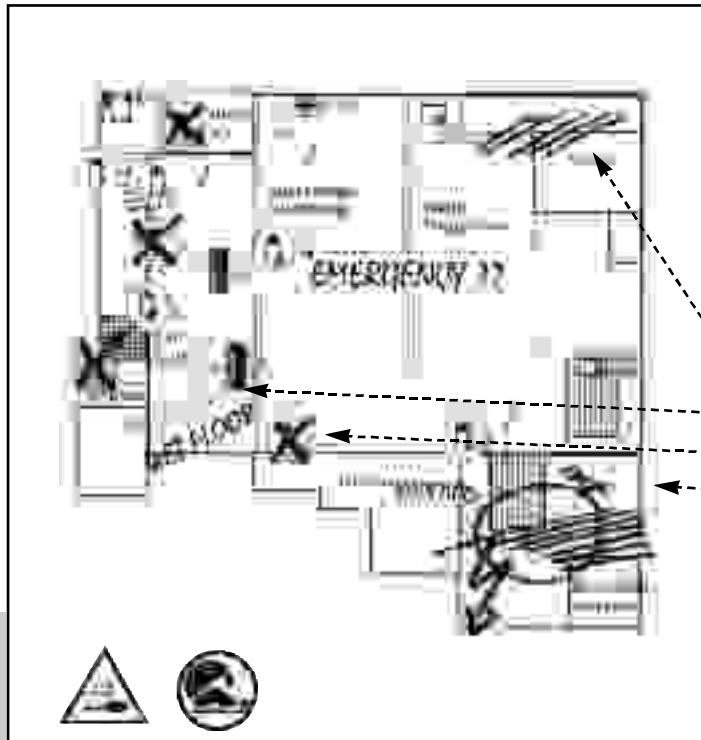
- Type of wastes
- Level of recycling
- Prevention measures
- Categories of waste

Data

- Waste disposed per year, tonnes
- Taxes paid on waste
- Level of recycling

8. Eco-map: risks

This eco-map identifies risks of accidents and pollution.



- Accessible and clearly identified emergency exits
- Known emergency procedures
- Dangerous situations
- Where do you use products which are carcinogenic, cause allergic reactions, etc.?

- Accidental spillage
- Problems with falls
- Non-compliance
- Solvent clouds and risk of explosion

Risks related to health, e.g. inhalation and absorption of dangerous products or accidents which cause bodily harm.



Risks related to the environment, e.g. leakage of products, accidental spillage and usage of toxic products



Risk related to fire, e.g. explosions and dispersion of toxic products



You must be prepared and know emergency procedures and telephone numbers.



Draw

- Location of extinguishers
- Emergency exits
- Areas of risk

Document

- Toxicology sheets
- Emergency procedures
- Authorisations
- Fire services
- Accident reports

Estimate

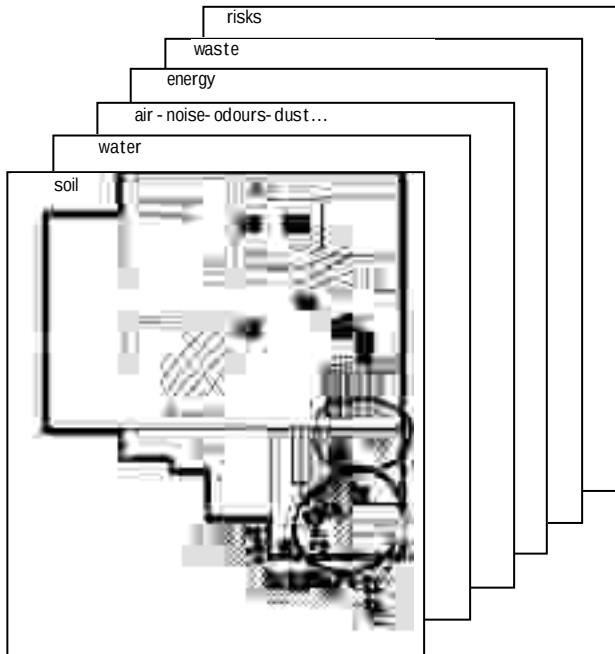
- State of machinery
- Emergency facilities
- State of ground

Data

- Number of accidents
- Hours of training for employees
- % of dangerous and toxic products in stock

9. Work programme

If you put your eco-maps one on top of the other (using overhead transparencies) environmental priorities will become clear straight away.



O Rank your problems in terms of seriousness. First deal with problems surrounded by a thick circle. Priority should be given to problems which link worker health and safety and the environment.

//// Then think about the areas of risks and develop solutions. This approach should be repeated once a year.

Develop your own indicators of environmental performance

Quantity of waste (kg per *)
Energy consumption (kWh per *)
Emissions CO ₂ , NO _x , SO ₂ ,... (kg per *)
Packaging (kg per *)
Transport (km per *)
Money spent on the environment (\$, DM, FrF, etc. per *)
Environment actions undertaken (hours per *)
Accidents per year (number per *)
Training of employees (hours/year per *)
etc.
(* unit of product or service)

10. Checklist

1. Data on the company (address, NACE code,)
 - 1.1 Calculation of material and energy flows in physical terms
2. General data
 - 2.1 Historical development
 - 2.2 Size of company
 - 2.3 Thematic eco-maps
3. Company operations
 - 3.1 Production processes
 - 3.2 Choice of products and raw materials
4. Waste
 - 4.1 Origin of waste
 - 4.2 Storage of waste
 - 4.3 Elimination of waste
 - 4.4 Waste management
5. Wastewater
 - 5.1 Quantity and quality of wastewater
 - 5.2 Treatment of wastewater
 - 5.3 Sewage system
 - 5.4 Taxes and charges paid for wastewater discharged
 - 5.5 Wastewater management
6. Soil and groundwater
 - 6.1 Storage of chemical products
 - 6.2 Impermeability of ground
 - 6.3 Risks in storage
 - 6.4 Soil analysis
7. Noise and vibrations
 - 7.1 Sources of noise and measurements
 - 7.2 Site and edge of site
8. Air
 - 8.1 Points of emissions
 - 8.2 Gaseous emissions and odours
 - 8.3 Reduction of emissions
9. Impact on the environmental quality of the surroundings
 - 9.1 Company's immediate environment
 - 9.2 Type of ground under the site and location in relation to drainage and collection of water
10. Environmental costs

(investment, taxes, charges, insurance, fines)
11. Permits and licences
 - 11.1 Relationship with authorities
 - 11.2 Relationship with local residents
 - 11.3 Responsibilities
12. Your environmental action plan

11. Some experiences with eco-mapping

Olivier Héaulme

Neuville-St-Vaast - France

SME

- + Allows you to easily visualise the origins of environmental impacts
- + Facilitates dialogue between employees and management
- + Saves time
- + Very easy and quick to use
- Perceived as not being serious enough, i.e. too childish and too innovative, by one representative of company management

Céline Paolacci

Nogent-sur-Marne - France

Hospital

- + Allows you to visualise the situation of a site following one good look
- + Allows you to visualise changes in parameters and to propose and check objectives
- Does not allow you to determine risks but rather to determine the physical reality of the site
- Not so easy to use in a site which covers a large area

Fernand Antonioli

Liège - Belgium

Trade Union representative
Solidarnosc - Stalowa Vola

- + Particularly interesting for workers on the shopfloor
- + Can easily be used by a union delegation without the help of external experts
- + Can benefit from the experience of employees in the area of health and safety

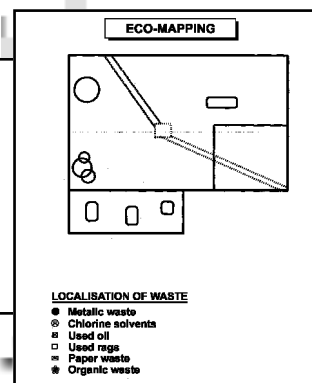
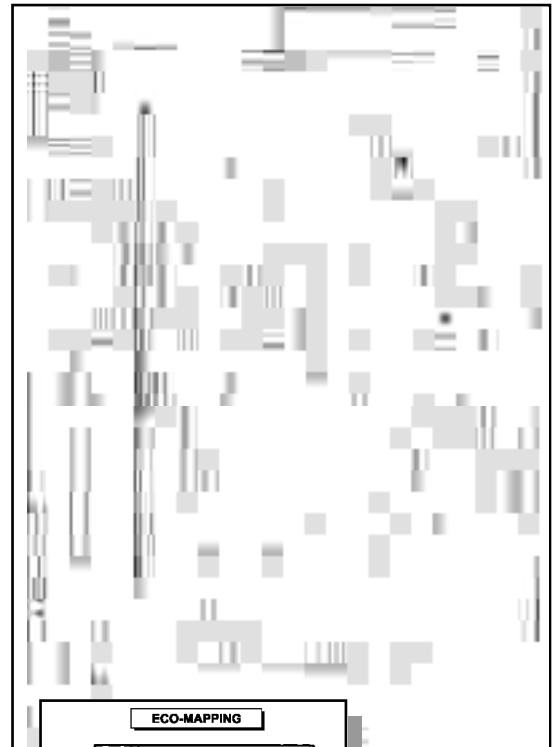
Marie-Christine de Wolf

Biffa (Severn Trent)

Braine-l'Alleud - Belgium

Landfill

- + Allows involvement of employees working at all levels in the company
- + Visualises the seriousness and the geographical importance of the impact
- + Simple material for training employees
- + The eco-maps can be superimposed, not the texts



Eco-mapping and EMAS

Initial review	
Environmental policy	☹
Legal compliance	☹
Environnemental programme	☹☹
Management systems	☹
Documentation	☹☹
Audit	☹☹☹
Employee involvement	☹☹☹
Communication	☹☹☹

Eco-mapping and ISO 14001

Environmental policy	☹
Environmental aspects	☹☹☹
Legal requirements	☹
Objectives and targets	☹☹
Programme for environmental management	☹☹
Structure and responsibilities	☹
Training, awareness-raising and competence	☹☹☹
Communication	☹☹☹
Documentation of the EMS	☹☹
Control of documentation	☹☹
Operational control	☹☹
Prevention of emergencies	☹
Monitoring and measurement	☹
Non-compliance, corrective and preventive actions	☹
Records	☹
Audit of the EMS	☹☹☹
Management review	☹☹
Employee involvement	☹☹☹

I would like to thank the following people for their support and co-operation in developing and testing eco-mapping:

Philippe Marzolf, Orée - France
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 Fernand Antonioli, CSC - Belgium
 Claire Paolacci, eco-counsellor - France
 Olivier Héaulme, eco-counsellor - France
 Pierre Arnould, astrophysicist - Belgium
 as well as the various companies which tested our tool.

2. Enrico M.: Close drums

Design: Philippe Ruelle

Move hydraulic out immediately!!

This tool was developed in the context of the INEM project, EMAS Tool Kit for SMEs.
 Translated from the original French into English by
 Claire Buckley, INEM

