

**Take off for the Environment;
Review the Impact from Using Industrial
Chemicals**

Invest in less hazardous products



HELCOM

Helsinki Commission - Baltic Marine Environment Protection Commission
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Develop clean production by risk management

Applying chemical risk management may provide opportunities to foresee and develop suitable and adequate alternatives.

Actions to prevent pollution and risk of ill health could start

at a very early stage. In fact, this could be done already when choosing chemical substances and techniques. This could, in turn, prevent precarious permit negotiations and dead end tracks when it comes to chemical risks.

Secure pollution prevention by taking internal measures

Early prevention of pollution and ill health has often turned out to cost less and take less

time compared with conventional pollution control and health protection.

It has shown to be more reasonable to pay attention to the production process and to consider chemical alternatives instead of taking the usual techniques for granted, addressing treatment and disposal of emissions and waste.

As exemplified below, company investments on pollution prevention have often reduced the need for and costs of end-of-pipe solutions to pollution and occupational safety to protect workers.

Ask for Material Safety Data Sheets

The supplier, that is the producer or importer of chemical products, has to provide professional clients with risk information including the classification of substances used as ingredients in chemical products. This should be part of the risk and safety information given with material safety data sheets, compulsory to provide to users.

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Consider the flow of chemicals

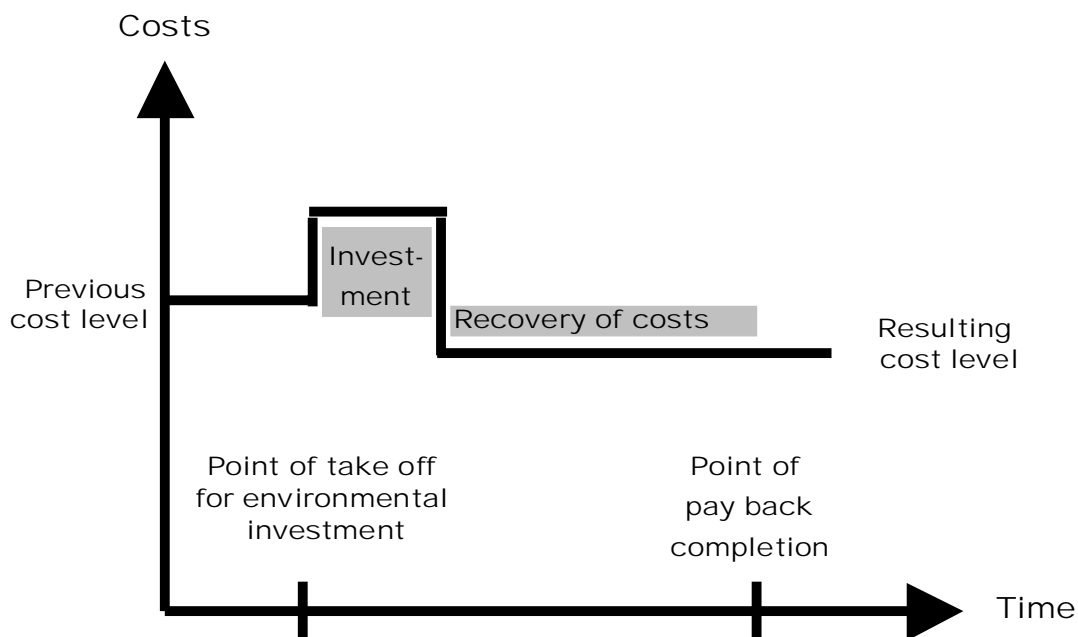
Chemical risks are dependent on the kind of chemical used and how it is handled. This affects further means available like measures for wastewater treatment or cleaning emissions to air.

What are the properties of chemical substances and preparations used at the workplace: raw materials, process chemicals, chemicals for up-keep?

What dangerous effects may the exposure to these properties have, at work, for the environment, by using the products and when it comes to waste?

Chemicals control of today could focus more on innovation, developing sound chemical products. Once companies have invested in environmental programmes, they often prove to benefit from them.

Less hazardous inputs may pay back



Ideal Pay Back Horizon selecting less hazardous alternatives to the use of dangerous products

Increase the capacity to carry out change

Consider the chemicals used and how they are handled in the process. Why are chemicals handled in one way or another?

What are the needs with regard to production, step by step? Are there acceptable alternatives?

Can something be achieved by minor organisational or technical changes?

Combine environmental management with engineering skills.

Are there parts connected with general and ongoing modernisation of production processes that should be covered by overall company investments?

It is important that sufficient knowledge and practical insights are returned to the company if a consultant carries out the work. In this way, rational outcomes could be better checked as well as provisions to ensure foreseeable obligations with regard to chemicals risk management.

Put into practice

Environmental management is worthwhile

Company profile

Business: Manufacturer of electrical motors and generators

Size: 300 employees

Yearly turnover: Euro 60 M

An environmental management system was implemented during one year. To map environmental aspects an extensive review was performed.

The production process was addressed step by step by a project manager and three other full time employees.

A few experts supported the team.

Results: Changes in the use of chemicals and alterations in the use of electrical energy provided for steady lower production costs.

For instance, within three years emissions to air were cut by 70

percent and the amount of landfill waste by 75 percent.

Total yearly savings are Euro 740,000. Contributing to these are for example revised management of metal scrap (135,000), cuts of emissions to air and water, partly by substitution of hazardous chemicals (100,000) and recycling of spill oils, emulsions and barrier water (17,000).

Comment: Savings made it possible to recover investment costs for the environmental programme within 0,9 year.

Cut costs by eliminating the sources of pollution

It is crucial to address the very source of pollution and ill health, to question the choice of chemicals, to reconsider the needs for them and to look for alternatives.

Key questions are: Why do we do it in this way and why do we use this particular chemical? Could we do it differently?

It is said that also generally these questions are too

seldom asked concerning technical production matters in the course of present-day activities.

If the questions were asked continuously, environmental investments could be more preventive and efficient.

Put into practice

Keep goods clean from the start

Company profile

Business: Manufacturer of metal springs

Size: 50 employees

Yearly turnover: Euro 3 M

All use and handling of trichloroethylene have ceased. Goods are kept clean through the production chain. Goods are washed only exceptionally, and if so, on trial with steam and fermented whey.

Results: Cost reductions amounting to Euro 6,000 per year as a result of no degreasing costs. No expenses for future municipal

demands on pollution control.

Comment: Releases to air and water of degreasing agents were thus eliminated. The company therefore did not have to appeal for emission permits.

Cutting releases by installing pollution control equipment would have raised daily costs considerably.

Decrease releases to wastewater and air

Chemical substances should work as efficiently as possible thereby reducing or eliminating emissions. The same applies to industrial use of water.

There are techniques available to recover or replace chemical substances such as

solvents, degreasers, anti-corrosion agents or other processing chemicals, at the same time reducing production costs.

Provided that discharges are treated properly, reuse of water and recovered chemical agents could in the

best possible way adapt to the operations and capacity of the cleaning equipment in operation.

Put into practice

Explore new chemical processes

Company profile

Business: Manufacturer of electric machinery
Size: 320 employees
Yearly turnover: Euro 54 M

Investing in paintsprayers eliminated the need for solvents, enabling the company to use paints of higher dryness.

Use of chromium was eliminated in rinsing baths by introduction of less hazardous chemicals, more frequent oil trap rinsing and better up keep of phosphatising set-up.

Results: Yearly cost reductions in painting amounting to Euro 34,000,

mainly through cutting costs of chemicals. Yearly reductions amounting to Euro 31,500 in water release costs, resulting in no further contaminated wastewater.

Comment: The costs and the cuts imply all together a 0,7 year investment payback. This enabled the company to let a full-time employee keep on working on the programme.

Cut costs by a cleaner working environment

Adopting a good working environment strengthens the basis for the well-being of the company.

Employees have often proved to be a main force to promote environmental management. They should be counted on and

engaged in such efforts.

A well-functioning working environment adds new opportunities to the planning and organisation of work and space.

A clean work environment may soon pay back as in the example below.

Put into practice

Find harmless substitutes for unhealthy substances

Company profile

Business: Manufacturer of metal springs

Size: 50 employees

Yearly turnover: Euro 3 M

Anti-corrosion oil used for spraying products while packing them was substituted by an oxidation packaging paper put in the boxes at product delivery.

Results: The unhealthy mist that was earlier spread when preparing deliveries with the oil was fully eliminated.

Packing costs were cut by 85 percent with the new method.

Comment: A healthy work environment was established.

The change provided for efficient use of working place area.

See your possibilities – take a pro-active stance on environmental behaviour

There are plenty of possibilities to act with concern for the environment and at the same time reinforce ones own business. Sustainable development is just about this. Environmental concern and economy should support each other.

The list below exemplifies positions and powers that ought to be given to staff responsible for a company's environmental behaviour.

Clear leadership

One person should take the main responsibility. Environmental concern should be encouraged and supported by the directing board as an integral part of the company policy.

Means to act

The responsible staff should be provided with sufficient means to act.

Authority to act

The one responsible should have powers to act and influence the company at top level with impact on market strategy, products development and funding for future investments.

Company integration

Environmental behaviour should be well integrated in key parts of the company, e.g. marketing, R&D and investment plans.

Established policy

All employees should acknowledge the environmental policy. White-collar and blue-collar workers should be engaged actively in it, e.g. by education efforts.

Spread responsibility

Personnel should be given responsibilities with regard to product knowledge, product handling, chemical choice and shifts in chemicals use.

Clever investments

Environmental demands should be considered from the very beginning as a prior factor to any investment and investment planning.

Impact on purchase and maintenance

Favouring prevention of risks, purchases of chemicals should be addressed also with regard to production processes and maintenance.

Impact on energy consumption, working environment and waste

The tasks of the environmental staff should relate closely to diminishing energy costs, making progress in work environment efforts, generating less hazardous waste, waste-water and emissions, recycling efforts, efficient use of working place areas and so forth.

Make a good start

Involving all company staff, launching an environmental programme might be quite an exiting journey. Many tasks will arise to consider. This may result in challenging perspectives and new opportunities.

Give rise to overall concern

Points of departure could be exploring the present use of chemicals, looking for unnecessary and unconsidered risks, less costs, more adequate purchases, better dimensioned purchases and stocks, adding to safety routines or providing for an overview of present alternatives.

Establish creative liaisons with suppliers

Ensure access to good information on products. In most countries suppliers have to present material safety data information in special sheets. Ask for them and make practical use of the information also in your safety instructions.

Utilize available experience

Another point of departure might be to mobilise the experiences and insights among the personnel:

- What equipment and what production links may be easily phased out opening up possibilities for a more proper environmental behaviour?
- What production lines may be cost efficiently renovated to provide for less dangerous chemicals handling and substitution of dangerous chemicals?
- What choices of products and what technological investments may give rise to less risks at acceptable costs or even providing cuts in costs?

Monitor results and share progress

Information should be given continuously to all interested parties. To inform company employees, gather to breakfast coffee or a refreshment break.

Make up an account on a yearly or a half-year basis. Operate e.g. step by step completing a protocol or extending a report material. Show what the benefits are in terms of work environment, consolidation of manpower force, market forecasts, public relations, fitness of process lines etc.

Contribute to environmentally acceptable alternatives on the market

What is placed on the market is decisive for the choice of other actors downstream. Producers do not only supply products to buyers but the product delivery also implies conditions for use and handling. If the use requires a high protection level or special waste treatment, the product choice includes additional

costs with regard to investments and maintenance.

Any environmental qualities in addition to the pure functional ones may imply considerable values to the user.

The company in the example given below had already a leading market position

when it received an order triggering its innovation capacity. It could respond to that challenge.

Also small companies could develop less hazardous, cost-reducing alternatives responding to the needs of their customers and relying on a supplier-user dialogue, including exchange of experience. Customers and users should not only ask for the most suitable and best working chemical, but also try to find the most conscious and supportive supplier.

Put into practice

Cooling agent extracted from air and recovered to air

Company profile

Business: Producer of industrial gases

Size: 11,000 employees

Yearly turnover: Euro 1,700 M

A technique was developed by which liquid nitrogen brings environmentally hazardous volatile, organic compounds to condensate in a way that they may be recycled or disposed of in an acceptable manner.

This technique was delivered on request of a chemical manufacturer.

Results: Emissions of volatile organic compounds

from the company's industrial processes ceased. The new technique is considered efficient and cost reducing by the customers. Sales have doubled since the introduction of the technique.

Comment: The company extracts nitrogen by compressing air. Vapours resulting from the process mainly consist of pure air.

Avoid diffuse spreading of hazardous elements and compounds

Consumer protection and pollution prevention could focus on what is spread in a diffuse way through the production and consumption chains. Elements or compounds included in products that are widely spread will sooner or later leak out, spreading in the most diffuse way.

If a substance is hazardous and does not easily decompose it will migrate to soil, water and the biosphere and threaten to contaminate life processes.

It is crucial to act today to ensure a safe environment and

good health for future generations. Taking an active part in this development is also to secure and strengthen the capabilities as an enterprise. From a commercial perspective it could be rewarded, not least adding value to your good name.

Put into practice

Suitable substitutes found for toxic metal

Company profile

Business: Manufacturer of metal springs

Size: 50 employees

Yearly turnover: Euro 3 M

Various alloy compositions were explored in order to find substitutes for the toxic metal compound beryllium copper in metal springs. It was found that bronze, phosphorous bronze and other alloy compounds could replace beryllium copper.

Results: The company has not to pay for the discharge of beryllium copper as hazardous waste.

Comments: Beryllium is a widely spread alloy metal, used among other applications in electric and electronic equipment. Generally metal recycling centres do not accept handling scrap containing beryllium.

By the substitution the company saved a toxic metal from being spread by a large number of users.

Adjust to environmental demands by renewing production lines

Since the scope of industrial investment seldom exceeds ten years, this period could be considered as the time frame for adjusting to environmental demands.

Whenever the scope of technical innovation shortens this time frame, there will be additional opportunities to make environmental adjustments. It is known to company mana-

gers that when cuts in fixed costs can be realized, worthwhile investments could be well motivated.

Environmental programmes could therefore preferably concentrate on activities to renew production processes, substitute polluting equipment, design new products and phase out obsolete chemicals.

Put Into practice

Look for investment on clean alternatives

Company profile

Business: Manufacturer of metal saw blades

Size: 260 employees

A process using vacuum heat treatment substituted a process treating saw blades at high temperature in a bath of barium salts.

Results: Energy consumption was reduced by 30 percent, the overall process capacity increased from 70 to 95 percent, blade rinsing to avoid corrosion ceased and there was less hazardous waste. Additionally, the processing of blades became faster,

needed less workers and the maintenance became cheaper.

Comments: If the bath process had not been substituted it would have implied high costs to meet environmental demands and occupational health requirements. Emissions giving rise to protests from the local community were abolished by the substitution.

Care for the Baltic Environment

Resources and opportunities of the Baltic Sea have to be taken good care of. It should be considered part of the inheritance of mankind.

Already natural conditions bring considerable stress to life in the Baltic. The present natural conditions have existed for a few thousand years only. Thus an adapted biological community has had just a little time to develop. Brackish bay water and surface water allow marine and fresh water species to live just on the very edge of their limits of survival.

Shallow and narrow gulf thresholds hinder the exchange of the deep basin marine water of the Baltic, giving rise to oxygen deficiencies in deeper parts of the sea basin. To complete its exchange of water should demand a period of up to 35 years. Stagnant water exchange due to these conditions contributes to low oxygen levels at the bottom but also to the difficult nutritious situation of surface water and coastal parts. Lack of vertical circulation of water masses makes the Baltic Sea a virtual trap for both nutrients and pollutants.

That is why the Baltic Sea is so very vulnerable. Emissions to air, the numerous rivers and watercourses set the Baltic Sea under severe strain. Nine highly industrialised coastal states are surrounding the Baltic Sea. There is a drainage area four times the size of the sea itself. There are more than 80 million people living in this area. The load of chemical matters originating from agriculture, industry, transport, and households has readily to readjust to the environmental demands.

The state of the Baltic environment requires the safe choice of industrial chemicals.

Consider hazardous properties and effects

Substances are elements or compounds. The main focus of HELCOM is on those hazardous substances or groups of substances that are placed on the market or obtained by production processes and considered to be **PBT** substances, i.e. **p**ersistent, **b**ioaccumulate and **t**oxic.

Persistence means that a substance for a long time will not decompose by biological or chemical processes. The concentration of the substance will thus build up in the environment. If the substance is hazardous it will stay in the environment and be able to poison living organisms and damage ecosystems.

Liability to bioaccumulate means that a substance may concentrate in the fats of living organisms by continuous intake. If hazardous, it may concentrate reaching effect levels able to poison living organisms and damage ecosystems.

Toxic effects mean that the exposure to a substance may give rise to acute death or sublethal damage like cancer and mutations, alteration in the ability of species to reproduce or disruption regarding how hormone systems are supposed to work.

For further definitions see HELCOM Recommendation 19/5, ATTACHMENT, Appendix 1: Glossary

Phase out too dangerous chemicals

HELCOM has selected 43 hazardous substances for immediate priority action towards the cessation of their discharges, emissions and losses. These substances are:

Organotin compounds

Alkanes

Chlorinated paraffins, short chained (SCCP)
Chloroform (Trichloromethane)

Phenols

Nonylphenoxyethoxylate and the degradation/transformation products (NPE)
Nonylphenol, 4- (NP)

Xylenes

Musk xylene

Organic oxygen compounds

Diethylhexylphthalate
Dibutylphthalate

Metallic compounds

Cadmium
Lead
Mercury
Selenium

Polycyclic halogenated aromatic compounds

Hexabromobiphenyl
PCB (Polychlorinated biphenyls)
PCT (Polychlorinated triphenyls - mixtures)
TCDD, PCDD, PCDF (Dioxins and Furans)

Polycyclic aromatic hydrocarbons

PAH

For the time being there are about 70 more substances under consideration. These substances are listed at the Helcom website: [http:// www. helcom. fi / projects / projectframe. htm](http://www.helcom.fi/projects/projectframe.htm).

Learn how hazard is classified

Systems for classification of chemical substances and preparations are introduced by the national states surrounding the Baltic Sea.

By national laws in the EU Member States a coherent classification system is adopted compulsory to European Commission Directives.

Included in the regulation of chemicals in each signatory state there is a list of hazardous substances classified with regard to health and environmental effects. This information should be given by the suppliers labelling chemicals and providing material safety data sheets. Any handling of chemical products should consider this information.

Helsinki Convention Signatory Commitments

Fundamental principles and obligations

Contracting parties to the Helsinki Commission are Denmark, Estonia, the European Communities, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The contracting parties shall...

... take all appropriate legislative, administrative or other relevant measures to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance.

...apply the precautionary principle, to take preventive measures when there is reason to assume that substances or energy introduced into the marine environment may create hazards to human health, harm living resources and marine ecosystems, damage amenities or interfere with other legitimate uses of the sea even when there is no conclusive evidence of a causal relationship between inputs and their alleged effects.

...promote the use of best environmental practice and best available technology in order to prevent and eliminate pollution of the Baltic Sea Area. If the reduction of inputs, resulting from... /this/... does not lead to environmentally acceptable results, additional measures shall be applied.

... apply the polluter-pays principle.

.... ensure that measurements and calculations of emissions from point sources to water and air and of inputs from diffuse sources to water and air are carried out in a scientifically appropriate manner in order to assess the state of the marine environment of the Baltic Sea Area and ascertain the implementation of the Helcom Convention.

.... use their best endeavours to ensure that the implementation of this Convention does not cause transboundary pollution in areas outside the Baltic Sea Area. Relevant measures shall not lead either to unacceptable environmental strains on air quality and the atmosphere or on waters, soil and ground water, unacceptably harmful or increasing waste disposal or increased risks to human health.

Adaptation to environmental demands

Turn your company into a company fit for the future. Concern for the environment is increasing by urgent needs and will have to increase much more as time goes by. It is crucial to adapt to envi-

ronmental demands, when introducing your company as a reliable supplier and sharing markets of Europe.

”Prevention is better than cure”

Bernadino Rammazzini (1613-1714)

Objective on Hazardous Substances

The HELCOM objective is to prevent pollution of the Convention Area by continuously reducing discharges, emissions and losses of hazardous substances towards the target of their cessation by the year 2020, with the ultimate aim of achieving concentrations in the environment near background values for naturally occurring substances and close to zero for man-made synthetic substances.

A project team for the implementation of the HELCOM objective with regard to Hazardous Substances was established and held its first meeting in October 1998. It consists of members from all Contracting Parties (Denmark, Estonia, the European Communities, Finland, Germany, Latvia, Lithuania, Poland, Russia, and Sweden) and representatives of the European Chemical Industry Council, the European Council of Chemical Industry Federations and the World Wide Fund for Nature.

Contact Information

www.helcom.fi

References

- Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992 (entered into force on 17 January 2000). Helsinki Commission – Baltic Marine Environment Protection Commission.
- HELCOM recommendation 19/5: HELCOM Objective with regard to Hazardous Substances, 26 March 1998

