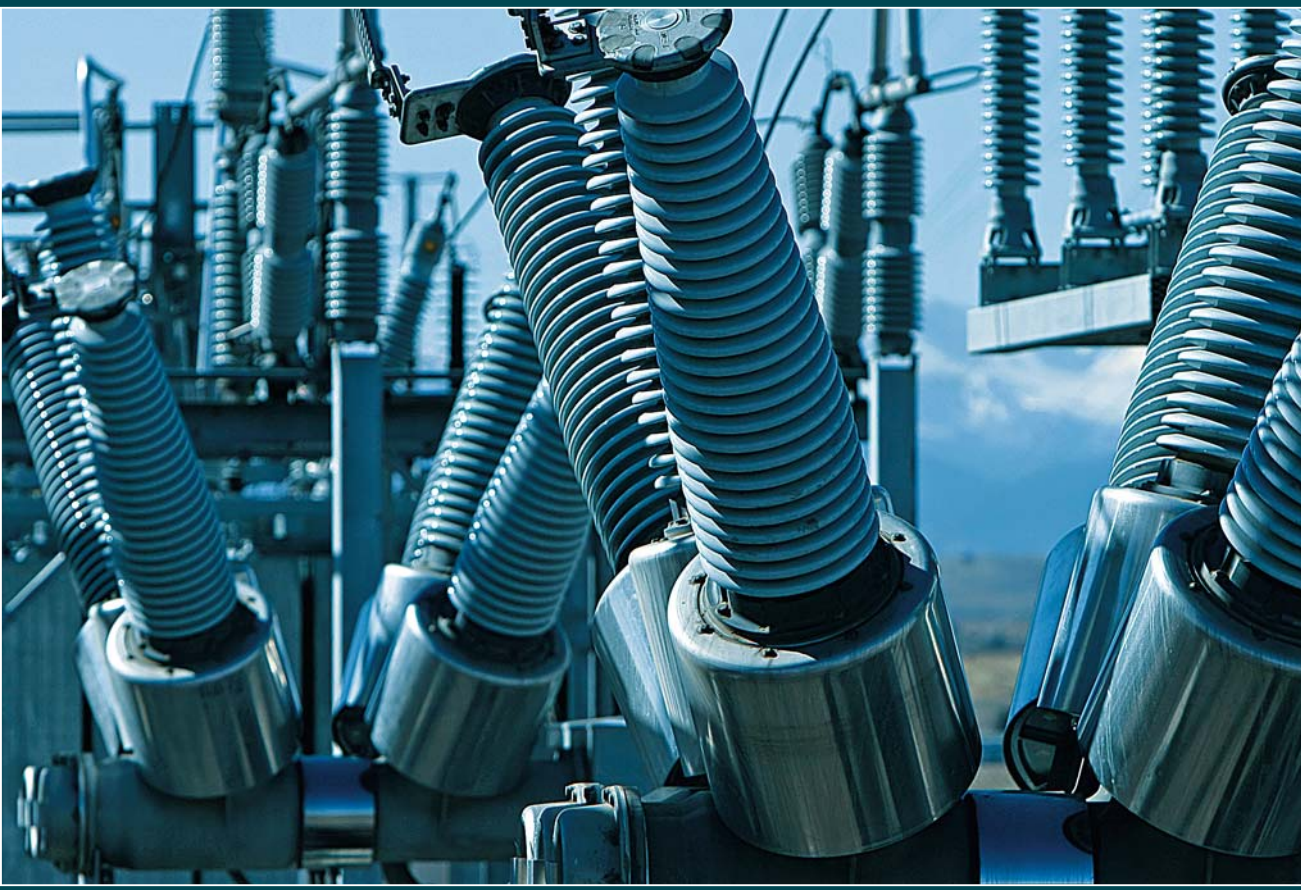


Chlorine Industry Review 2006-2007

Well-earned reputation rests on renewed sustainability efforts

Euro Chlor
representing the chlor-alkali industry

Contents

Cover: Electricity is essential to make chlorine. It cannot be substituted and represents up to 60% of the variable cost of production. Huge electrical transformers enable economic long-distance transmission of power for energy-intensive industries. Other photos kindly provided by Akzo Nobel, Ercros and Solvay.

Introduction

Not too many surprises – good or bad

The past year has been relatively uneventful for the European chlor-alkali industry. We didn't have too many surprises, good or bad. Mercury as a human health and environmental issue continued to be with us. However, I expect an end soon to the wrangling between the European institutions over banning exports and storing surplus metal as part of the EU mercury strategy.

Euro Chlor members continue to convert mercury electrolysis cells to alternative technology at a satisfactory rate. In 2007, membrane capacity will exceed mercury capacity for the first time.

European producers still have 9,600 tonnes of mercury used as a catalyst to make chlorine and caustic soda in 43 electrolysis plants in 14 countries. These account for 43% of regional capacity. However, our industry has voluntarily agreed to phase out the remaining such plants by 2020.

Improvements, but...

Results of a half-way review of our 2010 Sustainability Programme were broadly as expected. There were continued improvements in indicators for energy consumption, hydrogen usage and lost time injuries for employees, but a disappointing increase in the number of manufacturing accidents involving contractors. We have to work harder to meet expectations.

It was a surprise, however, to have two chlorinated solvents included in the Priority Hazardous Substances (PHS) list of the Environmental Quality Standards (EQS) Directive. We await the outcome of major representations to EU authorities to reverse this, although other aspects of this directive are broadly acceptable.

What of progress towards meeting the chlor-alkali sector's pressing need for access to electricity – one of our major raw materials – at a fair and predictable price?

Strong advocacy efforts will continue as EU energy policy proposals to combat climate change develop, aimed at resolving issues in this malfunctioning market and challenging the pass-through to customers of the values of CO_2 permits – all of which were issued free. Efforts by DG Competition to unbundle producers and distribution system operators to correct the market look unlikely to provide a solution.

The review by DG Environment of the Emissions Trading Scheme is likely to make for uncomfortable reading. This is because there is a perception that partial auctioning of permits is favoured by Member States post 2012, with the carbon market set to be considerably higher (above €20 per MT CO_2) than today with full pass-through of costs. While electricity prices have fallen to some extent in recent months – due mainly to a mild winter and corresponding lack of demand on fuel suppliers – the need for lasting competitive pricing stability remains.

Step forward

A key step forward for our industry – and a tribute to Euro Chlor's advocacy efforts – is the fact that the authorities now are starting to acknowledge that the industry cannot afford to have global competitiveness compromised by high electricity prices. It is now becoming understood among regulators that the chlor-alkali sector is a particular cause for concern because electricity costs represent more than 20% of sales value.

We should now expect real action from regulators.

A J Steel.

Alistair J Steel
Executive Director
31 July 2007

No time now for complacency

"European chlor-alkali producers can be proud of the substantial progress that has been made under the industry's Sustainability Programme, but with six years gone and the 2010 deadline approaching, we need to beware of complacency." Alistair J Steel, who took over as Executive Director of Euro Chlor mid-2006, added: "Our industry's well-earned reputation rests on how well we respond to the challenge of stepping up our environmental, health and safety performance during the next three years."

Unified strategic approach

All of the Western European chlorine manufacturing members of Euro Chlor agreed in 2001 an industry-wide strategy that focused on six voluntary commitments. These were first developed to ensure a united industry approach and commitment to address key sustainability concerns:

- Include environmental, social and economic factors in all strategic business decisions;
- Optimise energy efficiency in chlorine production;
- Reduce water usage through recycling;
- Continuously reduce polluting emissions to water, air and land;
- Use more hydrogen generated by the industry as a raw material or fuel;
- Give high priority to safe transportation of chlorine.

In parallel, data was collected for 2001-02 and with this information, 14 performance indicators and improvement goals were agreed among producers and announced by Euro Chlor in January 2003. Then the following year, a 15th indicator was added that required members to gain EMAS and/or ISO 14001 Environmental Accreditation for their plants.

The original 14 indicators come under the following main areas: economic aspects of production, environmental protection, safety and social progress. Each year, producers are required to report their progress to Euro Chlor, which combines feedback to report to the association's Management Committee prior to annual publication of the industry's performance.

In this section, we report on performance indicators and progress towards goals in 2006. Whilst the programme continues to be a powerful force for change, progress slowed last year for the first time. Improvements were made on three indicators – Lost Time Injuries (LTI) for company employees, energy consumption and hydrogen consumption. But all others remained basically unchanged with the exception of the LTI rate for contractors, which worsened.

ECONOMIC CONTRIBUTION

Energy use

Target: By 2010, reduce industry-wide energy consumption by 5.0% in terms of kWh/tonne of chlorine produced compared with the 2001 base year.

Update: Following a slight increase in average energy consumption from 3,491 kWh/t of chlorine produced in 2004 to 3,499 kWh/t in 2005, the industry got back on track in 2006 and reached the target four years ahead of schedule. Average energy consumption last year was 3,440 kWh/t.

Comment: Euro Chlor's Management Committee will now consider whether or not to reassess the goal in the light of progress.

Background: Since electricity is an indispensable raw material of the chlorine production process, the basic consumption – corresponding to the electrochemical reaction – cannot be significantly reduced. Energy savings arise primarily through using more efficient technologies and reducing ancillary energy use.

The energy indicator is weight-averaged across all producers and based on steam and electricity. Energy is used for electrolysis (transformers, rectifiers and cells) and motor power (pumps, compressors, centrifuges, etc.). Steam is used mainly for caustic soda evaporation and for minor utility purposes.

Hydrogen use

Target: Increase recycling and re-use of hydrogen gas from 80% (2001) to 95% by 2010.

Update: In 2006, 89.1% of hydrogen was utilised compared with 88.1% in 2005.

Comment: With further efforts, the 2010 goal should be achievable.

Background: High-quality hydrogen is co-produced with chlorine and caustic soda during electrolysis of brine. This can be used as a raw material or fuel.

Manufacturing technology

Target: The percentage of chlorine produced by mercury cells, diaphragm cells, membrane cells and other technologies will be reported each year.

Update: In 2006, the mercury process accounted for 43% of capacity followed by membrane (39%), diaphragm (15%) and other (3%).

Economic development

Target: Euro Chlor will report monthly, quarterly or annually data on European production of chlorine and caustic soda. This will include utilisation rates, caustic stocks, capacity and technology by plants and applications.

Update: In 2006, Euro Chlor published on its website and distributed to the media figures for monthly chlorine production and caustic soda stocks.

Energy consumption

Hydrogen utilisation

The *Industry Review* included a map of Europe showing location of all plants and a table indicating the location, ownership, technology and capacity of each plant *(see p.23 for 2006)*.

SAFETY & SOCIAL PROGRESS

Lost-time injuries

Target: To reduce lost-time injuries to 1.3 (LTI) per million working hours for all workers whether company employees or contractors working on production sites.

Update: There was a reduction in employee figures for 2006, with an LTI rate per million working hours of 8.32 for employees (compared with 9.09 in 2005). For contractors, the rate rose to an LTI rate per million working hours of 10.50 (compared with 7.72 in 2005).

Comment: The rate for contractors showed a disappointing increase and there is a marked need for additional effort by a number of companies.

Background: A lost time injury (LTI) is one resulting in at least one day off work. It is reported as the number of LTI per million working hours.

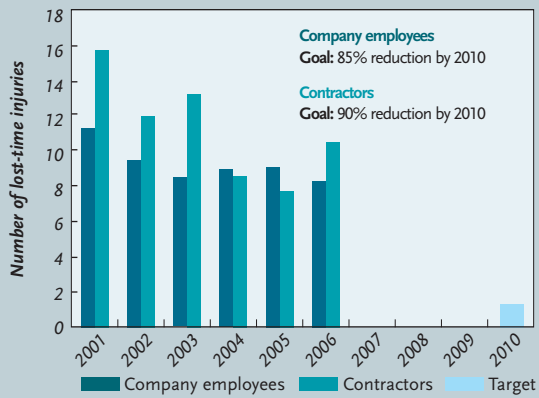
Process incidents and losses

Target: A 75% reduction in process incidents from 67 (2001) to 15.

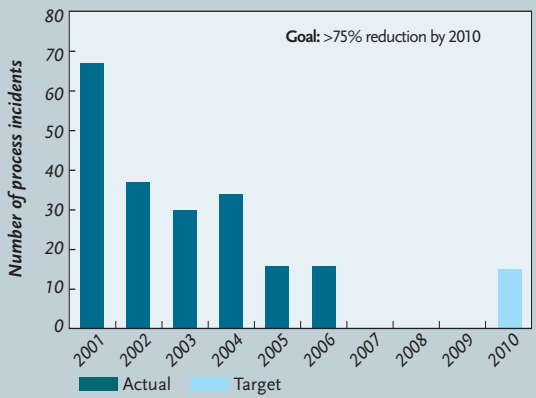
Update: There were 16 incidents in 2006 and the same number in 2005. For each year, this was less than half the annual average for 2001-2004.

Comment: The 2010 target is still considered achievable.

Lost-time injuries (per million working hours)



Process incidents and losses



Background: Incidents are classified as events involving a fire or an explosion or the release of chlorine, hydrochloric acid, sulphuric acid, sodium hypochlorite (bleach) and caustic soda, which cause a fatality, serious injury or property damage exceeding €100,000. Losses include any chemical spills to air, water or land, which impact human health or the environment, property or result in evacuation.

PVC industry doubles recycling in 2006

The European PVC industry recycled 83,000 tonnes of this chorine-based plastic in 2006, more than double the 2005 figure and almost six times the 2004 figure, according to the latest *Vinyl 2010 Progress Report*. Vinyl 2010 is a coalition of PVC industry groups: the European Council of Vinyl Manufacturers (ECVM), European Plastics Converters (EuPC), European Stabiliser Producers Association (ESPA) and European Council for Plasticisers and Intermediates (ECPI). Vinyl 2010 says that progress towards targets set in 2000 show that this particular approach to self-regulation is working.

Transportation

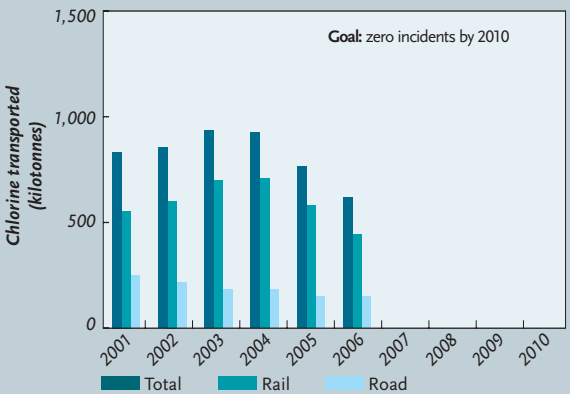
Target: 1. Zero transport incidents involving bulk movement of chlorine by 2010; 2. The tonnage of chlorine transported as a percent of the total chlorine produced will be reported annually as well as mode of transport.

Update: 1. Following zero accidents in 2004, three were reported in 2005 and one in 2006; 2. Last year, producers in Europe transported 618,000 tonnes of chlorine (2005: 761,000 tonnes), with 73% shipped by rail and the rest by road.

Chlorine transported (excluding pipelines) represented 6% of 2006 production vs. 7% the previous year. The average distance chlorine was transported by rail was 480 km and by road, 200 km.

Background: A chlorine transport incident is one which either involves death or injury, a spill of more than 5 kg, substantial property damage, public disruption of more than one hour or intervention of emergency services or media coverage.

Transportation of chlorine



The amount of chlorine transported in Europe by rail and road has halved during the past decade. Chlorine movement has been decoupled from production through supplier/customer relocations and more use of local pipelines. Rail transport dominates; road transport for bulk supply is used only in the United Kingdom and, to a limited extent, in Spain.

Responsible Care

Target: The 2010 goal is for all chlorine-producing members of Euro Chlor to become participants.

Update: The number of chlor-alkali producing members of Euro Chlor has fluctuated since the programme began as a result of restructuring and companies merging or withdrawing from the sector. At 31 December 2006, 35 out of 39 full members had joined national *Responsible Care* initiatives.

Background: *Responsible Care* is the chemical industry's global voluntary initiative by which companies, through national associations, work together to continuously improve their health, safety and environmental performance and to communicate with stakeholders about their products and processes.

Responsible Care was conceived in Canada and launched in 1985 to address public concerns about chemical manufacture, distribution and use. The number of national chemical industry associations embracing the *Responsible Care* ethic has grown from six to 52 countries since 1992.

Sustainability: a global concern

Addressing sustainability issues is not only important for Euro Chlor, but also to other national or regional chlor-alkali business organisations around the world.

In 2007, the World Chlorine Council published *Sustainability Commitments and Actions*. This publication reviews sustainability developments within the industry worldwide since a first review was published in 2002.

The new publication describes how the global chlor-alkali industry contributes to sustainable development, both by providing essential products and by continuously working to improve its social, economic and environmental performance. It also addresses key future challenges.

Sustainable development is, of course, approached differently by different nations. In general terms, such initiatives by the industry focus on the following:

- Providing essential products;
- Developing scientific understanding;
- Promoting sound chemicals management;
- Promoting resource conservation;
- Improving safety performance;
- Implementing *Responsible Care*.

WCC represents producers accounting for more than 80% of worldwide chlor-alkali production. It links 18 chlorine and chlorinated products industry associations in Europe, Asia, North and South America. *Sustainability Commitments and Actions,* can be downloaded from www.worldchlorine.org.

Air emissions target achieved; water goal is within reach

ENVIRONMENTAL PROTECTION

COC emissions

Target: Emissions of 22 chlorinated organic compounds (COCs) to be reduced by 75% to water and by 50% to air against the 2001 base year.

Update: At end 2006, COC emissions from manufacturing plants had been reduced by 69.8% to water compared with 67% at end 2005 and 50.8% to air compared with 35% a year earlier.

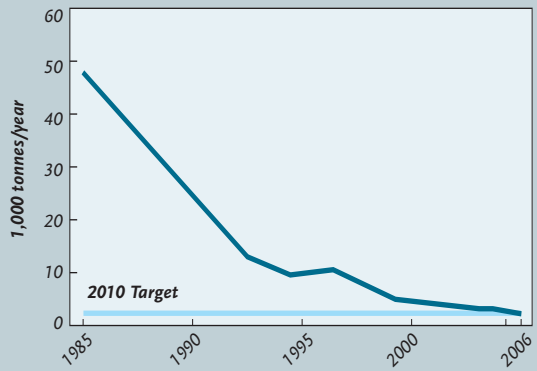
Comment: Euro Chlor will now consider whether or not to reassess the goal in the light of progress.

Background: The COCs were selected from various international regulatory priority lists for emissions reductions and comprise the following substances: 1,1,1-trichloroethane; 1,1,2-trichloroethane; 1,2-dichlorobenzene; 1,2-dichloroethane; 1,4-dichlorobenzene; 2-chlorophenol; 3-chlorophenol; 4-chlorophenol; carbon tetrachloride; chlorine; chlorobenzene; chloroform; dichloromethane; dioxins & furans (as TEQ); hexachlorobenzene; hexachlorobutadiene; hexachlorocyclohexane; pentachlorophenol; tetrachloroethylene; trichlorobenzene; trichloroethylene and vinyl chloride.

In 2005, pentachlorobenzene was added to the list of the substances to be monitored, in line with the requirements of the EU Water Framework Directive.

To provide a longer-term perspective of the sector's commitment to reducing emissions, the data shown spans the period 1985-2006.

Plant emissions to air



Plant emissions to water

7

Mercury emissions

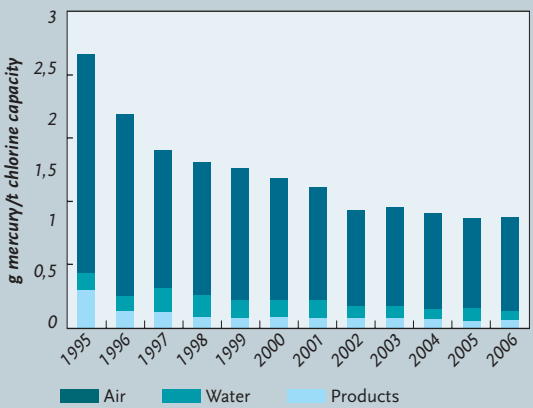
Target: Although all other programme deadlines are for 2010, the industry decided to maintain an earlier 1998 commitment to achieve an emission target of 1g/t/chlorine capacity on a national basis by end 2007.

The industry elected to keep the earlier date, since from October 2007 all EU chlor-alkali plants whether mercury, membrane or diaphragm require an operating permit under the Integrated Pollution Prevention and Control (IPPC) Directive.

Update: Overall European emissions in 2006 amounted to 1.055g Hg/tonne chlorine capacity compared with 1.046g Hg/t in 2005. The average mercury emissions for Western European countries remained at the level of 1 g/t capacity, but also with a slight increase compared with the previous year.

Comment: The overall level of emissions rose slightly last year primarily due to higher levels of emissions in a few plants, including one that underwent extensive maintenance work. The blip is considered temporary.

European mercury emissions



Product knowledge

Target: There is no specific goal for 2010. This is because the chlor-alkali sector decided to maintain an earlier (1999) commitment to provide by 2004 full eco-toxicological and environmental data on 29 chlorinated substances under the International Council of Chemical Associations/OECD initiative on high production volume (HPV) chemicals.

Update: The original ICCA/OECD global chemical industry deadline of initial assessment reports for about 1,000 HPV chemicals by 2004 proved far tougher than anticipated and was extended to 2009. In 2006, Euro Chlor completed four assessments bringing the total submitted to 25.

The summary information on all completed assessments is available publicly via the *Chlorine Online* website at www.eurochlor.org.

Environmental accreditation

Target: All full members to gain EMAS and/or ISO 14001 Environmental Accreditation for their plants by 2010.

Update: During 2006, one company gained ISO 14001 accreditation and three companies upgraded to the more comprehensive EMAS accreditation.

Background

EMAS (The Eco-Management and Audit Scheme) is the EU voluntary instrument which acknowledges organisations that improve their environmental performance on a continuous basis. EMAS registered organisations are legally compliant, run an environmental management system and report on their environmental performance through publication of an independently verified environmental statement.

ISO 14001 is an international quality assurance standard to evaluate an organisation's environmental management systems and encourage continuous improvement. It helps organisations minimise negative environmental impacts (to air, water or land), comply with applicable laws, regulations, and other environmentally-oriented requirements, and continually improve.

Reducing the industry's environmental footprint

Recent technological developments are having a major effect on reducing the chlor-alkali sector's environmental footprint, in particular by increasing energy efficiency. Examples of recent initiatives by Euro Chlor member companies include:

Akzo Nobel Base Chemicals started up two different pilot fuel cell systems to produce electricity from hydrogen in Bitterfeld, Germany, and Delfzijl, The Netherlands, during early 2007. The company could produce 5-10 megawatts of green electricity from the current excess hydrogen, which is co-produced at Bitterfeld. In Delfzijl, the one-year project will initially step up the pilot unit's power from 50 kW to more than a megawatt, at which point it becomes commercially attractive.

Bayer MaterialScience is due to complete construction in 2008 of the world's largest hydrochloric acid recycling plant at its Shanghai facility, where the company plans to build world-scale isocyanate production plants. It will be the first time that the company uses the innovative oxygen depolarised cathode (ODC) technology to produce chlorine in a world-scale facility.

Bayer's first ODC hydrochloric acid electrolysis unit, with much smaller capacity, started up in Brunsbüttel, Germany, in 2003. The experience gained there paved the way for the new plant in China. The ODC process consumes about 30% less electricity than the diaphragm process used by Bayer for many years.

Caffaro, an Italian member of Euro Chlor, started operating in 2006 at Brescia what is believed to be the world's first commercial, large-scale hydrogen fuel cells installation at a sodium chlorate facility. The 120 kW system produces estimated electricity savings of up to 20% and not only reduces the company's operational costs, but simultaneously cuts greenhouse gas emissions. The chlor-alkali electrolysis process presents many similarities to that used to make sodium chlorate, which is mainly used to produce chlorine dioxide for bleaching paper pulp.

At its Stade complex in Germany, **Dow** produces chlorine for use in propylene oxide production and other processes. These processes use 30 million m^3 of water taken from the Elbe and five million tonnes of salt per year. Dow has achieved a world first with development and implementation of a closed loop process for brine, chlorine and propylene oxide production. The project resulted in conservation of 7 million m^3/year of river water and 600,000 tonnes/year of salt, as well as a 23% reduction of annual salt discharge and of total organic carbon discharge to the river Elbe.

High-performance incinerators at many **Solvay** sites make use of the energy content from most of the unwanted chlorinated and fluorinated organic by-products. Organic wastes with high energy content are processed using increasingly sophisticated methods, with a growing part played by recycling and incineration to make use of the energy content.

Chlorine and caustic soda – key chemical building blocks

Adhesives	Ceramics	Fibre-glass	Lubricants
Advanced composites	Computers	Flame-proofing	Paints
Air bags	Cosmetics	Footballs	Paper
Antibiotics	Credit cards	Fungicides	Perfumes
Antifreeze	Detergents	Gaskets	Pharmaceuticals
Bleach	Disinfectants	Golf bags	Plastics
Blood bags	Drilling fluids	Greenhouses	Refrigerants
Brake fluids	Drinking water	Hairdryers	Roller blades
Bullet-resistant glass	Dry cleaning	Herbicides	Roofing
Bumpers	Dyestuffs	Inks	Safety belts
Car seats	Electronics	Insulation	Vitamins
Carpets	Explosives	Intravenous drips	Window frames ...
CDs and DVDs	Fertilisers	Lighting	... and much more.

The products of the chlor-alkali industry rarely go directly to consumers. However, an enormous range of products and 2,000,000 jobs in Europe depend directly or indirectly on chlorine chemistry.

Risk management

With the implementation of REACH chemicals legislation, the European Chlorinated Solvent Association (ECSA) has updated risk management strategies for producers to ensure long-term sustainable use and optimal end-of-life management for chlorinated solvents.

ECSA members have approved a programme that sets out short and long-term sustainability objectives and defines key performance indicators:

1. Sustainability actions
Objective: By 2009, ECSA commits to analysing and prioritising emissive applications, and defining sustainability improvement actions.

Comment: To drive long-term industry and product sustainability, industry needs to identify challenges for each application where emissions can occur; demonstrate continuous improvement; resolve energy and raw material issues.

2. Stakeholder engagement
Objective: By end 2009, ECSA commits to developing active dialogue with priority stakeholders, and to addressing concerns.

Comment: Open dialogue and listening to societal concerns will be key if the sector is to obtain operational feedback and recognition for the initiative.

3. Value chain engagement
Objective: By mid-2007, ECSA members commit to complying with the European Single Assessment Document (ESAD) or a similar distributor assessment scheme. By end-2008, they will develop education programmes in partnership with trade associations representing end-users and recyclers.

Comment: The first of these two objectives was completed on time. The buy-in and active involvement of distributors and representative organisations of downstream users will be essential to success. There are more than 100 distributors and many thousands of end-users of the three main chlorinated solvents – trichloroethylene, methylene chloride and perchloroethylene.

Legislative developments

Goal: Balanced and workable legislation

The most important and critical role of Euro Chlor is to provide advocacy leadership on efforts to positively influence proposed laws to protect environment, health and competitiveness. EU and international authorities share a common interest in achieving efficient, balanced and workable legislation. Additionally, industry must constantly strive to minimise potential threats – such as shortcomings in EU energy policy – to the industry's competitiveness on global markets.

Energy costs critical

The chlor-alkali sector is probably the most energy intensive industry in the world – even more so than cement, glass or iron and steel. In fact, electricity costs exceed 20% of sales value for European chlor-alkali producers, whose products underpin more than €300,000 million of annual European chemical industry turnover.

Euro Chlor continued to collaborate with Cefic and an alliance of seven energy-intensive industries to draw attention to increased costs caused by a malfunctioning internal energy market, and the potential impact of current and future EU energy policies to combat climate change.

Euro Chlor continues to call on EU authorities to publicly recognise the critical economic importance of the sector to the European chemical industry and the latter's role in the economy. The European Commission has been approached and urged when developing policies to take into account the sector's heavy reliance on electricity as a raw material and the need to maintain a competitive position on global markets.

A study by an independent energy expert into the effects of electricity pricing on the competitiveness of the chlor-alkali sector has been commissioned by Euro Chlor in order to improve understanding of the issue. This will be published fourth quarter 2007.

Water policy

In the EU's drive for cleaner rivers, lakes and coastal beaches, Euro Chlor continues collaborating with Cefic and other business associations such as ECPA (the European Crop Protection Association) on providing input to the development of a new directive to establish water quality standards for priority water pollutants, including mercury and 11 chlorinated chemicals.

This legislation aims to have a major impact on water quality over the next decade and it is vital for the chlor-alkali industry that environmental standards and emission limits set for priority chlorinated compounds are realistically determined and based on sound science. Euro Chlor is very concerned about emissions criteria requirements for a number of substances.

The Directive on Environmental Quality Standards (EQS) and Pollution Control, which sets limits for concentrations of substances in surface water, was adopted by the EU Commission in July 2006 and is generally supported by Euro Chlor.

The original draft quality standards took into account Euro Chlor work on marine risk assessments and defined workable maximum levels, or threshold values, in biota for mercury and the unwanted by-products, hexachlorobenzene (HCB) and hexachlorobutadiene (HCBD).

Unrealistic

Some exemptions also recognised Euro Chlor's position that a total cessation of emissions of HCB and HCBD was unrealistic and cannot be achieved. A study commissioned by Euro Chlor from BiPRO GmbH of Munich three years ago predicted that full cessation could lead to plant closures, and the loss of more than 100,000 jobs and €12,000 million in business.

11

Legislative developments

Parliament proposed 200 amendments

Since the Commission draft EQS Directive was published, the European Parliament and Council have been conducting reviews of the proposal. Euro Chlor has been monitoring progress and advocating positions on mercury and the 11 chlorinated chemicals. These are among 33 priority substances, of which some are identified as priority hazardous substances (PHS). For these, releases and losses to the environment should cease by 2025.

The Parliament has proposed more than 200 amendments to the regulation, including addition of more chemicals to the priority list and upgrading of some substances to PHS.

The principal issue for the chlorinated solvents producers is the Parliament's reclassification of carbon tetrachloride, perchloroethylene and trichloroethylene, even though these do not meet the PHS classification criteria. Euro Chlor will continue to oppose this since we are convinced there are no objective reasons for such a reclassification.

There were also some positive developments. For example, the Parliament rejected lower EQS values for HCB and HCBD and the "close-to-zero" emissions concept proposed by the Commission has remained unchanged.

In June, the Council of Environment Ministers supported a compromise text, which is close to the Commission's original proposal. A second reading will now be necessary early 2008 to reconcile differences between the Council and Parliament.

Serious effort

Euro Chlor was invited to join an EU expert group set up early 2007 to improve the scientific basis for evaluating EQS and develop a methodology to derive such standards for sediment and biota. This is a serious attempt to ensure sound science is the foundation of such standards and is supported by industry, since it should lead to publication of technical guidance by mid-2008.

Progress on storage

Euro Chlor continued to contribute actively to discussions with the EU institutions to find a sustainable and satisfactory solution to the storage of mercury following the planned 2011 implementation of a ban on exports of this toxic liquid metal to other parts of the world.

The proposed ban is part of the EU's mercury strategy designed to reduce supply, demand, emissions and exposure, whilst encouraging a global phase-out of new mercury and measures to prevent surpluses getting back onto the market.

Euro Chlor recognises the importance of reducing levels of mercury in the environment and producers are implementing a voluntary phase-out of chlor-alkali mercury cells by 2020 at a cost of more than €3,000 million.

During 2005-06, seven mercury-based chlor-alkali plants were either closed or replaced with non-mercury technology.

Industry supports EU Commission plan for permanent mercury storage

However, European producers still have 9,600 tonnes of liquid metallic mercury used by 43 electrolysis plants in 14 countries. These units account for 43% of European chlorine capacity.

Euro Chlor fully supports the proposed export ban and storage solution adopted by the Commission in October 2006, since it is consistent with industry's preferred solution of permanent underground storage of mercury from decommissioned chlor-alkali plants in former salt mines.

Mid-2007, Euro Chlor was in the final stages of obtaining membership endorsement of a voluntary agreement for this approach to storage. Details of implementation will clearly depend on the final wording of the regulation that is ultimately adopted by Council and Parliament.

The European Parliament's first reading in May – after review by its Environment Committee – focused on bringing forward the export ban from 1 July 2011, stopping mercury imports and requiring temporary storage either above or underground.

In June, the EU Council of Environment Ministers reached political agreement on the export ban and storage after agreeing that mercury could be disposed of permanently underground, subject to meeting yet-to-be determined technical criteria. However, due to the differing positions taken by the EU institutions, a second reading will be necessary early 2008.

Euro Chlor will continue to advocate the sector's position on permanent storage since there is no commercially viable process to transform the mercury into a less problematic compound.

Solvents restriction

A loophole in the Solvent Emissions Directive that excluded metal-cleaning end users of less than a tonne per year of trichloroethylene from compliance has been closed. This follows acceptance of a voluntary agreement proposed by industry at a December 2006 EU Risk Reduction Strategy meeting. After 2010, TRI will only be supplied for metal-cleaning if users have totally-enclosed equipment.

ECSA is opposing a recommendation by DG Enterprise to restrict use of methylene chloride (dichloromethane) in paint strippers solely for industrial applications. The proposed ban on use in consumer strippers followed publication in May 2007 of an impact assessment report prepared for the Commission.

Euro Chlor's advocacy role is equally essential at the international level, particularly representing the industry's interests with the UN Environment Programme (UNEP).

In February, the federation's Environment & Regulatory Affairs Director, Dr Arseen Seys, represented the global industry under the umbrella of the World Chlorine Council (WCC) at the 24th UNEP Governing Council meeting (Nairobi), when ministers agreed not to impose global, legally-binding restrictions on mercury.

Instead, UNEP decided to strengthen its mercury partnership programme. Euro Chlor, through its participation in WCC, supports this initiative, which includes promoting the reduction or elimination of global mercury releases

13

through the adoption of best management practices or conversion to non-mercury cell technology. Delegates from the EU, India, Russia, and North and South America acknowledged the responsible and collaborative attitude of the chlor-alkali industry in providing annual data summarising regional industry use, consumption and emissions of mercury. First data for 2006 has been submitted by WCC to UNEP and was presented at its Governing Council meeting in February.

POPs guidelines

In a positive move, guidelines on Best Available Technology (BAT) and Best Environmental Practice (BEP) to reduce unintentional emissions of persistent organic pollutants (POPs) from industrial processes were adopted at the UNEP Stockholm Convention meeting in May. These global guidelines – which relate mainly to the unwanted chemical by-products, dioxins, furans and hexachloro-benzene – do not impose restrictions on products or processes provided that BAT and BEP are applied when chlorine is involved. Euro Chlor has been actively involved through WCC and supported their adoption.

The meeting also adopted Guidelines for the Environmental Management of POPs Wastes developed under the Basel Convention. These set specific concentration levels for determining what constitutes POPs wastes ("low POPs content"), required levels of destruction for waste containing POPs, and sound destruction technologies. The low level content of POPs in waste has been fixed at 15 microgrammes toxic equivalents (TEQ) of dioxin/furans per kg of waste, in line with EU limits. WCC actively supported this position. Specifically, hazardous waste incineration is recognised as a preferred destruction technology for POPs wastes.

Candidate POPs

Euro Chlor and WCC are involved in the process of evaluating substances as new POPs under the global Stockholm Convention and the regional UN Economic Commission for Europe (UNECE) Long-Range Transboundary Air Pollution (LRTAP) Protocol. Several additional chlorinated substances have been proposed for evaluation, and could potentially be the first additions of new candidate POPs to both treaties.

The mechanism for adding substances as defined in the Stockholm Convention is supported by industry, but the process for reviewing candidates has included efforts by some countries to dilute and re-interpret criteria. This has important implications since chemicals could be classified and banned as POPs on unjustified grounds. Industry will continue to support a science and risk-based approach and maintains that some chemicals do not merit being listed as POPs.

Proposed decisions for 10 candidate chemicals under the Stockholm Convention will likely be considered by the POPs Review Committee in November, with formal adoption of any decision in May 2009. There currently seems to be no clear policy guidance on listing of new chemicals, with a "product by product" approach being taken.

Evaluation by UNECE of seven new substances – including hexachloro-butadiene, pentachlorobenzene and short-chain chlorinated paraffins (SCCPs) – is more advanced. A decision on management options for these substances could be taken by the Executive Body in December 2007.

Transparency: A key element in reputation management

Provision of timely and reliable information – particularly on health, safety and environmental issues related to chlorine chemistry – always underpins effective reputation management. Consequently, a policy of open and transparent communications with stakeholders at European and international levels is a key element in the strategy of Euro Chlor to achieve balanced and workable legislation.

Willing to listen and respond

The European chlor-alkali sector's approach is coupled with a willingness to listen and when necessary take voluntary measures to address concerns. For example, the 2010 sustainability programme adopted by the industry in 2001 *(see mid-term report, pages 2-10)* is firmly rooted in the recycling and emissions reduction initiatives developed by Euro Chlor 12 years ago.

Because chlorine is such a major building block of the broader chemical industry, it is inevitable that the chemical will be associated with emerging and future issues. Accordingly, the provision of sound scientific information continues to be an essential element of Euro Chlor work.

In 2006-07, the business association expanded its library of science publications. Comprehensive science dossiers entitled *Biodegradability of chlorinated aromatic compounds* and *Pentachlorobenzene – sources, environmental fate and risk characterisation* were published.

Starting with pentachlorobenzene, Euro Chlor is making all future science dossiers available on CDs in addition to being downloadable with all other publications from the Euro Chlor website, *Chlorine Online*.

The *Focus on Chlorine Science* series was also expanded with a new publication on life cycle analysis. Euro Chlor science managers participated in a major international congress and gave presentations on environmental risks and persistent organic pollutants to PhD students at universities in Madrid, Spain, and Ghent, Belgium.

Record attendance

A record 2,100 scientists from government, academia and industry participated in the Society of Environmental Toxicology & Chemistry (SETAC) annual congress in May (Porto, Portugal) at which Euro Chlor had a stand featuring chlorine science.

Chlorine Online is our main information resource on the Internet and efforts continued to promote visibility with search engines and improve site accessibility and content.

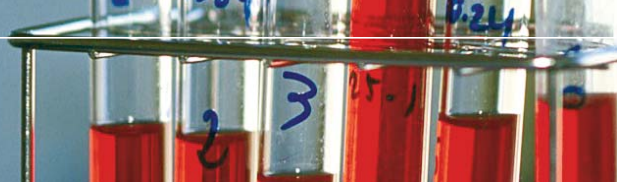
We continued work also with national associations to develop local language satellite sites under the *Chlorine Online* umbrella. The delayed German language site should be launched by December 2007, along with a new UK English site. This will succeed the chlorine website of the UK Chemical Industries Association's former Chlorine Working Group.

The UK-focused site will bring the number of mini sites under the *Chlorine Online* umbrella to three [the other, a Spanish site, was created in collaboration with the Asociación Nacional de Electroquímica (ANE) in 2005].

Online information source

Almost 360 chlorine information requests from 65 countries were received by Euro Chlor via the federation's Internet website Chlorine Online during 2006. The Top 5 countries comprised UK (68), Germany (32), USA (25), France (25) and China (20), which joined the ranking for the first time. Requests primarily concerned health, safety and environmental aspects of chlorine production and use.

15



Effective advocacy depends on sound science

Euro Chlor continues to use its scientific expertise to advocate sound, science-based regulatory decision-making. Key science-related activities in 2006-07 included setting up REACH consortia; compiling EU registration dossiers for chlorine-based biocides; investigating possible links between chlorinated swimming pools and childhood asthma; and updating recommendations on minimising workplace exposure to mercury.

Consortia gear up for REACH

Supported by member company experts, Euro Chlor embarked in 2006 on a major initiative to form consortia for the registration of 17 business-critical chlorine-related compounds under the new (June 2007) EU Regulation on Registration, Evaluation and Authorisation of Chemicals (REACH).

Under this legislation, about 30,000 substances will have to be registered by the European chemical industry. REACH aims to protect human health and the environment, maintain chemical industry competitiveness and prevent fragmentation of the EU internal market.

Euro Chlor expects to have most consortia operating by end 2007. Data availability, leading registrants, and cost-sharing procedures remain to be finalised. Fortunately, Euro Chlor and the European Chlorinated Solvent Association (ECSA), which is part of Euro Chlor, have extensive experience in data generation and dossier preparation under previous EU and international regulations.

Euro Chlor and member company scientists invested significant time and effort in meeting the July 2007 deadline for registration of chlorine, sodium hypochlorite and calcium hypochlorite under the Biocidal Products Directive. This aims to harmonise the European market for biocidal products and their active substances whilst providing a high level of protection for human health and the environment.

Existing risk assessment dossiers were updated to match the required format, and data was collected on the efficacy of available chlorine, and on exposure during the various applications covered by the directive.

Costs minimised

Costs were minimised by preparing the three biocides dossiers in parallel. Additionally, abstracts from the chlorine dossier were provided on a fee basis to a few non-member companies seeking to register active chlorine because they sell small-scale electrolysis units to produce the chemical on site in hospitals and swimming pools for disinfection applications.

Nonetheless, preparation of the dossiers will still cost industry more than €800,000 with additional registration data expected to cost a further €200,000 in 2008.

Chlorine and asthma

There have been persistent reports – often overly dramatised by the media – in recent years of a possible link between chlorinated indoor pools and childhood asthma. However, the body of sound scientific evidence to support the hypothesis has been lacking. Euro Chlor organised a meeting late 2006 in Brussels of scientists and medical specialists who discussed and reviewed the scientific literature, concluding that further investigations were warranted.

A decision was taken to invite international experts in epidemiology, swimming pool environments and respiratory ailments/asthma to debate the issue. The objective is to develop a consensus on current knowledge and which studies should be conducted to provide definitive evidence of any negative health effects resulting from exposure to chloramines. These are formed in the pool air by the reaction of free chlorine with organic substances such as sweat and urine.

The experts' meeting was scheduled to take place at Leuven University, Belgium, in August 2007 (after this Review had been printed).

Limiting exposure

Euro Chlor recommendations on best practices to limit mercury exposure in the workplace were reviewed and updated. These provide member companies operating mercury-based electrolysis plants with up-to-date practical guidelines for hygiene, exposure measurement and reporting.

The recommendations, which take the form of a Code of Practice, now include the new maximum occupational exposure recommendation of 30 microgrammes/g creatinine by the EU Scientific Committee for Occupational Exposure Limits (SCOEL). They were also revised to comply with industry's self-assessment audit scheme. This aims to optimise working practices, lower worker exposure and improve audit results.

Euro Chlor was also involved in preparations to implement the EU Occupational Electromagnetic Fields (EMF) Directive published in 2004 for national implementation within four years. The directive is applicable to all employers in the EU. It is primarily designed to protect workers against established impacts, such as thermal and electrical effects on the body.

CENELEC (the European Committee for Electrotechnical Standardisation) was mandated by the European Commission to prepare exposure limit standards. Euro Chlor assisted on behalf of the chlor-alkali sector by preparing a methodology to calculate exposure values around transformers and rectifiers in electrolysis cell rooms. Only a small number of trained operators work in these areas.

The Scientific Committee on Health & Environmental Risks (SCHER) endorsed in 2006 the conclusions of the EU risk assessment on caustic soda. This stated that most of the production steps and applications did not pose a risk to human health and there were no risks for the environment. However, a need was identified for risk management measures on a few aspects of production and use.

Children's health and chemicals

Children are particularly vulnerable to environmental exposures. Because of the ubiquitous nature of chlorine, Euro Chlor scientists endeavour whenever possible to contribute to informed debate about our responsibility to minimise or reduce environmental and health effects.

Through Cefic, for example, we provided information about our industry's product stewardship efforts for a publication (available as pdf under publications at www.cefic.org) distributed to participants at the mid-term review (June 2007) in Vienna of the WHO Children Environment and Health Action Plan for Europe.

Cefic presented industry's views on chemicals, environment and children's health as part of a long-term strategy to earn recognition as a valued stakeholder in the run up to the 2009 WHO Ministerial Conference on this issue.

17

Robust demand for caustic soda

For the third successive year, European chlorine production continued strong and steady in 2006, accompanied by robust demand for this chemical's co-product, caustic soda. Market demand last year for chlorinated solvents stabilised after a prolonged period of decline. On the manufacturing side, chlor-alkali producers continued the gradual shift away from mercury cells to more energy-efficient membrane technology.

Chlorine production totalled 10.39 million tonnes last year (2006) compared with 10.45 million in 2005 and the 10-year-high of 10.54 million in 2004. Capacity utilisation rates in 2006 averaged 83% compared with 84% in 2005.

For every tonne of chlorine produced, about 1.1 tonnes of caustic soda is made and production of the two chemicals last year exceeded 20 million tonnes.

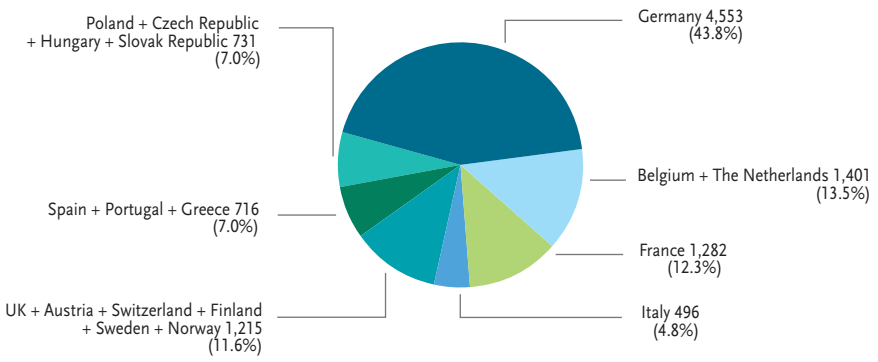
Demand for caustic soda (also called sodium hydroxide) fluctuated significantly, but overall there was strong demand for the second year in a row.

As a result, caustic stocks held by producers dropped below 300,000 tonnes in March 2006 and reached an all-time low of 215,000 tonnes in November. It was not until March 2007 that stock levels returned above the 300,000 tonnes mark.

Chlorine and caustic soda are used in more than half of all commercial chemistry applications to create hundreds of secondary compounds that in turn contribute to plastics, pharmaceuticals and thousands of other products. The largest use of chlorine is in production of polyvinyl chloride (PVC or vinyl) plastic *(see p. 19)* and for caustic soda in the production of pulp & paper *(see p. 20)*.

Germany is the largest chlorine producer (see below) accounting for 43.8% of

European chlorine production in 2006 (kilotonnes)



Note: Countries are grouped as shown to comply with EU competition law

European production. Belgium/The Netherlands (13.5%) overtook France (12.3%) in 2006 to become the second largest chlorine producer after Germany. France dropped to third place. Together, the top three regions accounted for about 70% of total production last year.

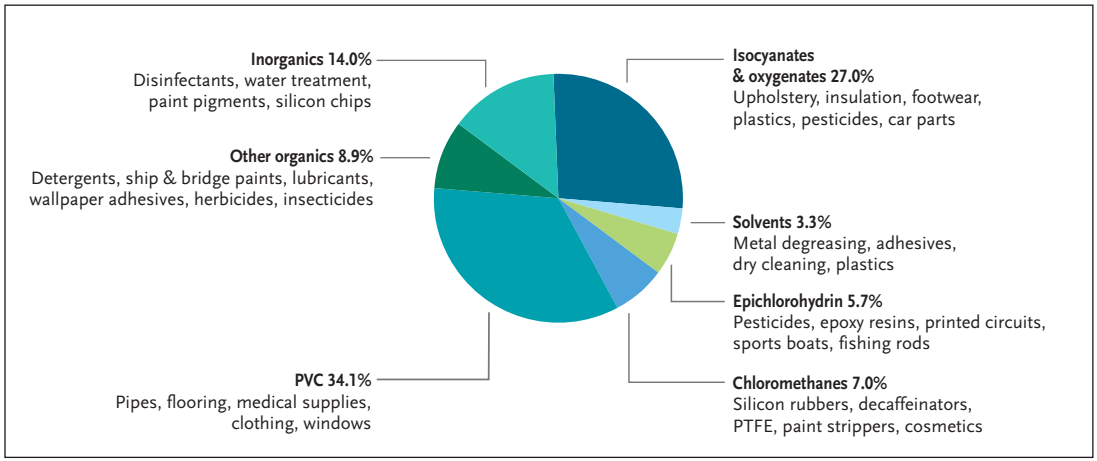
Chlorine and caustic soda are produced by electrolysis using three main technologies – mercury, membrane and diaphragm. The mercury process has been used for more than a century. Ten years ago, it accounted for more than 60% of European capacity. End 2006, it represented 43% and by end 2007 is expected to be overtaken as the principal technology by the more energy-efficient membrane process. By 2010, mercury cells are expected to represent less than 35% of capacity.

This gradual shift away from mercury cells stems from a voluntary commitment made by European industry to close or convert such plants to non-mercury technology by 2020 (except for production of a few speciality chemicals).

The long time frame is essential to allow chlor-alkali producers to absorb the estimated €3,000 million investment required to effect the phase-out without damaging the industry's competitive position on global markets.

The 2010 phase-out decision taken in 1998 was in response to public concerns about human health and environmental issues related to mercury. It is a naturally-occurring toxic element found in the earth's crust and mined industrially.

European chlorine applications in 2006 (10.14 million tonnes)



19

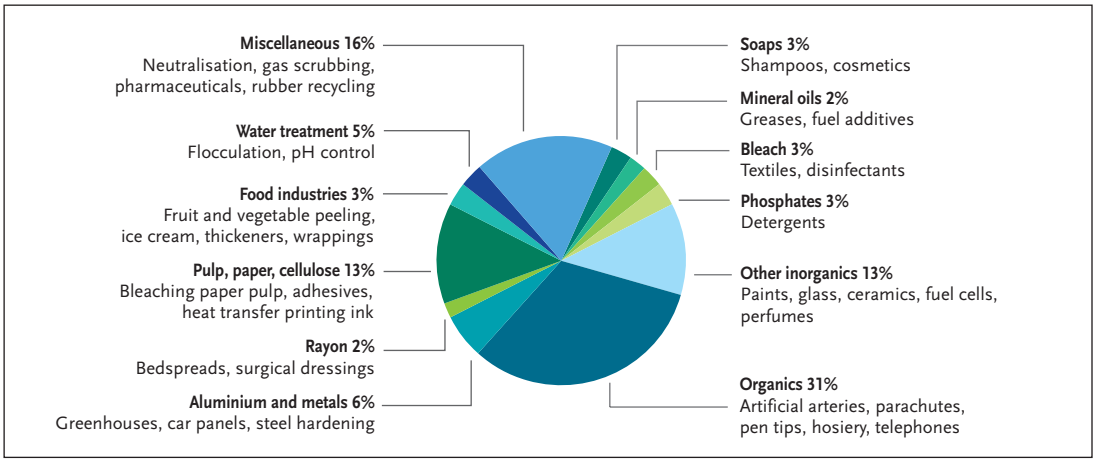
During 2006, mercury plants were decommissioned in several countries. In The Netherlands, Akzo Nobel shut down a plant (74,000 tonnes/year) in Hengelo as part of a restructuring to minimize chlorine transportation; in France, Arkema closed mercury cells (184,000t/y) at St Auban in the Alpes/ Haute-Provence region; in Belgium, Tessenderlo Chemie replaced a mercury plant (150,000 t/y) with membrane technology (270,000 t/y) and at Runcorn in the UK, INEOS Chlor completed a new membrane cell room as part of a continuing modernisation programme; the company retains some existing mercury cells at the site.

As mercury cells are decommissioned, producers return recovered surplus mercury to Minas de Almadén in Spain, which until it ceased production was the largest mercury mine in Europe.

Under a 2001 agreement with Euro Chlor, such mercury replaced tonne-for-tonne metal that would have otherwise been mined. This route was taken because it reduced emissions from mining and processing new mercury, saved energy and met legitimate demands for the metal elsewhere in the world.

During the past six years about 2,000 tonnes of liquid mercury from

European caustic soda applications 2006 (9.89 million tonnes)



Storage in salt mines provides corrosion-free environment

decommissioned plants has been recovered and reused, but about 9,600 tonnes remains in 43 mercury-based plants in 14 countries.

Since the EU Commission announced in 2005 that it intended to phase out all mercury exports by 2011 as part of a strategy against mercury pollution, Euro Chlor has been developing a plan to provide safe, indefinite storage of liquid mercury in deep underground salt mines.

Mercury from chlor-alkali plants - as well as non-ferrous metal and natural gas cleaning industries - would be stored in hermetically-sealed steel containers under such circumstances that there is no risk of corrosion (there is no humidity in a salt mine).

Both the EU Commission and Euro Chlor are convinced that such disposal can be done safely provided appropriate storage and rigorous safety requirements are observed.

With an EU regulation on exports expected to be agreed early 2008, Euro Chlor is now able to finalise plans for a voluntary commitment by producers on storage after 1 July 2011.

Combustion main source of mercury emissions

Some 70% of global mercury emissions of human origin come from coal-fired power stations and the incineration of waste materials. Cremation is a significant source, principally due to volatisation of amalgam dental fillings. Combustion in the production of steel, non-ferrous metals, pig iron and cement also contributes to emissions.

Solvents market stabilises

The European market for chlorinated solvents stabilised in 2006, totalling 214,000 tonnes in the EU-25 plus Norway, Switzerland and Turkey. This is 1% lower than 2005 (216,000 t).

The more stringent carcinogenicity classification for trichloroethylene (TRI) imposed by the EU in 2002 continued to hit sales, down 11% to 25,000 tonnes (2005: 28,000 t). TRI sales have fallen 60% since 2001 and only three European producers remain.

European sales of perchloroethylene (PER) were stable at 55,000 tonnes (2005: 56,000 t). PER is still the solvent of choice for 80% of dry-cleaning shops and continues to gain market share as a TRI substitute for metal degreasing.

For the first time since 1997, methylene chloride sales slightly increased to 134,000 tonnes (2005: 132,000 t). It remains the most widely-used chlorinated solvent, particularly for pharmaceutical production.

7th International Technology Conference - April 2008

Euro Chlor will hold its Seventh International Chlorine Technology Conference & Exhibition at the Lyon Congress Centre, France, 15-17 April 2008. The event is intended primarily for chlor-alkali industry personnel involved in production, maintenance, engineering, health, safety and environmental protection. There will be a special session (15 April) for technology presentations by member companies on improvements in energy consumption.

Information: *Chlorine Online* website at www.eurochlor.org.

21

Chlorine production plants

January 2007

Country	*	Company	Site	Process	Capacity (000 tonnes)
Austria	1	Donau Chemie	Brückl	M	65
Belgium	3	SolVin	Antwerp	Hg, M	474
	4	SolVin	Jemeppe	M	176
	5	Tessenderlo Chemie	Tessenderlo	Hg, M	400
Czech Rep.	6	SPOLANA	Neratovice	Hg	135
	7	Spolchemie	Usti	Hg	61
Finland	8	Akzo Nobel	Oulu	Hg	43
	9	Finnish Chemicals	Joutseno	M	75
France	10	PPC	Thann	Hg	72
	11	Rhodia	Pont de Claix	D	220
	12	Arkema	Fos	D, M	270
	13	Arkema	Jarrie	Hg	170
	14	Arkema	Lavera	Hg, D	341
	16	MSSA	Pomblières	Na	42
	17	Prod. Chim. d'Harbonnières	Harbonnières	Hg	23
	18	Solvay	Tavaux	Hg, M	375
	19	Tessenderlo Chemie	Loos	Hg	18
Germany	20	BASF	Ludwigshafen	Hg, M	385
	21	Bayer	Dormagen	M, HCl	480
	22	Bayer	Leverkusen	M, HCl	330
	23	Bayer	Uerdingen	Hg, M	240
	24	Bayer	Brunsbuttel	HCl	210
	25	Dow	Schkopau	M	250
	26	Vinnolit	Knapsack	Hg, M	310
	27	CABB	Gersthofen	M	40
	28	Dow	Stade	D, M	1,585
	29	Akzo Nobel	Ibbenbüren	Hg	125
	30	Akzo Nobel	Bitterfeld	M	83
	31	Degussa	Lülsdorf	Hg	136
	32	INEOS Chlor	Wilhelmshaven	Hg	149
	33	LII Europe	Frankfurt	Hg	167
	34	Solvay	Rheinberg	D, M	200
	35	VESTOLIT	Marl	Hg, M	216
	36	Vinnolit	Gendorf	Hg	82
	37	Wacker Chemie	Burghausen	M	50
Greece	38	Hellenic Petroleum	Thessaloniki	Hg	40
Hungary	39	BorsodChem	Kazincbarcika	Hg, M	301
Ireland	*40*	*MicroBio*	Fermoy	M	6

* Number on map

Country	*	Company	Site	Process	Capacity (000 tonnes)
Italy	41	Altair Chimica	Volterra	Hg	27
	42	Solvay	Bussi	Hg	87
	43	Caffaro	Torviscosa	Hg	68
	44	Syndial	Assemini/Cagliari	M	153
	45	Syndial	Porto Marghera	Hg	200
	48	*Eredi Zarelli*	Picinisco	Hg	6
	49	Solvay	Rosignano	Hg	125
	50	Tessenderlo Chemie	Pieve Vergonte	Hg	42
Netherlands	51	Akzo Nobel	Botlek	M	633
	52	Akzo Nobel	Delfzijl	M	108
	54	*GE Plastics*	Bergen op Zoom	M	89
Norway	55	Borregaard	Sarpsborg	M	45
	56	*Elkem*	Bremanger	M	10
	57	Hydro Polymers	Rafnes	M	260
Poland	58	PCC Rokita	Brzeg Dolny	Hg	125
	59	ZACHEM	Bydgoszcz	D	60
	60	Anwil	Wloclawek	M	214
	87	*Tarnow*	Tarnow	Hg	43
Portugal	61	Solvay	Povoa	M	29
	62	CUF-Químicos Industriais	Estarreja	M	68
Slovak Rep.	63	Novácke chemické závody	Novaky	Hg	76
Slovenia	*88*	*TKI Hrastnik*	Hrastnik	M	15
Spain	64	Ercros	Huelva	Hg	101
	65	Ercros	Sabinanigo	Hg	25
	66	Ercros	Vilaseca	Hg, M	190
	67	Electroquímica de Hernani	Hernani	M	15
	68	Elnosa	Lourizan	Hg	34
	69	Ercros	Flix	Hg	150
	70	Química del Cinca	Monzon	Hg	31
	71	SolVin	Martorell	Hg	218
	72	Solvay	Torrelavega	Hg	63
Sweden	74	Akzo Nobel	Skoghall	M	95
	75	Hydro Polymers	Stenungsund	Hg	120
Switzerland	77	SF-Chem	Pratteln	Hg	27
	89	Borregaard	Atisholtz	M	10
UK	82	INEOS Chlor	Runcorn	Hg, M	767
	85	Albion	Thetford	M	7
TOTAL					12,681

* Number on map

Process: Hg: Mercury M: Membrane Na: Sodium D: Diaphragm HCl: Electolysis of HCl to Cl_2

Company names in italic are not Euro Chlor members.

Euro Chlor

Regulatory and HSE focal point

Euro Chlor represents the interests of 97% of chlor-alkali producers in the EU-27 and the EFTA regions with the EU institutions and international authorities. It also provides a focal point for members to share best practices on health, safety and environment (HSE) matters as well as co-ordinate scientific and communications activities to improve understanding of chlorine chemistry.

In Europe, 39 producer members of Euro Chlor directly employ about 39,000 people at 69 manufac-turing locations in 19 countries. However, almost 2,000,000 jobs are directly or indirectly related to chlorine and its co-product caustic soda when downstream activities are taken into consideration.

Apart from producers, Euro Chlor also has 44 Associate members and 39 Technical Correspondents. These include national chlorine associations and working groups, suppliers of equipment, materials and services as well as downstream users and producers outside Europe.

From offices in Brussels, Euro Chlor also provides the Secretariat for the World Chlorine Council, a global network of national or regional organisations in more than 27 countries. WCC represents producers accounting for more than 80% of worldwide chlor-alkali production.

Euro Chlor was founded nearly 40 years ago as a production-oriented technical organisation but was restructured in 1989 in order to provide the sector with strengthened scientific, advocacy and communications capabilities. Since then, a strong focus has been placed on sound science coupled with continual health, safety and environmental improvements complemented by open and transparent communications with key stakeholders.

Management committee (30 July 2007)

Chairman, Tane, C	INEOS Chlor
Co-chairman, Ohm, C	Bayer MaterialScience
Coenen, F	Tessenderlo Chemie
Constant, F	Solvay
Fuhrmann, W	Akzo Nobel Base Chemicals
García Brú, F	Ercros
Garrigue, F	Rhodia Services
Kahsnitz, J	VESTOLIT
Lamm, R	Dow
Märkl, R	BASF
Pelzer, A	PCC Rokita
Procházka, M	Spolchemie
Raae, S	Norsk Hydro
Rieche, T	Degussa
Russo, G	Syndial
Tual, D	Arkema
Winhold, M	Vinnolit

Secretariat staff

Steel, Alistair	Executive Director
Minne, Françoise	Senior Assistant
Garny, Véronique	Science Director
van Wijk, Dolf	Science Manager
Marquardt, Wolfgang	Science Manager
Bertato, Valentina	Science Manager
Harcz, Péter	Science Manager
Norré, Viviane	Assistant
Seys, Arseen	Deputy Executive Director; Environment & Regulatory Affairs Director
Andersson, Caroline	Regulatory Affairs Counsellor
Coppens, Isabelle	Assistant
Orban, André	ECSA & Chlorinated Paraffins Manager
Whippy, Peter	Communications Manager
Tomas Moreno, Anna	Communications Coordinator
Debelle, Jean-Pol	Technical & Safety Director
Albus, Claire	Assistant

Organisation

The 16 Secretariat staff employed at offices in Brussels represent nine nationalities (Belgian, English, Dutch, French, German, Hungarian, Italian, Spanish and Swedish) and between them speak 10 languages.

Guidance and overall strategic direction is provided by the Management Committee and 38 committees and working groups provide specialist knowledge and support.

Global co-ordination responsibilities

Euro Chlor's Deputy Executive Director Dr Arseen Seys, who is responsible for Regulatory & Environmental Affairs, is also Managing Director of the World Chlorine Council. This followed transfer of the WCC Secretariat in January 2007 from the Chlorine Chemistry Division (CCD) of the American Chemistry Council to Euro Chlor.

Dr Seys is responsible for co-ordinating the combined resources of the main WCC members to meet broad global industry goals and targets. He is a frequent speaker on chemicals regulations, product stewardship and sustainability at seminars around the world held under the auspices of the WCC, International Council of Chemical Associations (ICCA) and UN bodies.

Committees & working groups

Management

- Management Committee
- Sustainability *ad hoc* Task Force
- Statistics Committee

Advocacy & communications

- Regulatory Affairs Committee
- EU Advisory Group
- National Chlorine Associations WG
- Chlorine Communicators' Network (CCN)

Product groups

- Chlorinated Paraffins Sector Group
- Potassium Group

Science

- Steering Committee
- Environmental Working Group
- Toxicology WG
- Risk Assessment *ad hoc* WGs
  - Caustic soda
  - Chlorine
  - Sodium hypochlorite
- Biocides Strategy Group Registration Groups
  - Chlorine
  - Sodium hypochlorite
  - Calcium hypochlorite
- REACH Project Team

Technical & safety

- General Technical Committee (GTC)
- Environmental Protection WG
- GEST (Safety) WG
- Equipment WG
- Transport WG
- Health WG
- Electromagnetic Fields WG
- Analytical WG

European Chlorinated Solvent Association

- Management Committee
- Communication & Outreach WG
- General Technical WG
- Occupational & Environmental Health WG
- Product WG
- Chlorinated Solvents Risk Assessment WG
- Chloroform Risk Assessment WG
- REACH Steering Committee (with six product teams)

25

Membership

Full members

Akzo Nobel Base Chemicals
Altair Chimica
Anwil
Arkema
BASF
Bayer MaterialScience
Borregaard Industries
BorsodChem
CABB
Caffaro
CUF-Químicos Industriais
Degussa
Dow Deutschland Anlagengesellschaft
Donau Chemie
Electroquímica de Hernani
Electroquímica del Noroeste (Elnosa)
Ercros
Finnish Chemicals
Hellenic Petroleum
Hydro Polymers
INEOS Chlor
LII Europe
MSSA
Novácke Chemické Závody
PCC Rokita
PPC SAS
Produits Chimiques d'Harbonnières
Química del Cinca
Rhodia Services
SF-Chem
Solvay
SolVin
SPOLANA
Spolchemie
Syndial
Tessenderlo Chemie
VESTOLIT
Vinnolit
ZACHEM

Associate members

Al Kout Industrial Projects
Albion Chemical Distribution
Angelini A.C.R.A.F.
Arch Chemicals
Asahi Kasei Chemicals
Association of Chemical Industry of the Czech Republic (SCHP)
Association of the Dutch Chemical Industry (VNCI)
Bochemie
Chemical Industries Association (CIA)
Chemieanlagenbau Chemnitz
Chemoform
Chlorine Engineers
Colgate-Palmolive Europe
ExxonMobil Petroleum and Chemical
essenscia - Belgian federation for chemistry and life sciences
Federchimica Assobase
GHC Gerling, Holz & Co
Hungarian Chemical Industry Association (MAVESZ)
Industrie De Nora
Jianghan Salt & Chemical Complex
K + S
Leuna Tenside
LOMBARDA H
Lonza
Nankai Chemical Industry
National Petrochemical Company of Iran
NCP Chlorchem
Nippon Soda
Plast- & Kemiföretagen – The Swedish Plastics and Chemicals Federation
Polish Chamber of the Chemical Industry (PIPC)
PPG Industries
Procter & Gamble Eurocor
SGCI Chemie Pharma Schweiz
Shikoku Chemicals
Sojitz Europe
Spanish Chlorine Producers Association (ANE)
Syndicat des Halogènes et Dérivés (SHD)
Syngenta
Teijin Twaron
Tosoh Corporation
Uhde
Unilever Hellas
Verband der Chemischen Industrie (VCI)
Waterchem

Technical correspondents

AGC Chemicals Europe
Alcan PMGE Pechiney Nederland
Applitek
Arabian Chlorine
Asahi Organic Chemicals Industry
Bayer Technology Services
Carburos Metálicos
Chemtec
Crane Resistoflex
Descote
Electroquímica de Sagua
Eramet
Garlock
GEA Messo
H2SCAN Corporation
UK Health and Safety Executive
ISGEC
Koruma Klor Alkali
Kronos
Lubrizol Advanced Materials Europe
Nufarm Coogee Pty
O.P.W Fluid Transfer Group Europe
Occidental Chemical
Phönix Armaturen – Werke
Powell Fabrication & Manufacturing
Recherche 2000
Samson
Sasol Polymers
Senior Flexonics Ermeto
Severn Trent Water
Shaw, Son & Greenhalgh
SIEM – Supranite
Simon Carves
Smart-Hose Technologies
Technip France
Tronox Pigments
Trust Chemical Industries
W.L.Gore & Associates
WT Armatur

Full members

Akzo Nobel Base Chemicals BV
P O Box 247
NL-3800 AE Amersfoort
THE NETHERLANDS
Switchboard: +31 33 467 67 67
General fax: +31 33 467 61 19
www.akzonobel.com

Altair Chimica SpA
Via Moie Vecchie, 13
I-56047 Saline di Volterra (PI)
ITALY
Switchboard: +39 05 88 98 11
General fax: +39 05 88 44 392
www.altairchimica.com

Anwil SA
ul. Torúnska, 222
PL-87-805 Wloclawek
POLAND
Switchboard: +48 54 236 30 91
General fax: +48 54 236 19 83
www.anwil.pl

Arkema
420, rue d'Estienne d'Orves
92705 Colombes Cedex
FRANCE
Switchboard: +33 1 49 00 80 80
General fax: +33 1 49 00 83 96
www.arkema.com

BASF AG
Carl-Bosch-Str., 38
D-67056 Ludwigshafen
GERMANY
Switchboard: +49 621 600
General fax: +49 621 604 25 25
www.basf.com

Bayer MaterialScience AG
D-51368 Leverkusen
GERMANY
Switchboard: +49 214 301
General fax: +49 214 303 88 10
www.bayermaterialscience.com

Borregaard Industries Ltd
P O Box 162
N-1701 Sarpsborg
NORWAY
Switchboard: +47 69 11 80 00
General fax: +47 69 11 87 70
www.borregaard.com

BorsodChem RT
P O Box 208
H-3702 Kazincbarcika
HUNGARY
Switchboard: +36 48 511 211
General fax: +36 48 511 511
www.borsodchem.hu

CABB GmbH
Am Unisys-Park 1
D-65840 Sulzbach am Taunus
GERMANY
Switchboard: +49 6930 527 777
General fax: +49 6930 5277 778
www.cabb-chemicals.com

Caffaro SRL
Piazzale Marinotti 1
I-33050 Torviscosa (UD)
ITALY
Switchboard: +39 0431 3811
General fax: +39 0431 381 379
www.caffaro.it

CUF-Químicos Industriais S.A.
Quinta da Industria
Beduído
P-3860-680 Estarreja
PORTUGAL
Switchboard: +351 234 810 300
General fax: +351 234 810 306
www.cuf-qi.pt

Degussa AG
Bennigsenplatz 1
D-40474 Düsseldorf
GERMANY
Switchboard: +49 211 6504 0410
General fax: +49 211 6504 1472
www.degussa.com

Dow Deutschland Anlagengesellschaft mbH
Werk Stade
D-21677 Stade
GERMANY
Switchboard: +49 4146 910
General fax: +49 4146 912 600
www.dow.com

Donau Chemie
Am Heumarkt, 10
1030 Wien
AUSTRIA
Switchboard:+ 43 1 711 470
www.donau-chemie.com

Electroquímica de Hernani SA
Avenida de Madrid, 13 - 1
E-20011 San Sebastian
SPAIN
Switchboard: +34 94 345 11 41
General fax: +34 94 345 39 65

27

Full members

Electroquímica del Noroeste S.A.U. (Elnosa)
P O Box 265
E-36080 Pontevedra
SPAIN
Switchboard: +34 98 685 37 20
General fax: +34 98 684 09 62

Ercros SA
Avenida Diagonal 595 - 10a pl.
E-08014 Barcelona
SPAIN
Switchboard: +34 93 439 30 09
General fax: +34 93 430 80 73
www.ercros.es

Finnish Chemicals Oy
P O Box 7
FIN-32741 Äetsä
FINLAND
Switchboard: +358 204 31 11
General fax: +358 204 310 431
www.finnishchemicals.com

Hellenic Petroleum SA
P O Box 10044
GR-541 10 Thessaloniki
GREECE
Switchboard: +30 2310 750 000
General fax: +30 2310 750 001
www.hellenic-petroleum.gr

Hydro Polymers
Drammensveien 164
N-0240 Oslo
NORWAY
Switchboard : +47 22 538 100
General fax: +47 22 532 444
www.hydropolymers.com

INEOS Chlor Ltd
Runcorn Site HQ
South Parade, PO Box 9
Runcorn
Cheshire WA7 4JE
UNITED KINGDOM
Switchboard: +44 19 2856 1111
www.ineoschlor.com

LII Europe GmbH
Industriepark Hoechst
D-65926 Frankfurt am Main
GERMANY
Switchboard: +49 69 305 20 50
General fax:+ 49 69 305 20 57
www.liieurope.com

MSSA SAS
Pomblière
F-73600 Saint Marcel
FRANCE
Switchboard: +33 4 79247070
General fax: +33 4 79247050
www.metauxspeciaux.fr

Novácke Chemické Závody A/S
M.R. Stefanika, 1
SK-97271 Novaky
SLOVAK REPUBLIC
Switchboard: +421 46 568 11 11
General fax: +421 46 546 12 23
www.nchz.sk

PCC Rokita SA
c/o PCC AG
Moerser Straße 149
D-47198 Duisburg
GERMANY
Switchboard: +49 2066 20 19 11
General fax: +49 2066 546 82
www.pccag.com

PPC SAS
95 rue du Général de Gaulle
68802 Thann Cedex
FRANCE
Switchboard: +33 3 8938 46 00
General fax: +33 3 8938 46 01
www.ppchemicals.com

Produits Chimiques d'Harbonnières
P O Box 1
Place de l'Eglise
F-80131 Harbonnières
FRANCE
Switchboard: +33 3 228 576 30
General fax: +33 3 228 576 31
www.spch.fr

Química del Cinca SA
Avenida Diagonal, 352 Entlo.
E-08013 Barcelona
SPAIN
Switchboard: +34 93 458 40 00
General fax: +34 93 458 40 07
www.qcinca.es

Rhodia Services
40, Rue de la Haie Coq
F-93306 Aubervilliers Cedex
FRANCE
Switchboard: +33 1 53 56 50 00
General fax: +33 1 53 56 54 91
www.rhodia-eco-services.com

SF-Chem
P O Box 1964
CH-4133 Pratteln 1
SWITZERLAND
Switchboard: +41 61 825 31 11
General fax: +41 61 821 80 27
www.sf-chem.com

Solvay SA
Rue du Prince Albert, 33
B-1050 Bruxelles
BELGIUM
Switchboard: +32 2 509 61 11
General fax: +32 2 509 66 17
www.solvay.com

SolVin SA
Rue de Ransbeek, 310
B-1120 Bruxelles
BELGIUM
Switchboard: +32 2 264 21 11
General fax: +32 2 264 30 61
www.solvinpvc.com

SPOLANA a.s.
ul. Prace 657
CZ-277 11 Neratovice
CZECH REPUBLIC
Switchboard: +420 315 661 111
General fax: +420 315 682 82
www.spolana.cz

Spolchemie
Revolu ní 1930/86
CZ-400 32 Ústí nad Labem
CZECH REPUBLIC
Switchboard: +420 477 161 111
General fax: +420 477 163 333
www.spolchemie.cz

Syndial SpA
Piazza Boldrini, 1
I-20097 San Donato Milanese (MI)
ITALY
Switchboard: +39 02 520 326 00
General fax: +39 02 520 326 16

Tessenderlo Chemie SA
Rue du Trône, 130
B-1050 Bruxelles
BELGIUM
Switchboard: +32 2 639 18 11
General fax: +32 2 639 17 02
www.tessenderlo.com

VESTOLIT GmbH & Co. KG
P O Box 10 23 60
D-45753 Marl
GERMANY
Switchboard: +49 2365 4905
General fax: +49 2365 4000
www.vestolit.de

Vinnolit GmbH & Co. KG
Corporate Center
Carl-Zeiss-Ring 25
D-85737 Ismaning
GERMANY
Switchboard: +49 89 96 1030
General fax: +49 89 96 103 103
www.vinnolit.com

ZACHEM S.A.
Ul. Wojska Polskiego 65
PL-85-825 Bydgoszcz
POLAND
Switchboard: +48 52 374 81 00
General fax: +48 52 301 02 82
www.zachem.com.pl

31 July 2007

Euro Chlor provides a focal point for the chlor-alkali industry's drive to achieve a sustainable future through economically and environmentally sound manufacture and use of its products. Based in Brussels, at the heart of the European Union, the federation works with national, European and international authorities to ensure that legislation affecting the industry is workable, efficient and effective.

Responsible Care

Euro Chlor
Avenue E. van Nieuwenhuyse 4, box 2
B - 1160 Brussels, Belgium
tel: +32 2 676 72 11
fax: +32 2 676 72 41
eurochlor@cefic.be
www.eurochlor.org