Chlorine Industry Review
2005-2006

Please accept this review of the chlor-alkali industry and 2007 desk diary with the compliments of Euro Chlor and its member companies

Euro Chlor
representing the chlor-alkali industry

Contents

Cover picture: Renewable energy from the sun. Chlorine is vital to the production of ultra-pure silicon needed to make solar cells. These trap the energy of the sun, transforming it into electricity to heat our homes and offices in an environmentally sound way.

The cover of this diary is made from board coated with PVC – just one of thousands of consumer and industrial applications for this plastic. The largest single use of chlorine in Europe is the manufacture of PVC, also known as vinyl.

Introduction

Stability vital in turbulent times

My predecessor Dr Barrie Gilliatt (see page 25) paid tribute in the last *Chlorine Industry Review* to the model business association, that Euro Chlor has become. This accolade came from Justin Greenwood (Professor of European Public Policy at Aberdeen's Robert Gordon University) author and editor of several acclaimed books on the impact of civil society and business interests upon EU policy.

This recognition should not be forgotten or ignored as the European chemical industry continues an initiative started 18 months ago to re-assess industry representation – first at the EU level then by European industry sector and country level. European policy making is undoubtedly becoming increasingly complex, especially with the continuing enlargement of the EU community. Simultaneously, the influence of non-governmental organisations, particularly on environmental and health issues, is steadily growing.

For Euro Chlor, this is not a time for "out with the old and in with the new". Rather it is a time for calm reflection and an opportunity for re-invigoration as we continue to focus our resources on sustainability issues which are of real concern to our members.

In the past, many issues have been specific to our sector, particularly the long-running challenge of phasing out the mercury-based chlorine production process. However, increasingly we are being affected by broader, legislative and regulatory initiatives with industry-wide impact such as REACH, probably the most important EU chemicals legislation for 20 years.

REACH will be a reality in 2007 and Euro Chlor is on track to do all that is necessary to enable member companies to pre-register and then register key products. Fortunately, Euro Chlor's pioneering work in risk assessment means much of the data is already available. More effort will be required for the smaller volume chlorinated chemicals, but plans are in place.

Sustainable Development is also a dominating necessity for our business life. Our sector took it's first steps down this road more than a decade ago, long before sustainability became fashionable.

Much progress has been made but a great deal more remains to be done if we are to achieve our objectives.

I'll conclude by highlighting an industry-wide issue that is absolutely critical to the chlorine sector: energy. Stable electricity costs and security of supply are paramount for our sector and other power intensive industries. We are bringing our collective innovative skills to bear on finding a short-term solution to unintended consequences of the CO_2 Emissions Trading Scheme and failures in the liberalization of EU electricity markets.

Electricity is an expensive and non-replaceable raw material used to make chlorine.

We have no alternatives.

Alistair J Steel
Executive Director

Sustainability

Time to redouble efforts

Good progress has been made since 2001 when the industry adopted a formal sustainable development strategy and since 2003 when Euro Chlor set 15 measurable environmental, recycling, safety, and energy efficiency performance improvement goals for 2010. With a few exceptions, the industry is on track. However, to achieve an across-the-board success, members will have to redouble their efforts in some areas.

"Euro Chlor believes that winning public trust and confidence depends not only on achieving continuous health, safety and environmental improvements, but also on communicating progress regularly to key stakeholders."

Peter W Whippy
Communications Manager

Sustainability was not yet a fashionable term within industry when in 1995 Euro Chlor unveiled four separate voluntary initiatives that today would be considered as sustainability commitments. The industry announced that it would complete a programme of marine risk assessments for chlorinated substances; reduce emissions from mercury-based plants; improve transfer of technology to Eastern European producers; and develop PVC recycling technologies.

These first steps paved the way for a more formal sustainability programme. This took into consideration not only the environmental implications, but also the social and economic impact of fundamental changes undertaken by the industry. These three aspects form the "triple bottom line" of sustainability.

In 2001, all Western European chlorine manufacturing members of Euro Chlor agreed an industry-wide sustainability strategy that focused on six voluntary commitments:

- 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 of the hydrogen generated by the industry as a raw material or fuel;
- Give high priority to the safe transportation of chlorine.

From these commitments, 15 performance indicators were established with goals for 2010, which were endorsed by the membership.

On the following pages, readers can review performance so far with charts tracking progress.

Economic contribution

Energy usage
The electrolysis process to manufacture chlorine and its essential co-product caustic soda requires considerable electrical power. Not surprisingly, producers have always worked actively to reduce energy consumption since it represents up to 70% of the variable cost of production.

Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). It seeks to achieve a better quality of life for everyone, now and in the future, while protecting and where possible enhancing the environment. It requires an integrated approach to deliver social progress and economic growth whilst maintaining the quality of our natural environment.

Rising energy prices during the past two years have not only hit domestic consumers, but also large industrial users of electricity such as producers of cement, glass, iron, steel, lime, non-ferrous metals, paper and chlorine.

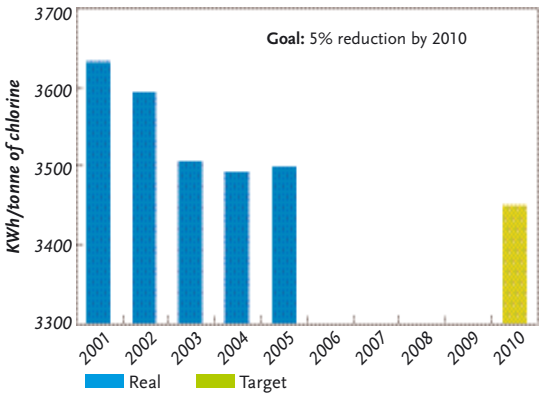
During 2005, Euro Chlor members continued as planned to close or switch from mercury cells, which represent almost 50% of production capacity, to the less energy-intensive membrane technology. Four mercury-based plants closed during 2005 and early 2006 in the United Kingdom (2); Sweden and Poland. New investments were made in membrane cells in Belgium, Sweden, The Netherlands and Poland.

With these changes, overall energy consumption by the industry should have continued to fall. However, production of chlorine continued strong and steady in 2005 resulting in a slight increase in average energy consumption, from 3,491 kWh/t. chlorine produced in 2004 to 3,499 kWh/t. chlorine. Since the programme started, a 3.7% reduction has been achieved, but the industry remains below the necessary trend to reach the 2010 target of a 5% reduction in energy consumption compared with the base year (2001).

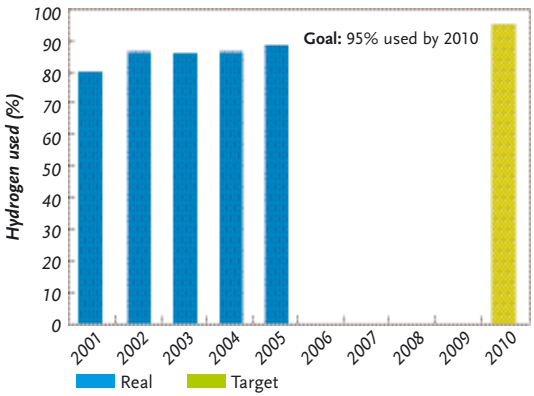
Hydrogen utilisation

Hydrogen gas, which is generated during the electrolysis process, is of high quality and can be used as either a chemical raw material or fuel. For the first time in several years, there was a marked improvement in the utilisation rate of hydrogen gas from 86.3% to 88.1%.

Energy consumption



Hydrogen utilisation



However, efforts will need to be stepped up in order to reach the 2010 target of 95% recycling and use.

Safety & social progress

Lost-time injuries

The goal for 2010 is to reduce lost time injuries (LTI) for both employees and contractors working on chlor-alkali manufacturing sites to 1.3 injuries per million working hours.

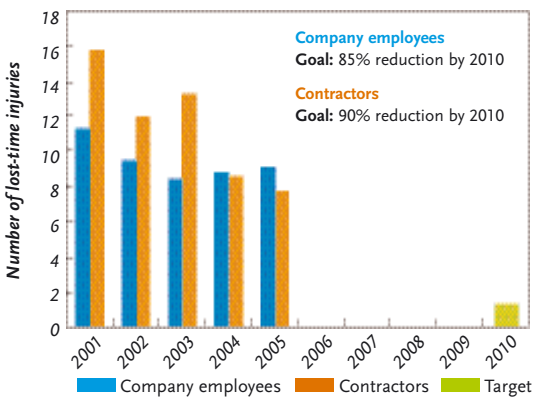
This means an 85% reduction for employees and 90% for contractors when compared with the base year 2001. LTI is measured as being at least one day off work. Lost-time injuries for contractors fell from 8.58 (2004) to 7.72 per million working hours in 2005, but there was a slight increase in the same figure for our own employees – from 8.78 (2004) to 9.09 per million hours. Improvements are being targeted based on the sharing of best practices between producers.

Process incidents and losses

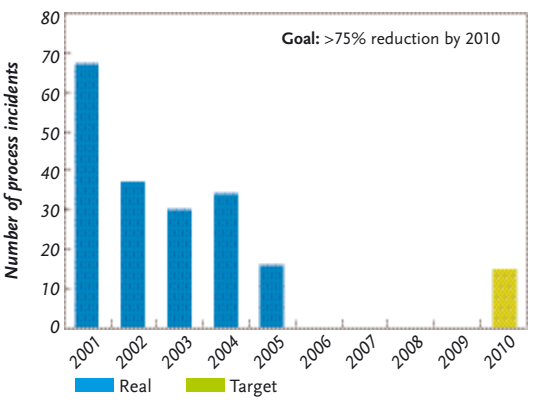
Our goal is a 75% reduction in process incidents and losses from 67 in the base year 2001 to 15 in 2010. Process incidents are classed as serious events involving a fire or an explosion or the release of certain chemicals which cause fatality, serious injury or property damage exceeding 100,000. Losses include any chemical spills to air, water or land which impact the human health, the environment, property or result in evacuation.

The chemicals covered by these statistics are chlorine, hydrochloric acid, sulphuric acid, sodium hypochlorite (bleach) and caustic soda.

Lost-time injuries (per million working hours)



Process incidents and losses



In 2005 there was a satisfactory reduction in the number of serious process incidents and the overall 2010 target continues to be achievable: there were 16 incidents in 2005, less than half the figure reported in 2004 (34).

Responsible Care

Responsible Care is the chemical industry's voluntary stewardship programme. By 2010, 100% of Euro Chlor members are expected to have signed up to their national Responsible Care programmes.

At present, 35 of the 39 chlorine producers that are members of the federation are participating in this stewardship programme. This figure has been unchanged since 2001.

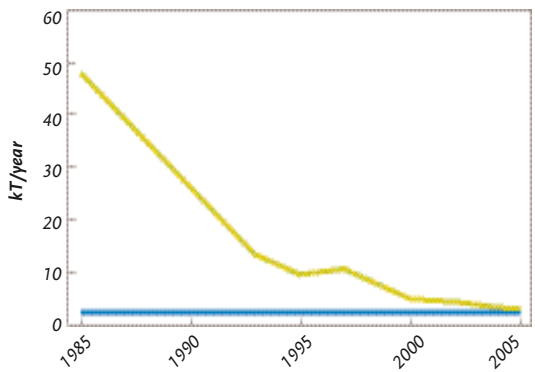
Environmental protection

Plant emissions

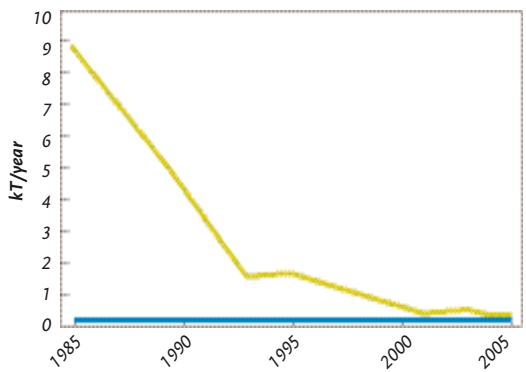
Emissions to air and water of the following 22 chlorinated organic compounds (COCs) have been collected since 1985: 1,1,1-trichloroethane; 1,1,2-trichloroethane; 1,2-dichlorobenzene; 1,2-dichloroethane; 1,4-dichlorobenzene; 2-chlorophenol; 3-chlorophenol; 4-chlorophenol; carbon tetrachloride; chlorine; chlorobenzene; chloroform; dichloromethane; dioxins and furans (as TEQ); hexachlorobenzene; hexachlorobutadiene; hexachlorocyclohexane; pentachlorophenol; tetrachloroethylene; trichlorobenzene; trichloroethylene and vinyl chloride.

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

Emissions to air (kT/year)



Emissions to water (kT/year)



Measuring from the 2001 baseline, a target of a further 50% reduction to air and 75% to water was set for 2010.

At end 2005, the industry had achieved a 34% reduction for emissions to air compared with 31% at end 2004 and a 67% reduction to water compared with 36% at end 2004.

Mercury emissions

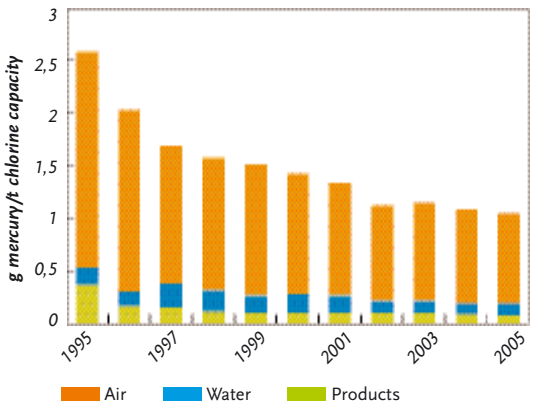
The deadline for a reduction in mercury emissions was set for 2007 rather than 2010 since the industry had already set a voluntary goal in 1998, three years before the wider sustainability programme started. Members agreed to retain the earlier date, since from October 2007 all EU chlor-alkali plants – regardless of technology used – will require a permit based on Best Available Techniques (BAT) under the Integrated Pollution Prevention and Control (IPPC) Directive.

The 2007 voluntary goal was to reduce emissions to 1.0g mercury per tonne of mercury cell chlorine capacity on a national basis with no individual plant exceeding 1.5g/t capacity.

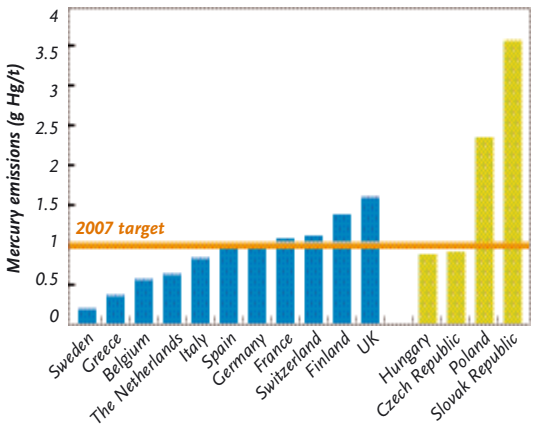
Data for 2005 includes emission levels from Eastern European plants as well as Western Europe plants.

The overall European average emissions level dropped from 1.09 (2004) to 1.05 g Hg/t chlorine capacity in 2005. For Western Europe alone where Euro Chlor has been monitoring emissions since 1977, the average on a national basis dropped for the first time below 1.0 g/t capacity.

All European mercury emissions



Compliance with commitments 2005



Transportation
The 2010 goal is for zero incidents involving bulk transportation of chlorine. Today, with the exception of local pipelines, just 7% of all chlorine produced in Europe is transported, so accident rates remain low.

Following zero accidents in 2004, three were reported to Euro Chlor in 2005, including a potentially serious derailment of a bulk chlorine train in Sweden.

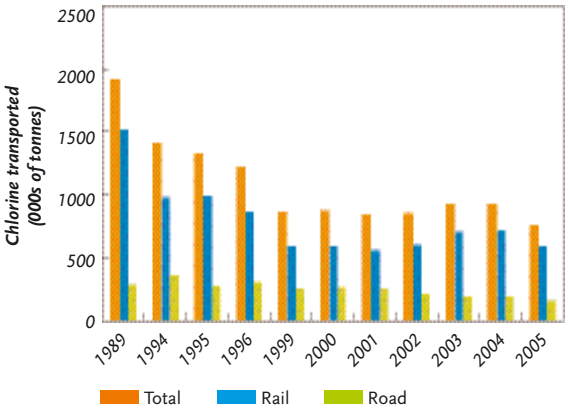
There were no injuries and because company emergency teams at the incident followed best practices, there were no chemical releases when chlorine was transferred from the damaged tank cars.

The amount of chlorine transported continues to fall. In 2005, manufacturers in Europe transported 761,000 tonnes (2004: 925,000 tonnes) of which more than three-quarters was shipped by rail and about one-quarter by road.

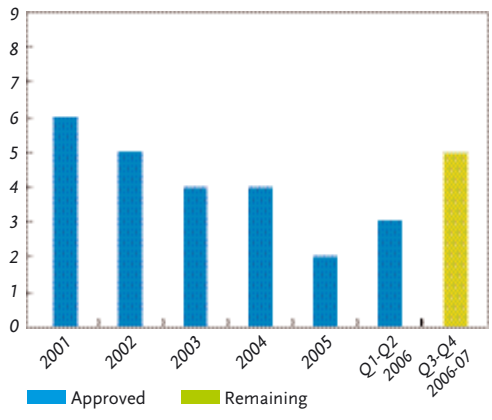
The average distance chlorine was transported by rail was 419 km and by road 187 km.

Extending product knowledge
Euro Chlor opted not to set a specific target for 2010 since the sector had committed in 1999 to an earlier global chemical industry initiative. This voluntary programme - managed by the International Council of Chemical Associations (ICCA) and OECD - aimed to provide harmonised, internationally-agreed data

Transportation of chlorine



Assessed chlorinated chemicals



and initial assessment reports for about 1,000 High Production Volume (HPV) chemicals by 2004. This deadline proved far tougher than anticipated and was extended to 2009 by ICCA.

By end 2005, a total of 542 chemicals had been dealt with by the global chemical industry. Of this total, Euro Chlor completed 21 (including p-chloro-toluene, C.I. pigment green 7 in 2005) and a further three (1,4-dichloro-2-butene, 2,3-dichloro-1,3-butadiene and sodium chlorate) were finalised during early 2006.

Five other assessments will be completed by December 2007 making a total of 29 fulfilling the European sector's original commitment of 1999.

Vinyl 2010 reports recycling success

Recycling of PVC waste through the Vinyl 2010 project more than doubled in 2005 from 18,400 tonnes (2004) to 38,800 tonnes. Launched in 2000, this voluntary 10-year plan was rolled out across all 25 EU Member States in 2006. The goal is to achieve sustainability throughout the life cycle of this plastic, which consumes more than a third of annual European chlorine production to make pipes, flooring, medical supplies, clothing and windows.

The European PVC industry's commitment to recycle and reuse 200,000 tonnes of waste per year by 2010 has been extended to include the new EU member states, "keeping in mind that experience has demonstrated that the available volumes of PVC waste are actually lower than the ones expected in 2001".

This is attributed to a longer-than-expected product lifecycle and to direct re-use of products such as 'end-of-life' PVC window profiles. "Economic conditions in the waste market also encourage exporting waste outside Europe to be recycled."

Delays in implementation of the Landfill Directive in EU countries other than Germany means that it is still cheaper to send waste to landfill sites than to recycle. Vinyl 2010 would like to see the directive fully effective across the entire enlarged European Union.

Legislative developments

Drive for efficient and balanced regulations

European chlor-alkali producers look to their business association to provide leadership and focus, particularly in contributing to the development of efficient and balanced regulations and legislation. Whether at regional, global or national levels, Euro Chlor drives industry-wide advocacy initiatives to achieve this goal. Significant contributions were made regulatory initiatives aimed at reducing mercury pollution and advocacy efforts accelerated to achieve faster implementation of an effective EU internal energy market.

Seeking viable mercury storage solution

Almost half (48%) of the chlorine capacity in Europe currently depends on a process that utilises mercury, a toxic metal that the EU Commission wants to ban for environmental and health reasons.

In June 2005, as part of a broader EU mercury strategy, the Council of Ministers called on the Commission to develop a regulation with two goals. Firstly, to ban the export of all mercury from the EU no later than 2011. Secondly, to specifically control storage of metal from decommissioned mercury-based chlorine plants until all are either voluntarily closed or converted to alternative membrane technology. An impact assessment on the regulation will also have to be carried out.

Euro Chlor has been contributing to discussions with the Commission to help find a sustainable and satisfactory solution to both export and storage issues.

Currently, there is no legislation restricting the export of mercury from the EU. Since 2001, 1,500 tonnes of pure mercury from decommissioned plants has been returned to the Spanish mining and trading company Minas de Almadén, which has used it to replace metal that would otherwise be mined.

The Commission acknowledges that this approach is a responsible effort by industry to help control pollution: it saves energy through eliminating the need to process ore and reduces emissions from mining new metal. However, since the industry agreement with Almadén would automatically become redundant following an export ban, the Commission last year invited Euro Chlor to explore the scope for a voluntary storage agreement.

Euro Chlor prepared an outline voluntary agreement early 2006 with a view to endorsement by the Commission before year end. It will then be forwarded to the Council of Ministers and European Parliament for review.

Key industry concerns include the need for such an agreement to be legally sound and recognised in the planned regulation; that there will be no export ban earlier than 2011; storage in underground salt mines of excess mercury would be permanent; certain exemptions from existing directives would be permitted (e.g. to allow mercury to be stored as a liquid); and legal certainty that the transport of mercury between Members States would be authorised.

Electricity key factor in chlorine economics

Electricity is used primarily as a raw material by the chlor-alkali sector. Producing chlorine industrially requires the passing of a strong electrical current through a brine solution (electrolysis). Electricity cannot be substituted and represents as much as 70% of the variable cost of chlorine production.

The chlor-alkali sector is the largest user of electricity in the chemical industry. Escalating EU energy prices have had a disproportionate effect on

European producers and their competitiveness in global and regional markets. In 2005, an estimated 40 million megawatt hr. of electricity was used in Europe to produce 12.3 million tonnes of chlorine.

The lack of real competition in EU electricity supply is a major concern for chlor-alkali producers and all similar energy-intensive industries. The situation has worsened because of the EU Emission Trading Scheme (ETS), which started at the beginning of 2005.

Under the scheme, power producers are allocated carbon dioxide (CO_2) emission permits free of charge by national governments, but have to purchase additional permits on the open market if they exceed the volume of allocated emissions. The cost of these purchased permits is then built into the electricity price, including the production for which permits were issued free, thus yielding so called "windfall profits".

Commented Euro Chlor Executive Director Alistair Steel: "For our sector alone it is estimated that producers will now have to absorb an additional € 500 million per year.

We believe that EU policy makers must find a rapid solution to this specific issue, perhaps by correcting the CO_2 allowances allocation method so that energy-intensive industries are not impacted."

"More generally, measures must urgently be taken that would lead to a truly liberalised energy market. We welcome the creation of the EU

Membrane technology preferred for new plants

Chlorine and its co-product caustic soda (sodium hydroxide) are produced industrially in Europe by primarily three electrolysis processes: mercury, diaphragm and membrane. The two oldest technologies are diaphragm (1885) and mercury (1892). The membrane process was introduced in the early 1970s and has become the technology of choice for most producers because it uses less energy and is more environmentally sustainable.

In the mercury electrolysis process, the liquid metal is used as the cathode and titanium as the anode. When a strong electrical current is passed through an aqueous solution of salt (sodium chloride) called brine, chlorine gas is produced at the anode and caustic soda and hydrogen gas are produced indirectly via the cathode. The liquid mercury is continually recycled in the closed cells, but very minute quantities are lost to the environment.

A typical mercury-based chlorine plant can contain up to 100 cells and has an economic life span of 40-60 years. Currently, about 11,000 tonnes of pure mercury are utilised in the 45 remaining mercury plants in Europe. The investment needed to close or convert these to alternative technology is high - estimated at about €3,000 million - hence the relatively long phase out period industry needs to finance the change over to membrane technology.

In 2005, mercury accounted for 48% of European capacity, membrane 32%, diaphragm (3 plants) 18% and other technology 3%.

Urgent measures needed to create "truly liberalised energy market"

High Level Group on Competitiveness, Energy & Environment, which first met in February 2006, and we will work through the Alliance of Energy Intensive Industries and Cefic to help achieve practical short and long-term solutions."

During 2006, a Euro Chlor-led programme will focus on the competitive supply of energy and advocate the economic case for long-term electricity supply contracts, which would not be opposed by the competent authorities. However, Euro Chlor believes that a win-win situation could be achieved if both intensive energy customers and providers could enter into much longer-term arrangements with guaranteed, affordable and sustainable prices.

Consortia to handle key chlor-alkali substances

With the proposed REACH legislation due to come into force mid-2007, Euro Chlor announced plans mid-2006 to create registration consortia for selected key chlorine-related substances. These include chlorine, caustic soda, sodium hypochlorite, calcium hypochlorite, trichloroethylene, perchlorethylene, methylene chloride, chloroform, chlorinated paraffins, and ethylene dichloride (in conjunction with the European Council of Vinyl Manufacturers). All pre-registrations will need to be submitted to the European Chemicals Agency no later than end 2008. Euro Chlor will manage these consortia and where appropriate utilise the services of Reach Centrum, an independent professional services company announced by Cefic in June 2006 as a free-standing operation. It will assist businesses directly with REACH compliance as well as complement services planned by some national chemical industry associations and affiliates such as Euro Chlor.

Emissions compromise saves jobs

Progress has been made on achieving a more sustainable draft "daughter" directive to the Water Framework Directive (WFD) of 2000. In discussions with the Commission on the directive for Environmental Quality Standards (EQS) and emission controls, it has been accepted that complete cessation of releases and losses of priority hazardous substances (PHS) is technically impossible.

DG Environment has acknowledged concerns of an industry coalition and agreed that the new directive will permit exemptions where cessation is not feasible or entails disproportionate costs. The coalition represents chlorine (Euro Chlor), crop protection (European Crop Protection Association), non-ferrous metals (Eurometaux) and chemicals (Cefic).

The directive will set EQS for 33 priority substances, including mercury and 11 chlorinated compounds. Most proposed EQS

11

for chlorine-related compounds were acceptable to Euro Chlor. For two substances – hexachlorobenzene (HCB) and hexachlorobutadiene (HCBD) – Euro Chlor prevailed in advocating the use of science-based quality standards.

Following extensive advocacy efforts, the EU Commission also agreed not to classify trichlorobenzene (TCB) as a Priority Hazardous Substance (PHS) because it is not a chemical of concern and does not meet the criteria for persistence, bioaccumulation and toxicity (PBT).

Solvents focus shifts to sustainability

The market for chlorinated solvents in Europe has been characterised for several years by increasingly stringent marketing and use restrictions that have impacted sales. However, the decline in sales slowed in 2005 and is expected to stabilise during 2007.

With the evolution of a more stable market, the seven remaining members of the European Chlorinated Solvent Association (ECSA), a part of Euro Chlor, are increasingly focusing on developing more sustainable businesses for chlorinated solvents. The primary goal is to respond effectively to possible health or environmental concerns by ensuring that closed systems are used for all market applications and that chlorinated solvents continue to be used as feedstocks to make other chemicals. Producers of methylene chloride, perchlorethylene (PER) and trichloroethylene (TRI) have found it a tougher task than anticipated to develop longer-term sustainability goals. A decision has been taken to seek the assistance of a specialist consultant with publication of measurable industry-wide goals expected during 2007.

Methylene chloride is the most widely used of the chlorinated solvents with 50% utilised in pharmaceutical production, most of which is recycled for paint stripping. In November 2005 the EU Commission held a forum to discuss risks vs. benefits of using this solvent, or alternative chemicals, for paint strippers. Opinions of participating government representatives varied considerably, but some restrictions appear inevitable. Any ban on methylene chloride in paint strippers would have a major cost impact on the pharmaceutical sector.

The EU Commission published a risk assessment for TRI in 2005; the assessment for PER was delayed by a year to end 2006. Producers continue to collaborate on developing risk reduction strategies for both products.

Chlorinated paraffins

Further regulatory restrictions on chlorinated paraffins based on health and environmental concerns continued to be discussed with the Commission. Short-chain CPs were banned in the EU for metalworking and leather applications after publication in 2001 of an initial risk assessment; further restrictions are being considered. Producers of medium-chain CPs continued to resist pressure for a more restrictive label because the proposed changes are not based on sound science.

Scientific and risk-based approach key to workable POPs regulations

New POPs

The need for a scientific and risk-based approach also forms a key focus of industry efforts to achieve workable regulations under various international conventions on Persistent Organic Pollutants (POPs).

Both the UN-ECE POPs Protocol and the UNEP Stockholm Convention have been going through an important phase in terms of the methodology and principles to be followed for evaluation of new POPs candidate chemicals. The chlor-alkali industry has many concerns about the non-scientific character of the evaluation criteria for POPs as well as evidence of a strong bias towards hazard rather than risk. The EU and several European countries have vigorously pushed for a precautionary approach. Industry has provided numerous inputs and additional information on candidate substances. In addition, Euro Chlor has suggested approaches to assessing if substances are "likely to cause significant adverse effects through long-range transportation."

The overall industry objective is to ensure that there is a transparent approach based on science and risk as required by the adopted convention texts.

Supported by Euro Chlor, the World Chlorine Council (WCC) continued to lead the drafting of Best Available Techniques (BAT) and Best Environmental Practices (BEP) for the management of unintentional POPs. These are to assist countries in implementing their obligations under the Stockholm Convention, and focus on chemical processes using chlorine as well as incineration and open-burning of wastes.

Basel Convention: The chlorine industry contributed to the development and is generally supportive of POPs Waste Guidelines established in coordination with the Stockholm Convention. These aim to identify practical and achievable measures for sound management of POPs wastes.

European Community: A proposed limited value of 15 ppb of dioxins in low POPs-containing waste was adopted by the EU mid-2006. This was an important development for the chlor-alkali sector since it means that waste containing dioxins below this concentration will not need to be irreversibly transformed or destroyed.

ELVs unacceptable

A challenging issue has been the establishment under the UN-ECE Heavy Metals Protocol of emission limit values (ELVs) for individual mercury-based plants. Several EU Member States had proposed a 0.75 g Hg/t Cl_2 capacity ELV, which industry maintains is unacceptable since the approach is inconsistent with the IPPC Directive and cannot reasonably be achieved by all plants concerned.

Information & education

Building trust

In line with Euro Chlor's long-standing policy of openness and transparency, communications projects throughout 2005-06 focused on optimising availability of information about chlorine. Euro Chlor continued to emphasise online information whilst exploring a range of complementary traditional techniques for communicating the benefits of chlorine chemistry.

Leading information resource renewed

The federation's Internet site Chlorine Online was re-launched in September 2005. This one-stop online chlorine information resource was redesigned to further improve content and navigation. A specialist search engine marketing company was engaged also to raise the site's ranking with major search engines for those seeking information about chlorine. As a result, the Euro Chlor site is now rarely out of the top three sites for chlorine information.

To further pull visitors to Chlorine Online, Euro Chlor has registered five new chlorine-related names with the EU's new domain .eu. Internauts entering these .eu domains into a search engine, such as Google, will automatically be redirected to Chlorine Online at www.eurochlor.org.

A regularly-updated home page news section keeps visitors abreast of industry developments and each month, applications of various chlorinated compounds are featured. The media section has been complemented by addition of a photographic library.

Chlorine Online has also been structured to provide links to country information. There is a satellite site in Spanish created in collaboration with the Associación Nacional de Electroquimica (ANE) and a similar site in German is under development with the Verband der Chemischen Industrie (VCI) to be launched by end 2006.

Global network

Euro Chlor contributed in 2005 to the development of a new low-cost extranet linking chlor-vinyl business associations around the world. Launched in January 2006, ChlorVinyl.net *(CVn)* is a new password-protected extranet developed under the umbrella of the World Chlorine Council (WCC) and the Global Vinyl Council (GVC).

CVn permits news and information to be shared online. In addition, each participating business association can use restricted-access private sections to facilitate their own membership communications and provide an infrastructure for online management of the activities and meetings of committees and working groups.

Sound science is key

Provision of sound scientific information is also a key aspect of Euro Chlor communications activities and the federation continued efforts to produce relevant information on key chlorine-related issues.

To help address continuing uncertainties surrounding the issue of respiratory ailments in young swimmers using chlorinated indoor pools, Euro Chlor started work (in collaboration with the US Chlorine Chemistry Council) on a comprehensive science dossier, Chlorine, asthma and swimming pools. This is scheduled for peer review and publication Spring 2007.

During 2005, another science dossier, *Hexachlorobenzene - sources, environmental fate and risk characterisation*, was published.

One of the co-authors presented it at the SETAC North America meeting (Baltimore, Maryland, November 2005) and a peer-reviewed shortened version appeared in Elsevier's *Science of the Total Environment* (349 (2005) 1-44). Another science dossier entitled Mercury effects at low doses is scheduled for completion by end 2006.

Chlorination by-products and *Environmental fate and impact of chlorinated solvents* are the titles of two documents issued in 2005 as part of a new series entitled Focus on Chlorine Science. These aim to clarify and consolidate scientific research in the field of chlorine chemistry, facilitating the knowledge gathering of scientists, regulators and key decision makers.

Metro campaign on chlorine benefits

A first-ever pilot poster campaign on selected Brussels metro stations was run by Euro Chlor during April 2006 to reach key influencers working within the EU regulatory community. It aimed to increase awareness of some of the often-overlooked benefits of chlorine.

The campaign focused on three specific uses of chlorine, to produce ultra-pure silicon, polycarbonate and polyurethane (PU) plastics.

The posters featured solar panels (see front cover), an astronaut with a polycarbonate visor left and a climber using high-performance PU-soled shoes. Each poster included an explanatory caption and the slogan *Chlorine – an essential element of life.*

Post-campaign market research amongst 200 EU employees revealed that 91% either liked or felt neutral about the posters and 77% said the posters were somewhat or completely credible. Consideration is being given to a broader public information poster campaign in 2007.

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Improving risk management

Euro Chlor is stepping up efforts to use science to help member companies improve risk management at manufacturing facilities. Results from the annual occupational health self-audit for all chlor-alkali plants in 2005 revealed a continuing need for improvement.

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Member companies were urged to undertake more risk audits in 2006 and the 10 companies operating the lowest-performing mercury cells (i.e. where workers had the highest recorded urinary levels of mercury) were contacted individually by the federation and offered support and practical tools to improve workplace practices.

Good progress was made during 2005-06 on supporting the EU Risk Assessment Reports (RARs) on sodium hypochlorite, chlorine and caustic soda under the Existing Substances Regulation. Each RAR comprises sections on the product's impact on the environment and human health.

The assessments have been under development by the EU for several years with caustic soda completed end 2005 and chlorine scheduled to be finalised in 2007. For sodium hypochlorite, which is frequently used as a disinfectant or bleaching agent, the environmental section was accepted by Member States in 2005, although the United Kingdom had reservations about the extent to which conclusions could be drawn from the worst- case scenario Whole Effluent Test that was done as part of the RAR.

These reservations are expected to be resolved and the assessment submitted to the Scientific Committee on Health and Environmental Risks (SCHER) for review by end 2006. The section on identification of potential human health risks is expected to be completed at the same time.

For caustic soda, industry helped the rapporteur country, Portugal, prepare a final draft of the RAR in January 2006. This concluded that the majority of production steps and applications did not pose a risk to human health. However, a need was identified for improved risk management measures for people involved in certain very limited aspects of production and use. No risks were identified for the environment. SCHER is also expected to review this report by end 2006.

A first draft of the environmental section of the chlorine RAR was completed in 2005. Agreement was reached on the conclusions, with environmental risks considered acceptable for all production and application scenarios. Some issues details were discussed and resolved by the Technical Committee for New and Existing Substances (TCNES) via a written procedure and bilateral discussions with the Dutch government.

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Euro Chlor broke new ground at the 16th Society of Environmental Toxicology & Chemistry (SETAC) international meeting in The Hague (May 2006) by organising a special symposium on the natural organochlorine cycle. Four leading scientists spoke on topics such as biodegradability and the biochemical cycle of chlorine. As in previous years, the federation had a stand at the main event and distributed a newsletter, this time describing the symposium.

Disagreements remain on the use of a computer model to simulate the distribution of emissions in the air and their breakdown by light.

For occupational exposure, the TCNES has asked Euro Chlor to provide further justification for the use of average exposure concentrations rather than 90-percentile values. This issue is central to determining whether risk reduction measures are required.

A final version of the chlorine RAR is expected to be completed by end 2006.

Work continued on the collection and evaluation of information for dossiers on chlorine, sodium hypochlorite and calcium hypochlorite under the 1998 EU Biocidal Products Directive. Full risk assessments are required for selected applications. These include disinfection uses in laundries, slaughter houses, food and beverage production, swimming pools and drinking water. Initial dossiers for each product must be submitted to the Italian rapporteur by 31 July 2007.

Chlorine exposure

Recommendations for medical treatment of plant operators exposed to chlorine gas were updated as part of the federation's continuing programme to ensure members have timely access to best practices. The update took into account research sponsored by Euro Chlor at the University of Linköping (Sweden) on use of corticosteroids to treat chlorine inhalation.

Workplace incidents involving chlorine inhalation are occurring less frequently, a positive sign of industry's continuous improvements in safety. For example, in 2005 Euro Chlor initiated a survey on exposure treatment by occupational physicians and staff (nurses, first aiders) in member companies.

Whole Effluent Assessment

In 2005-06, Euro Chlor helped develop a cost-effective method to screen for bioaccumulation potential of effluents. The method will become part of a Europe-wide standardised Whole Effluent Assessment "toolbox".

This is being prepared by an Intersessional Expert Group for use by countries that are part of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR). Work is expected to continue until Spring 2007 on establishing how best to evaluate the persistence of effluents.

Modelling workshop

A small-scale modelling workshop was held with external experts to develop a methodology to assess the impact of low emissions of Priority Hazardous Substances (PHS) in river basins (Brussels, October 2005). The Water Framework Directive currently requires cessation of discharges by 2025. This would have serious consequences for the chlor-alkali industry, with costs far outweighing any environmental benefits. Initial results from the model indicate that very low PHS emissions do not pose an environmental problem.

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Industry overview

Demand remained strong and steady

Most world economies continued their improvement in 2005 and despite higher energy and raw material prices, returns to the global chlor-alkali industry continued to improve. In Europe, production remained strong and steady for the second consecutive year and was virtually unchanged (10.38 million tonnes) compared with 2004 (10.39 million tonnes) - the highest for a decade. European capacity utilisation rates averaged 84.5% compared with 85.4% the previous year.

Germany continued to be the largest chlorine-producing country in Europe (see chart below/left/right) with total annual production little changed at 4.53 million tonnes (2004: 4.40m tonnes). France remained second highest producer with 1.40m tonnes (2004: 1.46m tonnes) closely followed by the Benelux (Belgium and The Netherlands) with 1.32m tonnes (2004: 1.36m tonnes).

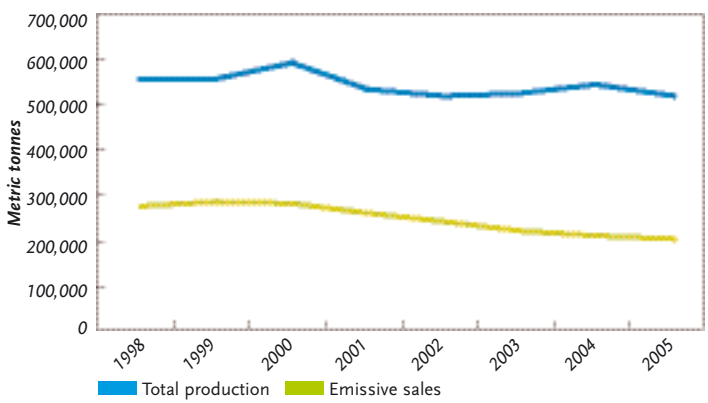
Two United Kingdom producers, Albion Chemicals (Sandbach, 90,000 tonnes/year) and Rhodia (Staveley, 29,000 t/yr) closed mercury-based plants during 2005 and both resigned from Euro Chlor as full members, although Albion switched to the Associate grade since it continues to operate a small membrane unit for sodium hypochlorite manufacture at Thetford, Norfolk. These changes left INEOS Chlor (Runcorn, 767,000 t/yr) as the sole chlor-alkali manufacturer in the country.

Akzo Nobel closed a mercury-based unit (100,000 t/yr) at Bohus, Sweden, and invested in new membrane capacity in Rotterdam as part of a broader restructuring of chlor-alkali operations in The Netherlands. Mercury cells were closed down by Dwory (Poland) at Oswiecim (39,000 t/yr) and Syndial (Italy) at Priolo (204,000 t/yr). In Belgium, Solvay invested in new membrane capacity in Antwerp).

At 1st January 2006, there were 75 chlorine plants in 20 European countries with a production capacity for chlorine of 12.54m tonnes/yr. Due to closure of two of the three-chlorine plants in the UK and the need to protect confidentiality of actual production at individual plants, Euro Chlor now groups production data in the UK with five other smaller countries. The top five regions accounted for 88% of total production in Europe during 2005.

With the Czech and Slovak Republics, Hungary and Poland joining the European Union early 2005, Euro Chlor expanded monthly reporting of overall chlorine production figures and caustic soda stocks to encompass the four new countries.

Western Europe chlorinated solvents 1998-2005



This combined data is published monthly on Chlorine Online (www.eurochlor.org) in line with Euro Chlor's commitment to openness and transparency.

Although chlorine is a key building block for the chemical industry, its essential co-product, caustic soda (sodium hydroxide) is also important. About 1.1 tonnes of caustic soda is simultaneously manufactured for every tonne of chlorine. The largest single use of caustic soda is for bleaching of pulp, paper and cellulose.

The strong demand for caustic soda in 2004, which resulted in the lowest average monthly stocks for 20 years, continued throughout 2005 and into the first half of 2006 when stocks remained at historically low levels.

Solvents

The decline in European sales of chlorinated solvents slowed in 2005 and is expected to stabilise by late 2007 once the Solvents Emissions Directive is fully implemented. Sales last year in the EU 25 countries plus Norway, Switzerland and Turkey totalled 216,000 tonnes, a 2% decrease compared with 2004 (220,000 tonnes).

The tougher carcinogenicity classification for trichloroethylene (TRI) imposed by the EU in 2002 continued to impact sales, which dropped 89% between 2001 and 2005 to 28,000 tonnes (2004: 33,000 t). Faced with a declining market, Arkema stopped production late 2005. However, future supply for industrial applications is assured because TRI is also an important intermediate in the manufacture of other chemicals.

Perchloroethylene (PER), which is best known for dry cleaning, continued to gain market share as a substitute for TRI in metal degreasing. In Spain, Ercros stopped production in 2005 before merging with Aragonesas. European sales in 2005 totalled 56,000 tonnes (2004: 54,000 t). Methylene chloride sales remained stable in 2005 at 132,000 tonnes (2005: 133,000 t). It remains the most widely-used of the chlorinated solvents, particularly for pharmaceutical production.

Sharing technical expertise

Under the umbrella of the World Chlorine Council, Euro Chlor contributed to three UN Environment Programme (UNEP) projects to share expertise and practical know-how on best techniques to reduce mercury use and emissions. In December 2005, RusChlor, the Russian chlor-alkali producers' association, hosted the first partnership workshop; two months later six RusChlor members visited three mercury-based plants operated by Euro Chlor members in Germany, Spain and Italy; in March 2006, Euro Chlor representatives participated in a second UNEP workshop in Mexico.

Following the first workshop in Volgagrad, the US EPA (on behalf of UNEP and the Arctic Council) praised Euro Chlor for "the excellent co-ordination and success of the technical exchange with all objectives completed."

First WCC stewardship conference in China

Euro Chlor speakers participated in the first international chlorine/PVC

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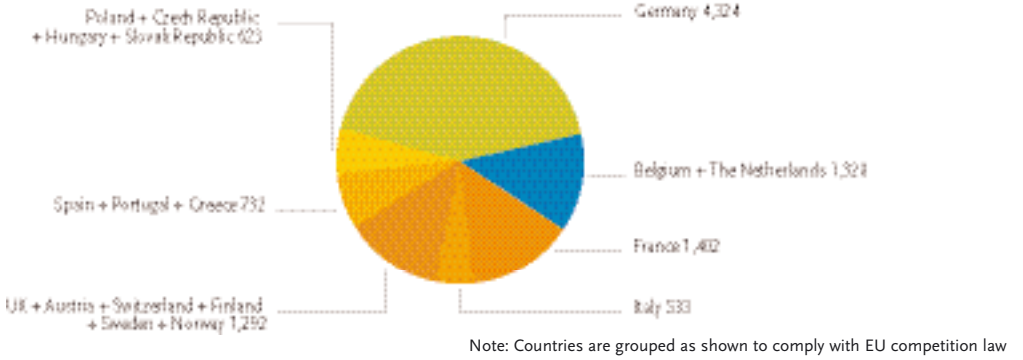
European production & use data

Where and how chlorine is made and used

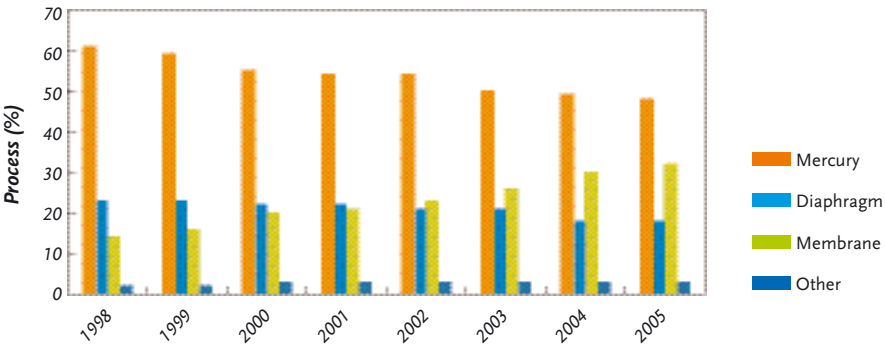
Every year, more than 20 million tonnes of chlorine and caustic soda – as well as hydrogen – is produced in Europe by the chlor-alkali sector. These chemical building blocks underpin 55% of European chemical industry turnover (2004: 634 million). Chlorine chemistry makes a major contribution to our quality of life...from paint pigments to plastics....surgical dressings to shampoos...fuel cells to footwear. Illustrations in this section show how widely chlorine and caustic soda are utilised to make industrial and consumer products; manufacturers, processes and production sites in Europe and how newer membrane technology is gradually replacing the mercury process.

European chlorine production in 2005 (Ktonnes)

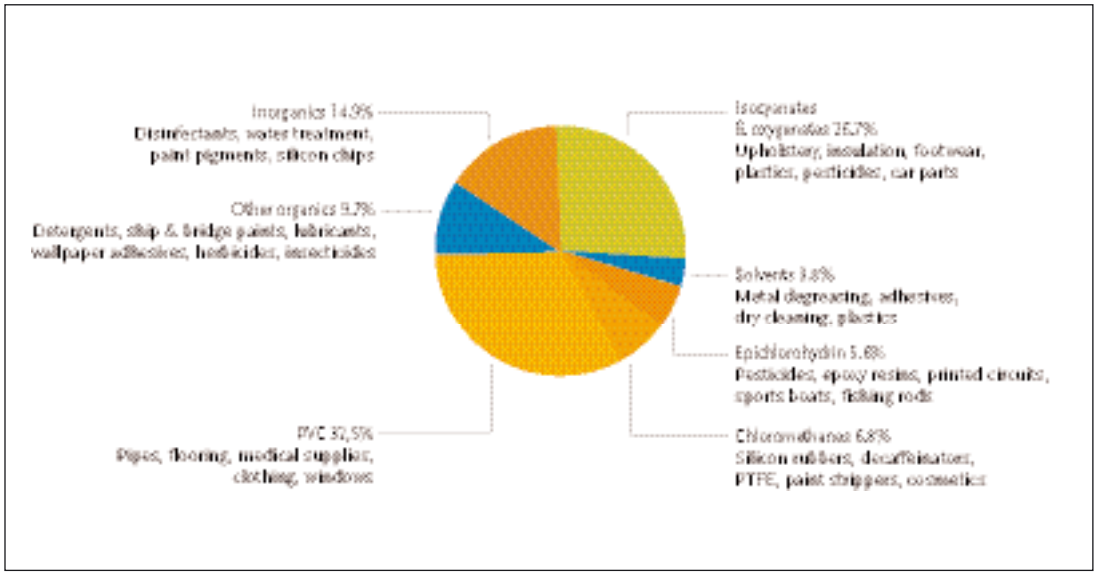


Note: Countries are grouped as shown to comply with EU competition law

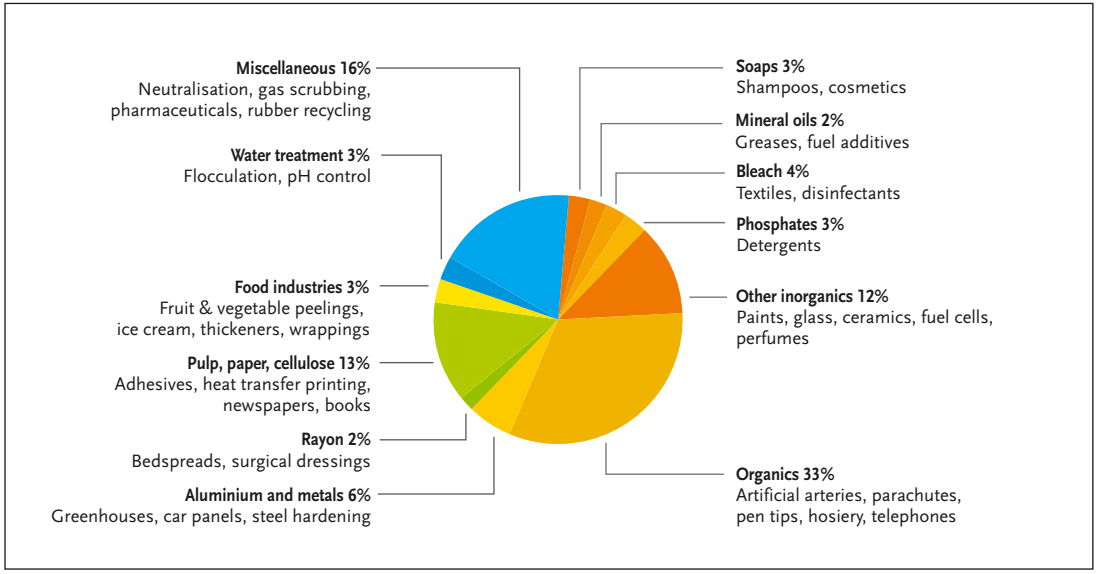
Evolution of chlorine routes by process



European chlorine applications in 2005 (10.35 million tonnes)



European caustic soda applications 2005 (10.02 million tonnes)



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Chlorine production plants

January 2006

Country	*N°	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	250
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	Albemarle	Thann	Hg	72
	11	Rhodia	Pont de Claix	D	240
	12	Arkema	Fos	D, M	270
	13	Arkema	Jarrie	Hg	170
	14	Arkema	Lavera	Hg, D	341
	15	Arkema	Saint Auban	Hg	184
	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	1585
	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	137
Ireland	40	MicroBio	Fermoy	M	6

Country	*N°	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
	53	Akzo Nobel	Hengelo	Hg	74
	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 Chemicals	Thetford	M	7
Total					12,537

* Number on map

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

Euro Chlor

Voice of the chlor-alchali industry

From the capital of Europe, Euro Chlor speaks for 98% of chlor-alkali producers in the EU-25 and EFTA regions. The federation is a key link between industry, policy makers, and the general public. In order to strengthen society's confidence in the chlorine sector, Euro Chlor works to further industry transparency, and drive efforts to achieve a sustainable future through addressing environmental, social and economic issues.

Originally founded nearly 40 years ago as a production-oriented technical organisation, Euro Chlor was restructured in 1989 to provide the sector with strengthened scientific, advocacy and communications capabilities. Since then, major emphasis has been placed on sound science and on constantly improving health, safety and environmental standards.

Across Europe, 39 chlorine producers are full members of Euro Chlor. They employ about 39,000 people at 69 manufacturing locations in 17 countries. The total membership amounts to 119, as Euro Chlor also has 42 Associate Members and 38 Technical Correspondents, including suppliers of equipment, material and services as well as downstream users and producers outside Europe.

Product groups for chlorinated solvents, chlorinated paraffins, chloroisocyanurates and potassium hydroxide are also an integral part of the Euro Chlor structure.

Management committee (xxxxxxxx)

Chairman, Paini, G	Syndial
Co-chairman, Tane, C	INEOS Chlor
Coenen, F	Tessenderlo Chemie
De Grève, J-P	ECVM
Fuhrmann, W	Akzo Nobel
García Brú, F	Ercros
Gielen, F	Solvay
Kahsnitz, J	VESTOLIT
Lamm, R	Dow
Mäki-Kala, J	Finnish Chemicals
Märkl, R	BASF
Ohm, C	Bayer MaterialScience
Pelzer, A	PCC Rokita
Procházka, M	Spolchemie
Raae, S	Hydro Polymers
Redon, A	Rhodia
Tual, D	Arkema
Winhold, M	Vinnolit

Secretariat staff

Alistair Steel	Executive Director
Françoise Minne	Senior Assistant
Véronique Garny	Science Director
Dolf van Wijk	Science Manager
Raf Bruyndonckx	Science Manager
Valentina Bertato	Science Manager
Viviane Norré	Assistant
Arseen Seys	Environmental & Regulatory Affairs Director
Caroline Andersson	Regulatory Affairs Counsellor
Isabelle Coppens	Assistant
André Orban	ECSA & Chlorinated Paraffins Manager
Peter Whippy	Communications Manager
Liliana Pao	Communications Coordinator
Jean-Pol Debelle	Technical & Safety Director
Claire Albus	Assistant

Organisation

The Management Committee gives guidance and overall strategic direction to the Euro Chlor Secretariat. Specialist knowledge in advocacy, science as well as health, safety and the environment is provided by 37 committees and working groups.

Direction of Euro Chlor stays in safe Scottish hands

Alistair J. Steel, former managing director and UK country manager for Rhodia, has taken over as executive director of Euro Chlor. He succeeded fellow Scot Dr Barrie S. Gilliatt, who retired 31 May after 10 years in the position.

At the Euro Chlor 2005 Annual Assembly, previous chairman Udo Bergmann (BASF) publicly recognised Dr Gilliatt's "leadership, and his counsel, determination, courage, positive attitude and ability to achieve results through others".

Dr Gilliatt was also awarded a Resolution of Appreciation by the Board of Directors of US Chlorine Institute in March, acknowledging a lifetime of service to the global chlor-alkali industry.

After qualifiying as a chemical engineer (1966), Dr Gilliatt joined ICI and held a series of increasingly important responsibilities within the chlorine sector. He is a former chairman of the UK Chemical Industries Association's Technical Committee (1986-91) and Chlorine Council (1991-1996). Before joining Euro Chlor in 1996, Dr Gilliatt was Business Technical Director of ICI Chlor Chemicals (now INEOS Chlor). He was also chairman of the Monckton Coke and Chemical

Committees & working groups

Management

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

Advocacy & communications

- Regulatory Affairs Committee
- EU Advisory Group
- Nat. Chlorine Associations WG
- Chlorine Communicators' Network

Product groups

- Chlorinated Paraffins Sector Group
- Chloroisocyanurates Group
- Potassium Group

Science

- Steering Committee
- Monitoring & Environmental Chemistry WG
- Marine Risk Assessment WG
- Toxicology WG
- Risk Assessment ad hoc WGs
  - Caustic Soda
  - Chlorine
  - Sodium hypochlorite
  - Mercury
- Biocides Strategy Group
  Biocides registration
  - Chlorine
  - Sodium hypochlorite
  - Calcium hypochlorite

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

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Euro Chlor membership

Full members

Akzo Nobel Base Chemicals
Albemarle Europe
Altair Chimica
Anwil
Arkema
BASF
Bayer MaterialScience
Borregaard Industries
BorsodChem
CABB
Caffaro
CUF – Químicos Industriais
Degussa
Dow
Dwory (until end 2006)
Electroquímica de Hernani
Electroquímica del Noroeste (Elnosa)
Ercros
Finnish Chemicals
Hellenic Petroleum
Hydro Polymers
INEOS Chlor Limited
LII Europe
MSSA
Novácke Chemické Závody
PCC Rokita
Produits Chimiques d'Harbonnières
Química del Cinca
Rhodia Eco Services Sulfurique
SF-Chem
Solvay
SolVin
Spolana
Spolchemie
Syndial
Tessenderlo Chemie
VESTOLIT
Vinnolit
ZACHEM

Associate members

Ahlia Industrial Projects
Albion Chemicals Ltd
Angelini A.C.R.A.F.
Arch Chemicals
Asahi Kasei Chemicals
Asociación Nacional de Electroquímica (ANE)
Association of Chemical Industry of the Czech Republic (SCHP)
Bochemie
Chemical Industries Association (CIA)
Chemieanlagenbau Chemnitz
Chemoform
Chlorine Engineers
Cotelle
De Nora Tecnologie Elettrochimiche
ExxonMobil Chemical Europe
Fédération des Industries Chimiques de Belgique (Fedichem)
Federchimica Assobase
GHC Gerling, Holz & Co
K+S
Leuna Tenside
LOMBARDA H
Lonza
Nankai Chemical Industry Co.
National Petrochemical Company of Iran
NCP Chlorchem
Nippon Soda
Polish Chamber of the Chemical Industry Employers' Association (PIPC)
Plast- & Kemiföretagen – The Swedish Plastics & Chemicals Federation
PPG Industries
Procter & Gamble Eurocor
SGCI Chemie Pharma Schweiz
Shikoku Chemicals
Sojitz Europe
Syndicat des Halogènes et Dérivés
Syngenta
Teijin Twaron
Tosoh Corporation
Uhde
Unilever Hellas
Verband der Chemischen Industrie (VCI)
Vereniging van de Nederlandse Chemische Industrie (VNCI)
WATERCHEM

Technical correspondents

Applitek
Arabian Chlorine
Asahi Glass Europe
Asahi Organic Chemicals Industry
Bayer Technology Services
Carburos Metálicos
Chemtec
Crane Resistoflex
Descote
Electroquímica de Sagua
Eltech Systems
Eramet
Garlock Sealing Technologies
ISGEC
Koruma Klor Alkali
Kronos Worldwide
KSB-AMRI
Nufarm Coogee Pty
Occidental Chemical
O.PW. BELTECH
Pall Corporation
Phöenix Armaturen- Werke Bregel
Quicksilver Recovery Services
Reliance Industries
Samson
Sasol Polymers
SembCorp Simon-Carves
Senior Flexonics Ermeto
Severn Trent Water
Shaw, Son & Greenhalgh
SIEM Supranite
Technip LCI France
Thasco Chemical
Tronox Pigments (Holland)
Trust Chemical Industries
UK Health & Safety Executive
WL Gore & Associates
WT Armatur

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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.

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