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Chlor-alkali Industry Review 2017/2018

The times they are a changin’

On all fronts, regulatory, technical, political and economic we are seeing continuing flux, as constant change becomes the new normal.



Mercury

The biggest change that we have addressed this year has been the phase-out of mercury in production processes. This is a big step forward in modernising our technologies and improving sustainability. The delivery of this structural change demonstrates a level of excellence and expertise across the sector that we should be proud of.

There is still work to be done, particularly around ‘stabilisation’ and safe final disposal. Euro Chlor will be active throughout that process.

Investment

A recent highlight has been the stream of investment announcements coming from our members. This demonstration of confidence is exactly what we need to attract the next generation of chemical engineers.

The massive investments underpin the vital role of the chlor-alkali industry in the European economy, both in its own right and as a provider of the essential building blocks for the manufacture of millions of products.

Euro Chlor will continue to advocate for the infrastructure, economic and regulatory environments necessary for our members to continue to invest and innovate, and to secure fair and sustainable returns.

“Let’s build on the strengths of our industry, and nurture our reputation as an informed, credible and constructive partner.”

Dolf van Wijk Executive Director



The full version of this report is available from:

chlorineindustryreview.com

Within Euro Chlor

We are in the process of appointing my successor, who will be tasked with ensuring that Euro Chlor continues to provide a strong voice for the chlor-alkali industry.

We are also preparing to move to our new headquarters in central Brussels as an even more integrated part of the Cefic organisation. The new location will place Euro Chlor within walking distance of many key influencers, which will help us to have our voice heard.

We are also exploring and adapting to the new digital world. This review, presented in a 'digital first' format, is one example of how we intend to develop.

Safety

Some things remain constant, including the absolute commitment to safety. Safety must be the foremost priority of any industry. That is why we continue to carefully follow up on our safety record.

Our safety initiative has been re-invigorated through talking with employees of all levels at their sites, to gain a deeper and mutual understanding of our members' needs. As a result, we are strengthening our focus on sharing experiences through incident reporting, and using that information to identify areas where we can develop and implement new practices so that all

our colleagues return home every day, healthy and able to enjoy the benefits of working in a safe and successful industry.

Energy

Chlorine manufacture is an energy intensive process and the industry has made impressive progress towards energy efficiency. However, the energy policy developments in Europe remain challenging for our competitiveness. Given the major importance of reliable and affordable energy supply, we will maintain the pressure for new and more competitive energy solutions for Europe.

Looking back

As this is my final review, I will take the opportunity to look back a little further than usual.

I came to Euro Chlor from Akzo Nobel in 2001 to manage the environmental science programme. I took on additional advocacy and regulatory affairs responsibilities, becoming Science & Regulatory Affairs Director. In 2015, I became Executive Director.

The great strength of Euro Chlor has always been the combination of two worlds. One is the deep knowledge of the science, technology and factual foundations of the industry; the other is constructive relationships with regulators.

We promote our case in a well-informed, credible and transparent manner, as this is critical to building the trust necessary to deliver long term and sustainable outcomes.

The collegiality in our chlor-alkali world is always heart-warming and motivating, and many contacts have become friends. Could there be some invisible trust, or a shared basic understanding that permeates our industry? If so, I hope that is one thing that does not change.

A 'letter on the desk'

If I were to leave a 'letter on the desk' for my successor, my advice would be to build on the strengths of our industry, and nurture our reputation as an informed, credible and constructive partner.

I am confident that my successor can rely on the strong team in Brussels to continue supporting a safe, sustainable and successful chlor-alkali industry for Europe.

Finally, I will take this opportunity to thank my colleagues and friends who made my working life so pleasant and rewarding.

Keep up the good work!

Dolf

19
European
countries

34
Full
members

57
Associate
members

65
Manufacturing
locations

19
Working
groups

58
Technical
Correspondents

For more information about Euro Chlor: eurochlor.org



Dieter Schnepel

Chairman, Management Committee

Cooperation is key in our changing industry

As I approach the end of my two-year tenure as Euro Chlor's Chairman, I am amazed at how much has changed during my time in office. Indeed, I wish all the best to my successor, Mr. Jürgen Baune from AkzoNobel, as he navigates during such changing times.

We are starting to see the effect of regulations drafted in the past, impacting the present. This is most evident in the energy policies being pushed by national and European politicians. The many developing energy policies may severely restrict our global competitiveness. We therefore need to work with European decision-makers, explaining the challenges we face and helping them to find solutions that assist European industry. This is one of Euro Chlor's key, ongoing tasks.

Changes in technology have also had an impact. Mercury technology phase-out has changed the dynamics of investment and led to many projects across the continent. In addition, buoyed by positive demand for polyurethane, PVC and propylene oxide, the demand for our versatile and essential chemical building blocks is rising. This will lead to expansion in capacity, more equipment in the ground and potentially more staff.

It is also vital that we continue taking care of such staff, and whilst our sector's safety performance is good, we are actively pursuing progress. Under the leadership of the Euro Chlor secretariat and with the help of the wider chlor-alkali industry, we are developing tools to improve incident information sharing.

At a recent Safety Workshop, 14 member companies assembled to openly discuss incidents and share practical experience. We are often competitors in the market place, but when it comes to safety, we are all united. Therefore, my Management Committee colleagues and I strongly support this initiative and urge all members to actively participate.

As Euro Chlor, we are benefitting from a new structure at Cefic. This creates opportunities for our Industry, giving us a stronger voice in key Cefic decision-making bodies, and is improving our connections with key EU influencers. An area where we are seeking further change is in increase governmental support for the manufacturing industry. Our global competitiveness needs this to improve and it is time that regulators take the '20% of GDP' target for Europe's manufacturing industry seriously.

This Euro Chlor review for 2017-2018 outlines the key changes we are facing in our core areas of Sustainability, Regulation and Manufacturing and Application. Although change is not always easy, I know I can rely on everyone in the Euro Chlor community to work together to help support a safe, sustainable and successful chlor-alkali industry for Europe.

Sustainability*

*For this review, 96.5% of Euro Chlor member's capacity is covered from 31 companies at 51 sites.

"Euro Chlor's sustainability programme was the first to be launched within the European chemical industry back in 2001. It aims to monitor and address environmental, social and economic issues by providing a snapshot of key parameters, particularly energy consumption, hydrogen use and reduced emissions".



Ton Manders, Technical Director

Manufacturing technology

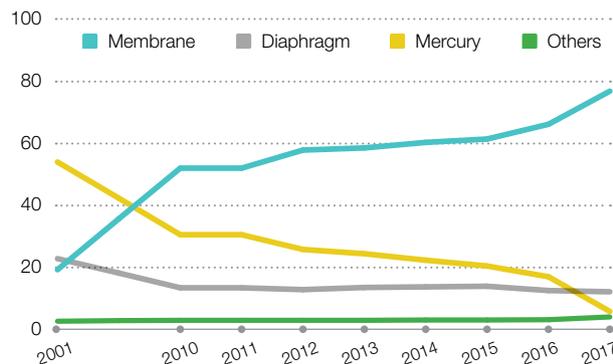
In December 2017, the deadline for the phase-out of mercury technology under the Best Available Techniques (BAT) chlor-alkali conclusions as part of the EU's Industrial Emissions Directive passed.

Consequently, the share of mercury technology in chlor-alkali manufacture shows a steep decline in 2017 (see graph).

However, the phase-out did not fully complete in 2017 due to some technical challenges that extended into 2018.

CHLORINE MANUFACTURING PROCESS

(% of total installed capacity end of year)



Mercury emissions

2017 was the year for the phase-out of mercury technology. Despite this, Euro Chlor considers it vital to continue monitoring and reducing mercury emissions at those production sites that used mercury-based technology.

The absolute level of mercury emission declined to approximately 1.2 tonnes in 2017, a reduction of around 130 kg compared to 2016. This is mainly due to the closure of several mercury installations in 2016.

Specific mercury emissions increased from 0.63 g Hg/tonne* to 0.68 g Hg/tonne in 2017.

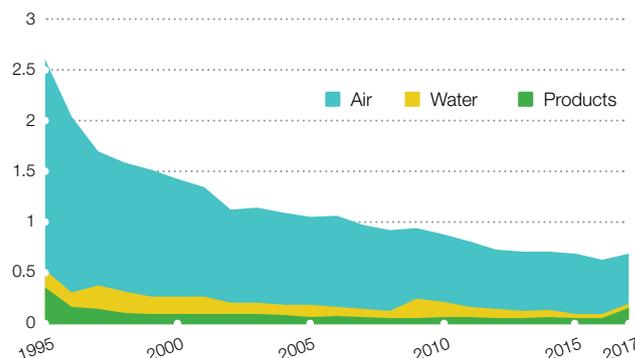
Mercury emissions declined to

1.2 tonnes

*corrected from last year's figure of 0.68 g Hg/tonne

TREND OF MERCURY EMISSIONS

(g Hg/tonne Cl₂ capacity)

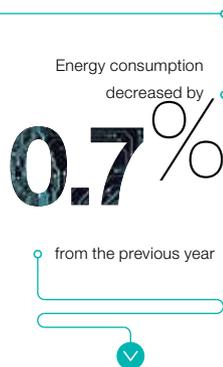


Sustainability

Energy consumption

Energy consumption in 2017 was at 92.5% versus the 2011 reference. The decrease of 0.7% (93.2% to 92.5%) from the 2016 level is due mainly to the mercury to membrane technology conversion. This year, energy consumption is expected to drop further thanks to the phase-out of mercury technology.

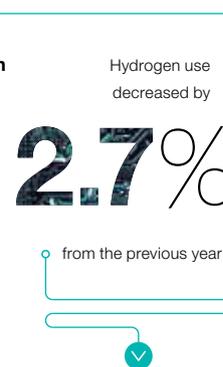
Discover more on the role of energy in our industry via our new Energy webpages: www.eurochlor.org/chlorine-industry-issues/energy.aspx



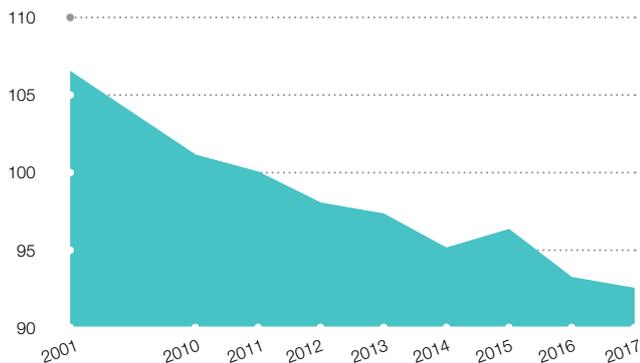
Hydrogen use

The use of hydrogen has decreased since 2014. In 2017, the utilisation rate of hydrogen was 84.8%, which represents a decline of 2.7% compared to the previous year.

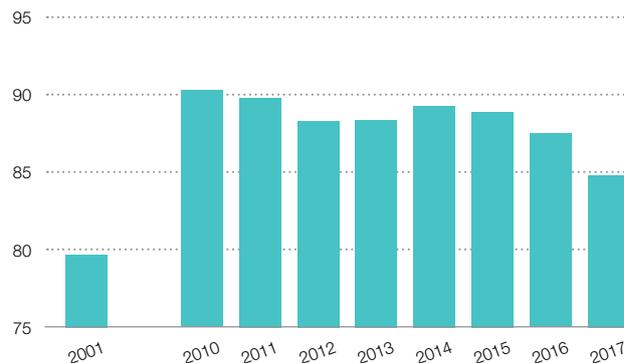
Although hydrogen is suggested to be an important chemical for the low carbon economy, there is still an ongoing decline in its utilisation rate from the chlor-alkali electrolysis plants. Further increasing hydrogen use (where different options are available) is often complicated in practice due to economic constraints.



PRIMARY FUEL ENERGY CONSUMPTION
(% with respect to 2011)



HYDROGEN USED
(% of production)



Sustainability

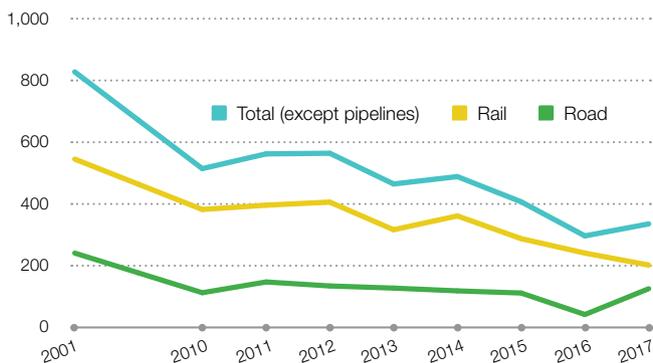
Transportation

The amount of chlorine transported from production sites increased in absolute numbers compared to 2016.

However, it remained more or less stable at a low percentage of the total production. In 2017, 3.7% of the total chlorine production was transported by rail or road.

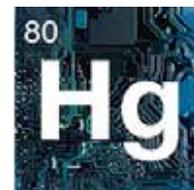


CHLORINE TRANSPORTED OUTSIDE INDUSTRIAL SITES
(thousands of tonnes)



Health Issues: looking beyond Mercury

Even though Euro Chlor's Health Working Group still collects data on mercury in urine from plants that are decommissioning, several new non-mercury topics have gradually found their way into discussions.



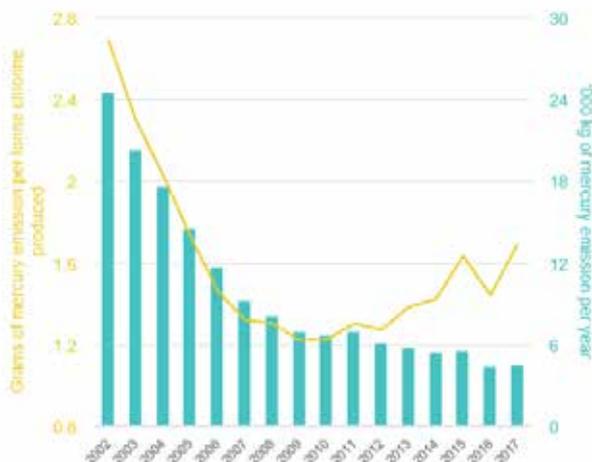
Electromagnetic fields formed an interesting topic, and are discussed separately in this review. Caustic soda remains on the radar, as incidents involving severe burns still occur. Through the specially-developed self-assessment questionnaires, the Health Working Group persists in raising awareness for the seemingly harmless, but actually 'caustic', white powder or water-like solution. In addition, the group is investing time on the topics of stress and burnout. Whilst not chlor-alkali industry-specific, these topics are growing in importance. Stress and burnout may also be linked to other issues, like overall loss of concentration, as well as carelessness and tiredness, which may contribute to the larger number of incidents that Euro Chlor has noted in its sustainability questionnaire.

Chlor-Alkali Partnership mercury reporting

The World Chlorine Council continues to gather mercury emission data from its members (including Euro Chlor) and reports it annually to the United Nations Environment Programme (UNEP) Chlor-Alkali Partnership.

The number of mercury plants is decreasing as expected and will further reduce in the coming year due to mercury technology no longer being allowed in Europe by the end of 2017. In 2017, there were 30 mercury plants operational with a joint production capacity of 2.64 million tonnes of chlorine per year.

The absolute mercury emission increased in 2017 from 4.4 tonnes to 4.5 tonnes. In 2017, the emission per tonne of chlorine capacity increased from 1.44 g/tonne Cl₂ to 1.69 g/tonne Cl₂.



VinylPlus® well on track to reach its objectives

VinylPlus continues to enhance the accomplishments of its predecessor Vinyl 2010, in order to make PVC even more sustainable. Three years away from its 2020 milestone, progress is continuing on all five Sustainability Challenges, derived from The Natural Step (TNS) System Conditions for a Sustainable Society.

Recycling

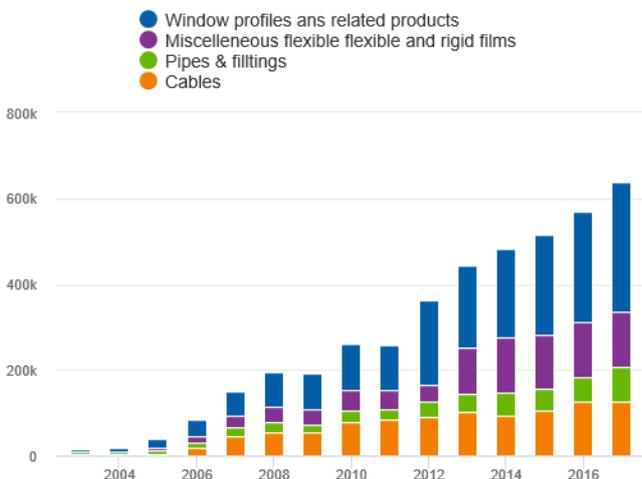
VinylPlus brings a significant contribution to circular economy activities, which represents a key objective of current EU policy. VinylPlus' strong emphasis on external monitoring, transparent reporting and entire value chain involvement is fully in line with the EU approach.

In 2017, VinylPlus increased the volume of recycled PVC to nearly 640,000 tonnes, avoiding emissions of more than 1.2 million tonnes of CO₂. A cumulative total of 4.2 million tonnes of PVC has been recycled since 2000, thanks to VinylPlus efforts. Legacy additives remain a concern, and ill-designed restrictions could jeopardise these impressive achievements. VinylPlus remains confident though that the studies it has undertaken in support of PVC recycling/recycled product safety will convince EU authorities to adopt balanced solutions, ensuring maximum safety with increased recycling potential.

Sustainability

VinylPlus also made significant progress in its commitment for the sustainable use of additives by completing the development of the Additives Sustainability Footprint (ASF), a methodology combining quantitative life cycle inventory data with criteria based on the TNS principles. All of this has been carried out in constant dialogue with all stakeholders as demonstrated again by the diverse audience of the annual VinylPlus Sustainability Forum.

In 2017, VinylPlus increased the volume of recycled PVC to nearly 640,000 tonnes, avoiding emissions of more than 1.2 million tonnes of CO₂



Sustainability

This year's VinylPlus Sustainability Forum featured the theme of 'Meeting Societal Needs' and explored how the vinyl sector and its products can help to meet the wide-ranging challenges of providing essential services for a growing global population in areas such as healthcare, housing and related infrastructure.

The event attracted more than 140 stakeholders from 30 countries, representing the European Commission, European Parliament, the United Nations, consumer organisations, academia, specifiers, designers, architects, recyclers and the PVC value chain.

Another major achievement in 2017 was the implementation of the VinylPlus® Product Label for the window profile sector. The sustainability labelling scheme was developed in cooperation with Building Research Establishment (BRE) Global and TNS, with support from EPPA (the European PVC Window Profile and Related Building Products Association). The Product Label focuses on PVC applications for the building and construction sector and aims to help specifiers, consumers and procurement decision makers to identify sustainable PVC products and solutions.

The recent signature of a Social Charter with trade unions embodies VinylPlus' objective to build a partnership focusing on health and safety and environmental standards with specific support to recycling facilities, information and training of the workforce, as well as sharing best practices between industry sectors and EU countries.

Website

Visit VinylPlus.eu to keep up to date on all our activities



Progress report



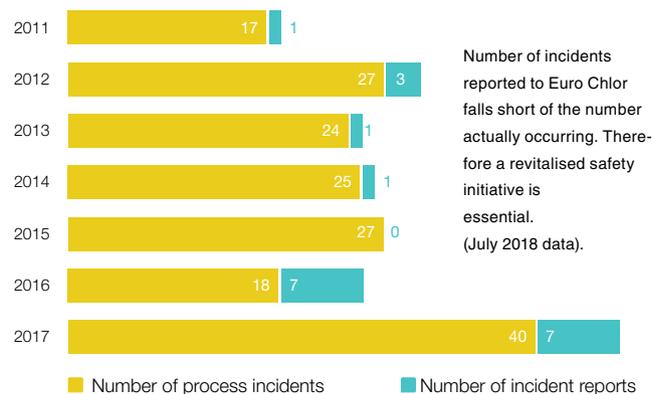
Safety initiative

In 2014, the Euro Chlor Safety Initiative was launched following stagnating and declining performance indicators. This resulted in several activities like the quarterly Safety Newsletter and discussion of incidents in all technical meetings. More recently, a workshop on incident sharing was held that included an informative poster (shown opposite).

In 2016 and 2017, members were visited by Euro Chlor experts to foster networking, obtain a better understanding of their expectations and to facilitate the sharing of process incidents. This has led to better participation in the technical workgroups, an increased number of shared incident reports and more frequent requests for support.

Several ideas on how the Euro Chlor secretariat can support the members in improving their safety performance will be followed up within the technical committees.

INCIDENT REPORTS



“It is vital that we continue to maintain our colleagues’ and contractors’ safety as they work around our plants. Sharing knowledge from incidents, and the lessons learned, is one of the cornerstones of the continuous improvement of Euro Chlor’s safety advice”.



Dieter Schnepel, Chairman of the Management Committee

Incident reporting & experience sharing workshop

On 12-13th of June 2018, Euro Chlor held a successful Safety Workshop on incident reporting and experience sharing.

With 27 participants from 14 member companies, the workshop covered why incident reporting and learning from these incidents is important, based on the experiences of two of the members present.

The event also involved group work on a theoretical incident, designed to help attendees identify root causes and mechanisms to share learnings both within their companies and the wider Euro Chlor community. No chlorine valve or piping, membrane, knock-out vessel or measurement instrument remained unstudied!

Sharing knowledge from incidents, and the lessons learned, is one of the cornerstones of Euro Chlor’s safety advice. Feedback from the event has identified that more work is needed to encourage incident reporting, using digital media and a task force dedicated to process safety issues and incident reporting. Ton Manders, Euro Chlor’s Technical Director, praised the hard work of all participants, commenting that “it was encouraging to see people with different backgrounds working together to find safety solutions”.



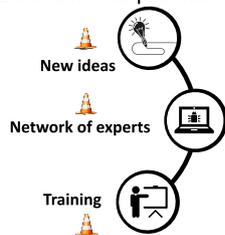
Safety Initiative



Create a knowledge sharing culture to improve results

Incidents	Reports
2011: 17	2011: 1
2012: 27	2012: 3
2013: 24	2013: 1
2014: 25	2014: 1
2015: 27	2015: 0
2016: 18	2016: 7
2017: 36	2017: 6

Euro Chlor to provide



Action Plan

- Working group discussions
- Quarterly Safety Newsletter
- Cardinal rules for the chlorine industry
- 2018 workshop on incident sharing

Why a workshop on incident sharing

Learning & sharing are cornerstones of improvement

Improvements

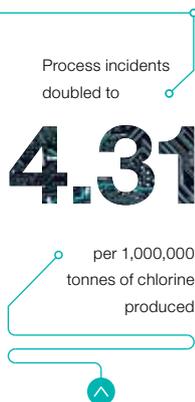
- Tasks & goals of working groups
- Awareness of Euro Chlor’s work
- Sustainability questionnaire & incident reporting
- Key locations and accessibility of documents

EURO chlor A sector group of Cefic
European Chemical Industry Council - Cefic Ltd

Process incidents

Process incidents and losses doubled in 2017 compared to 2016, from 2.16 to 4.31 incidents per million tonnes of chlorine produced.

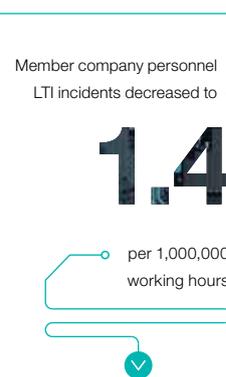
This is the highest number for the last 16 years. As yet there are no clear reasons for this, but this is being critically evaluated. The Euro Chlor Safety Initiative continues to work on the improvement of incident and best practice sharing to improve the safety performance of our entire sector.



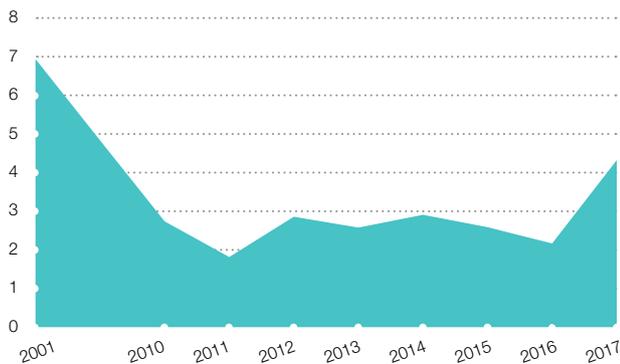
Occupational safety

In 2017, Lost Time Injuries (LTIs) for member company personnel improved quite remarkably (from 2.0 to 1.4) compared to 2016, whilst the LTI figure for contractor staff worsened (from 1.8 to 2.1). Euro Chlor members are 'aiming for zero', so there is still a lot of work to be done.

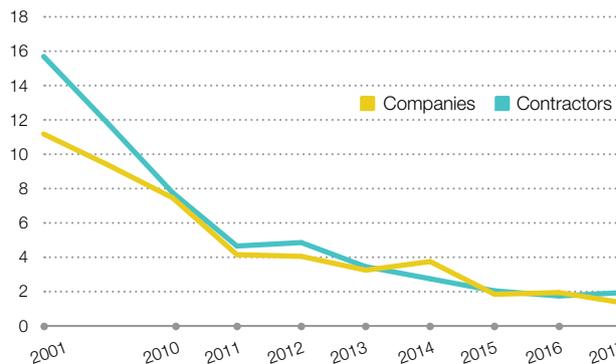
It should be noted that, since 2011, this LTI rate per million working hours only includes incidents directly related to chlorine industry specific items.



PROCESS INCIDENTS AND LOSSES
(number per million tonnes chlorine produced)



CHLOR-ALKALI LOST TIME INJURIES FREQUENCY RATE
(number of LTI incidents per million working hours)



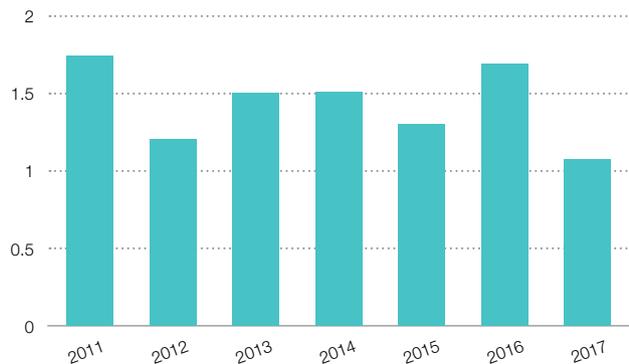
Time dedicated to HSE training

This indicator, introduced during the second phase of Euro Chlor's Sustainability Programme, which runs from 2011-2021, monitors the proportion of working time spent on the formal training of member company operators in the fields of health, safety and environmental protection (HSE).

Over the last few years, this figure stabilised around 1.5%, but this year we have seen a decrease to 1.1%.



TRAINING DEVELOPMENT (% of time on training)



Dice thrown for the fourth phase of EU ETS

Directive 2018/410, published in May 2018, lays down the specific rules for the fourth phase of the EU Emissions Trading System (ETS), which relates to the period from 2021 to 2030. The ETS intends to be the EU's key tool for reducing greenhouse gas emissions. For our industry, it has always been crucial to preserve the possibility to compensate so-called 'indirect emissions'.

The reason is that our competitiveness may be harmed in case the price for the allowances, paid by the power sector is passed on through elevated electricity prices. The fourth phase of the ETS still allows for indirect compensation via State Aid, with some limitations.

With the upcoming review of the State Aid guidelines in 2020, Euro Chlor will now work with the Cefic Energy & Climate team to keep chlorine production on the compensation list and, with the European Commission, determine the correct benchmark for indirect cost compensation via State Aid.

The EU's clean energy ambitions; a challenge for us all

The EU is aiming high, not only by striving for an energy mix consisting of 32% renewable energy sources by 2030, but also in counting on an increase in energy efficiency of 32.5% by that same date. These EU-wide targets were agreed during June 2018 trilogue meetings between the European Commission, the Parliament and the Member States. These will now need to be taken up in the Member States' National Climate and Energy Plans for the upcoming years (up to 2050).

The European Commission's 'Clean Energy Package' aims to place the consumer centrally in the energy market. There will be support for small installations, so that households are also able to participate in the market and self-generate, consume and store any energy they produce. In addition, families will be better informed about energy prices and potential efficiency improvements. The Commission expects this to help to combat 'energy poverty'. In the package, industry is not seen as a specific, separate player, but merely as a large consumer. Therefore, the challenge is to help streamline the final two pieces of legislation that address the actual energy-market rules.

Particularly for electricity-intensive industries like ours, it is our challenge and our goal to safeguard a reliable and affordable electricity supply.

Biocides work continues with new topics on the horizon

The active substance approval date is rapidly approaching for the disinfectant uses of chlorine, calcium hypochlorite and sodium hypochlorite. By 1st January 2019, biocidal products will also need to be registered and additional studies have been submitted by the Euro Chlor Biocide Registration Groups on the oxidising and explosive properties of these biocides. Work is also underway to provide methods to detect impurities and check for their presence in water as requested by the Member States.

Efforts also continue on characterising chlorates, a decomposition product of the hypochlorite active substances, particularly in food and water. This comes at a critical moment as the European Commission prepares to modify the Drinking Water Directive (98/83/EC) to include a limit for chlorate in potable water. The registration groups are following this very closely and have submitted technical advice to help decision makers during this process.

Approval works on the cooling system and slimicide (preservative, PT11/ PT12) uses are not expected to start until 2020.

“In times of fast changing regulations, we are closely following EU developments to keep our members informed and provide input to authorities at the most useful moment. Read our success stories and recent challenges...”

Marleen Pauwels, Regulatory Affairs Director



Evaluating the safe, effective use of chlorinated alkanes

Support for the REACH CoRAP testing programme, which involves the Euro Chlor Chloro Alkane Product Group, has continued over the last year with some promising results that will assist in further evaluating the PBT (persistent, bioaccumulative, toxic) properties of medium chain chlorinated alkanes (MCCP). The current REACH dossier maintains no PBT status for these substances. Using state-of-the-art methods and international expertise in environmental toxicology and chemistry, the group has been able to show that these versatile chemicals are much more biodegradable than previously thought.

These data are particularly important given the uninformed, premature scrutiny by authorities in areas such as the RoHS (Restriction of Hazardous Substances 2002/95/EC) and Water Framework (2000/60/EC) Directives.

In addition, the group is preparing for an international workshop, to take place in New Delhi on the 29th of November 2018, to discuss the global importance of chlorinated alkanes and their wide range of essential uses, the regulatory and latest scientific developments and risk management strategies.

Mercury, not only part of our past...

On the 2017 Euro Chlor calendar, 11th December marked the official phase-out of mercury-based production technology. Meeting the deadline in a safe and responsible way has been the subject of several meetings and workshops in recent years. Today our attention has shifted to the safe decommissioning of mercury plants and the safe disposal of contaminated materials.

Regulation (EU) 2017/852 on mercury provides the European legal framework for the temporary storage and permanent disposal of mercury and mercury compounds. It allows elemental mercury, that is no longer used in chlor-alkali cells, to be stored temporarily under specific conditions, before its mandatory conversion into mercury sulphide for permanent disposal (e.g. in salt mines).

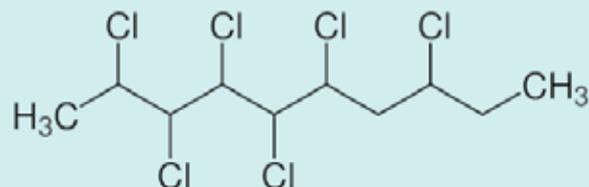
At this moment, there are two companies providing an operational conversion service in the European Union, as detailed on the Euro Chlor website www.eurochlor.org. A third one is still in development and a fourth one located in Switzerland. The Regulation excludes the export of liquid mercury outside the EU. With only two operational installations, the annual conversion capacity risks running short in treating the total amount of mercury remaining within the available (5 year) time-frame. Euro Chlor maintains contacts with the European Commission to discuss the current status and to jointly monitor the progress of mercury stabilisation and disposal.

SCCP exemptions to be assessed under the Stockholm Convention

Euro Chlor continues to monitor the Stockholm Convention for one substance of interest, short chain chlorinated paraffin (SCCP).

SCCP was listed on Annex A (elimination) of the Convention in 2017, with exemptions, and the process has begun for signatory parties to apply for these (e.g. in rubber conveyor belts, waterproof/fire retardant paints, secondary plasticisers). These must be submitted by December 2019 for final evaluation by the technical committee in 2020.

This also has implications for future updates of the Best Available Techniques/ Best Environmental Practices guidance. If the current measures are considered to be unsuitable for managing SCCP, then these may need to be updated.





Montreal Protocol and the EU ODS regulation

The UN has begun revising the Montreal Protocol on the protection of the ozone layer and will include halogenated very short-lived substances (VSLs).

Methylene chloride (DCM) belongs to these substances with an atmospheric lifetime of 0.4 years. NGOs are strongly advocating for strict global usage restrictions or even bans of VSLs substances under the Montreal Protocol. Scrutiny of DCM was triggered by an article in *Nature*, which reported increasing amounts in the atmosphere and also proposed that this could delay the ozone layer repair.

However, this assumption came from unrealistically high growth rates of DCM production, particularly in China. As various media reported on the article, ECSA replied to *Chemistry World* and other outlets and consulted Dr. Archie McCulloch, who published a paper showing how DCM actually has a negligible effect on stratospheric ozone depletion. Any DCM that does get into the stratosphere rapidly decomposes in the lower stratosphere. The contribution of anthropogenic and natural DCM emissions to the overall total stratospheric chlorine is <1%. This led to a presentation by ECSA, supported by HSIA, at a side event of the Montreal Protocol meeting in November 2017. As most emissions of the solvent originate from developing countries, where DCM is used mainly in emissive applications (particularly in India and other parts of Asia), further regulatory action should focus on minimising emissions in these countries. This has already begun in China.

In parallel, in mid-2017, the EU Commission began the process of revising the EU Ozone Depleting Substances (ODS) regulation, which implements the Montreal Protocol in the EU. ECSA is a recognised stakeholder of this process, and members have provided extensive feedback on the consultation process to simplify and streamline the regulation without comprising its goal to protect the ozone layer.

UBA PMT approach

The German Environment Agency (Umweltbundesamt, UBA) has published their “Assessment of persistence, mobility and toxicity (PMT) of 167 REACH registered substances” with the aim of protecting drinking water resources in Germany.

UBA has set conservative criteria that are alleged to match the properties of perchloroethylene (PER) and trichloroethylene (TRI), meaning that they appear high on the list. UBA also aims to establish PMT as an “equivalent concern” under Article 57 of REACH, and to use PMT substances as substances of very high concern (SVHC) for inclusion on the candidate list for authorisation under REACH. To test this, UBA are starting with the first 9 substances of the report which include these solvents.

ECSA does not consider such a classification as being the right tool to improve drinking water quality especially as TRI is already listed in Annex XIV (authorisation) and PER is handled today almost exclusively in closed systems with no intentional emission to water or soil.

ECSA has therefore prepared a position paper and works with the Cefic PMT task force and German Industry Association (VCI) on advocacy efforts to oppose the PMT concept for SVHC identification. Major arguments include how the PMT concept is too conservative and not considered equivalent to PBT as defined by REACH, and how there is already sufficient regulation in place for drinking water protection (including the drinking water directive, water framework directive, and national water protection legislation).

REACH

In 2017, the ChlorSolv REACH Consortium showed that methylene chloride (DCM) has no endocrine disrupting properties, refuting Italy’s 2016 allegations. Concerning chloroform, new assessments also confirmed that all industrial uses are safe and unavoidable discharges into sewage treatment plants pose no environmental risk.

Manufacturing & Applications

Member investments demonstrate confidence and create career opportunities in Europe

Euro Chlor members are investing in new technologies and facilities to support a safe, sustainable and successful chlor-alkali industry for Europe.

In recent months, there has been a raft of significant announcements including:



Bondalti has begun construction of a new **55M€** chlorine plant at Torrelavega in Spain.



Kemira will make a **multi-million euro investment** to expand production at its Joutseno chlor-alkali site in Finland.



A **200M€ investment** by Covestro in its production facilities in Tarragona.



INOVYN: a **major expansion project** at the Rafnes Site, Norway and a substantial investment in new technology for the production of chlorine and caustic soda at Cologne, Germany.



Further expansion at the Ercros chlor-alkali plant in Vila-seca, Tarragona.



Vinnolit **expanding its chlorine and VCM capacities** at the Chemical Park, Gendorf.



AkzoNobel Specialty Chemicals and Evonik Industries joint venture successfully starting **chlorine and potassium hydroxide production** at their joint venture facility in Ibbenbüren, Germany



AkzoNobel Specialty Chemicals **expanding chloromethane production capacity** at Frankfurt, Germany

“The products of our industry are vital for society and recent investments demonstrate a confidence in the future role of chlor-alkali chemistry.”

Dolf van Wijk, Executive Director



Chlorine production 2017

2017 chlorine production was reported at 9,895 kilotonnes, 4.6% above the 2016 level but still 7.5% below the 2007 peak level. This means that there has yet to be a recovery to pre-crisis level, but improvement has been observed. The utilisation rate was 81.4% compared to 79.1% in 2016.

Production in the EU chemicals sector grew 1.9% in 2017 (compared to 2016) according to Cefic figures. This means that chlorine production showed a stronger increase in production growth than the rest of the chemical industry in 2017. Cefic data also indicate that high-energy costs are the ‘Achilles’ Heel’ for Europe’s chemical industry on a global stage, so there is a continued need for EU policymakers to support the competitiveness of the European chemical manufacturing industry.

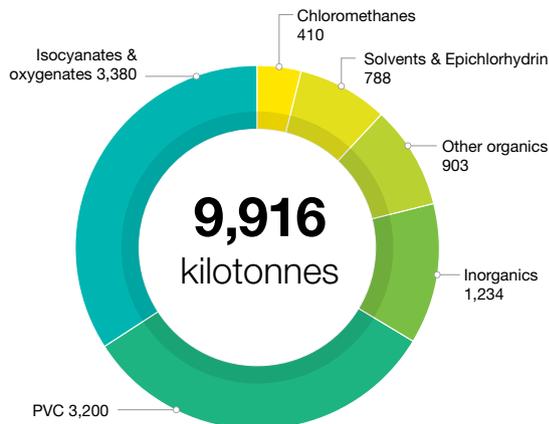
CHLORINE PRODUCTION LEVEL

(in kilotonnes/year)



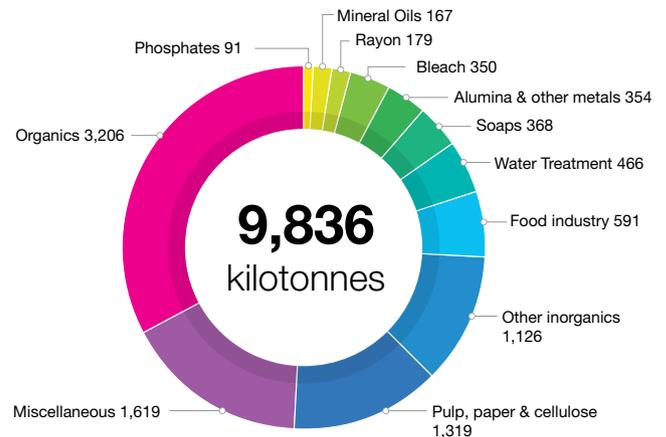
EUROPEAN CHLORINE APPLICATIONS 2017

(in kilotonnes)



EUROPEAN CAUSTIC SODA APPLICATIONS 2017

(in kilotonnes)



Chlorine Production Plants

January 2018 capacities

Process

Hg = mercury

M = membrane

D = diaphragm

"Others" include HCl electrolysis, ODC, molten salt electrolysis, alcoholates

Non Euro Chlor members are indicated in italic

* Total combined production capacity of the Tessenderlo site permit = 400 kt Cl₂/yr



	Country	Company	Site	Total (000 tonnes chlorine)	Hg	D	M	Others
1	Austria	Donau Chemie	Brückl	74			74	
Austria Total				74	0	0	74	0
3	Belgium	INOVYN	Antwerp	500			500	
4	Belgium	INOVYN	Jemeppe	174			174	
5	Belgium	Vynova	Tessenderlo *	400*	205		325	
Belgium Total				1,074	205	0	999	0
7	Czech Republic	Spolchemie	Usti	82			82	
Czech Republic Total				82	0	0	82	0
9	Finland	Kemira	Joutseno	75			75	
Finland Total				75	0	0	75	0
10	France	PPChemicals	Thann	43			43	
11	France	VENCOREX	Pont de Claix	112		21	91	
12	France	Kem One	Fos	333		178	155	
13	France	Arkema	Jarré	72			72	
14	France	Kem One	Lavera	341			341	
15	France	Arkema	St Auban	20			20	
16	France	MSSA	Pomblière	42				42
18	France	INOVYN	Tavaux	360			360	
19	France	PC Loos	Loos	30			30	
France Total				1,354	0	199	1,113	42

	Country	Company	Site	Total (000 tonnes chlorine)	Hg	D	M	Others
20	Germany	BASF	Ludwigshafen	385	170		215	
21	Germany	Covestro	Dormagen	480			400	80
22	Germany	Covestro	Leverkusen	390			390	
23	Germany	Covestro	Uerdingen	260			260	
24	Germany	Covestro	Brunsbüttel	210				210
25	Germany	Dow	Schkopau	250			250	
26	Germany	Vinnolit	Knapsack	250			250	
27	Germany	CABB GmbH	Gersthofen	52			52	
28	Germany	Dow	Stade	1,500		1,000	500	
29	Germany	Neolyse Ibbenbüren GmbH	Ibbenbüren	75			75	
30	Germany	AkzoNobel	Bitterfeld	99			99	
31	Germany	Evonik Industries	Lülsdorf	77				77
33	Germany	AkzoNobel	Frankfurt	250			250	
34	Germany	INOVYN	Rheinberg	220		110	110	
35	Germany	VESTOLIT	Marl	260			260	
36	Germany	Vinnolit	Gendorf	180			180	
37	<i>Germany</i>	<i>Wacker Chemie</i>	<i>Burghausen</i>	55			55	
96	Germany	LEUNA-TENSIDE	Leuna	15			15	
Germany Total				5,008	170	1,110	3,361	367
94	Greece	Kapachim	Inofita Viotias	10			10	
Greece Total				10	0	0	10	0
39	Hungary	Borsodchem	Kazincbarcika	419	131		192	96
Hungary Total				419	131	0	192	96
40	Ireland	MicroBio	Fermoy	9			9	
Ireland Total				9	0	0	9	0
41	Italy	Altair Chimica	Volterra	55			55	
42	Italy	Società Chimica Bussi S.p.A.	Bussi	18			18	
44	Italy	Ing. Luigi Conti Vecchi	Assemmini	25			25	
49	Italy	INOVYN	Rosignano	150			150	
99	<i>Italy</i>	<i>Halo Industry Spa</i>	<i>Torviscosa</i>	24			24	
93	Italy	Fater	Campochiaro	20			20	
Italy Total				292	0	0	292	0
51	The Netherlands	AkzoNobel	Botlek	637			637	
52	The Netherlands	AkzoNobel	Delfzijl	121			121	
54	<i>The Netherlands</i>	<i>Sabir</i>	<i>Bergen op Zoom</i>	89			89	
The Netherlands Total				847	0	0	847	0

Process

Hg = mercury

M = membrane

D = diaphragm

"Others" include HCl electrolysis, ODC, molten salt electrolysis, alcoholates

Non Euro Chlor members are indicated in italic

* Total combined production capacity of the Tessenderlo site permit = 400 kt Cl₂/yr

Country	Company	Site	Total (000 tonnes chlorine)	Hg	D	M	Others	
55	Norway	Borregaard	Sarpsborg	46			46	
56	Norway	Elkem	Bremanger	11			11	
57	Norway	INOVYN	Rafnes	280			280	
Norway Total			337	0	0	337	0	
58	Poland	PCC Rokita	Brzeg Dolny	150			150	
60	Poland	Anwil	Wloclawek	214			214	
Poland Total			364	0	0	364	0	
62	Portugal	CUF	Estarreja	142			94	48
Portugal Total			142	0	0	94	48	
91	Romania	Oltchim	Rimnicu Valcea	105			105	
92	Romania	Chimcomplex	Borzesti	96			96	
Romania Total			201	0	0	201	0	
63	Slovak Republic	Fortischem	Novaky	76	76			
Slovak Republic Total			76	76	0	0	0	
88	Slovenia	TKI Hrastnik	Hrastnik	16			16	
Slovenia Total			16	0	0	16	0	
64	Spain	Electroquimica Onubense	Huelva/Palos	44			44	
65	Spain	Ercros	Sabinanigo	30			30	
66	Spain	Ercros	Vilaseca	120			120	
67	Spain	Electroquimica de Hernani	Hernani	30			30	
70	Spain	Quimica del Cinca	Monzon	45			45	
Spain Total			269	0	0	269	0	
75	Sweden	INOVYN	Stenungsund	120	120			
Sweden Total			120	120	0	0	0	
77	Switzerland	CABB AG	Pratteln	47			47	
Switzerland Total			47	0	0	47	0	
98	UK	Runcorn MCP	Runcorn	430			430	
85	UK	Brenntag	Thetford	7			7	
97	UK	Industrial Chemicals Ltd	West Thurrock	15			15	
UK Total			452	0	0	452	0	
GRAND TOTAL			11,267	702	1,309	8,790	553	
PER PROCESS				6.2%	11.5%	77.4%	4.9%	

Process

Hg = mercury

M = membrane

D = diaphragm

"Others" include HCl electrolysis, ODC, molten salt electrolysis, alcoholates

Non Euro Chlor members are indicated in italic

* Total combined production capacity of the Tessenderlo site permit = 400 kt Cl₂/yr

Full Member Companies

AkzoNobel Industrial Chemicals BV
Altair Chimica SpA
Anwil SA
Arkema S.A.
BASF SE
Borregaard AS
BorsodChem Zrt.
CABB AG
CABB GmbH
CHIMCOMPLEX SA
Covestro AG
CUF-Químicos Industriais SA
Donau Chemie AG
Dow Deutschland Anlagengesellschaft mbH
Electrochimica del Noroeste S.A. (ELNOSA)
Electroquímica de Hernani SA
Electroquímica Onubense S.L.
Ercros SA
Evonik Performance Materials GmbH
International Chemical Investors Group
Ing. Luigi Conti Vecchi S.p.a.
Inovyn
Kemira Oyj
KEM ONE
MSSA SAS
PCC Rokita SA
Produits Chimiques de Loos SAS (Tessenderlo Group)
Química del Cinca, SA
Societa Chimica Bussi S.p.A.
Spolana as
Spolchemie, a.s.
VENCOREX
VESTOLIT GmbH
Vinnolit GmbH & Co KG

Associate Member Companies

Adama Makhtshim Ltd
Alchemist International Ltd.
Angelini A.C.R.A.F. S.p.A.
AQUAGROUP AG
Arch Chemicals S.A.S.
Asahi Kasei Chemicals Corp.
Asociación Nacional de
Electroquímica (ANE)
Association of Chemical Industry
of the Czech Republic (SCHP ČR)
ATANA
Axiall LLC
Banner Chemicals Ltd
Barchemicals S.r.l.
Biomca Quimica SL
Bochemie Inc
Brenntag UK & Ireland
BWT AG
Caffaro Brescia S.r.l.
CBee Europe Ltd (CLOROX)
Chemical Industries Association Ltd (CIA)
Chemieanlagenbau Chemnitz GmbH
Chemoform AG
De Nora Deutschland GmbH
essencia ASBL
EU Salt
Fater S.p.A.
FEDERCHIMICA - Assobase
GHC Gerling, Holz & Co Handels GmbH
Haixing Eno Chemical Co. Ltd.
Helm AG
Hungarian Chemical Industry
Association (MAVESZ)
Industrial Chemicals Limited
Innovation and Chemical Industries
in Sweden (IKEM)

Inquide S.A.
K+S Entsorgung GmbH
Kapachim S.A.
LEUNA-TENSIDE GmbH
LOMBARDA H S.r.l.
Lonza AG
MicroBio (Ireland)
Nankai Chemical Industry Co., Ltd.
NCP Chlorchem (Pty) Ltd
NIPPON SODA CO., Ltd.
Novacid
Olin (Blue Cube Operations, LLC)
Polish Chamber of the Chemical
Industry (PIPC)
SINOPEC JIANGHAN SALT &
CHEMICAL COMPLEX
Sojitz Europe plc
Swiss business association for the
chemical, pharmaceutical and biotech
industries (scienceindustries)
Syndicat des Halogenes et Derives (SHD)
Syngenta Crop Protection Monthey SA
Syngenta Ltd
Teijin Aramid BV
ThyssenKrupp Uhde Chlorine
Engineers
Tosoh Corporation
Unilever R&D Vlaardingen
Van den Huevel Watertechnologie bv
Veltek Associates Inc
Verband der Chemischen Industrie e.V.
(VCI)
Vereniging van de Nederlandse
Chemische Industrie (VNCI)
Vinyl Vegyipari KFT

Technical Correspondents

AGC Chemicals Europe Ltd.

www.agcce.eu.com

Applitek NV/SA

www.applitek.com

BATREC INDUSTRIE AG

www.batrec.ch

BELL-O-SEAL VALVES P. LIMITED

www.bellowseal.com

Blackhall Engineering Limited

www.shawvalves.co.uk

Bluestar (Beijing) Chemical Machinery Co Ltd.

www.bcmc.chemchina.com/bhjen

Carburros Metálicos, S.A.

www.carburros.com

Chemtec UK Limited

www.rmarmstrong.com

CHLORAN CHEMICAL PRODUCTION CO. (CCPC)

www.classco.it & www.chloran.com

CONVE & AVS INC.

www.conveavs.com

Coogee Chlor Alkali Pty Ltd.

www.coogee.com.au

Descote

www.descote.com

DSD Chemtech Projects & Services GmbH

www.dsd-chemtech.com

DuPont Asturias, S.L.

www.dupont.com

Econ Industries GmbH

www.econindustries.com

ERAMET SA

www.eramet.fr

Eynard Robin

www.groupe.eynardrobin.com

Fariman Petrochemical Industries**FIKE**

www.fike.com

F.M.I. SPA UNIPERSONALE

www.fmi-spa.com

Garlock GmbH

www.garlock.eu.com

Hunt and Mitton Valve Company Ltd

www.huntandmitton.net

Huntsman (Europe) BVBA

www.huntsman.com

ISGEC Heavy Engineering Limited

www.isgec.com

IXOM (formerly ORICA Chemicals)

www.ixom.com

Jiangsu Ancan Technology Co., Ltd.

www.ancan-cn.com

JORDAN BROMINE COMPANY (JOC)

www.jordanbromine.com

Kronos Europe NV

www.kronostio2.com

KUROTEC-KTS Kunststofftechnik Stade GmbH

www.kurotec-kts.de

Lubrizol Advanced Materials Europe BVBA

www.lubrizol.com

MERSEN PGY SAS

www.mersen.com

Micro Bio Ireland Ltd.

www.micro-bio.ie

NEELTRAN, INC

www.neeltran.com

Nirou Chlor Co.

www.nirouchlor.com

Nuberg Engineering Limited

www.nubergindia.com

Occidental Chemical Belgium BVBA AZ

www.oxy.com

PERMASCAND AB

www.permascand.com

Pfeiffer Chemie-Armaturenbau GmbH

www.pfeiffer-armaturen.com

Phönix Armaturen-Werke

www.phoenix-armaturen.de

Powell Fabrication & Manufacturing Inc.

www.powellfab.com

PRINCE RUBBER & PLASTICS CO., INC.

www.princerp.com

PROFILCO BV

www.profilco.nl

R2

www.r2000.com

Remondis QR GmbH

www.remondis-qr.de

RESTORE

www.restore.energy

Richter Chemie-Technik GmbH

www.richter-ct.com

National Institute for Public Health and the

Environment (RIVM) – Centre for External

Safety (CEV)

www.rivm.nl

SALCO PRODUCTS INC.

www.salcoproducts.com

Sasol Chemicals

www.sasol.com

SAVINO BARBERA SRL

www.savinobarbera.com

Senior Ermeto

www.senior-aerospace-ermeto.com

SGL CARBON GMBH

www.sglgroup.com

SIEM - SUPRANITE

www.siem.fr

STEULER-KCH GMBH

www.steuler-kch.de

STEULER-KCH GMBH

www.steuler-kch.de

TechnipFMC France

www.technip.com

Tronox Pigments (Holland) BV

www.tronox.com

W.L. Gore & Associates GmbH

www.gore.com/sealants

Xomox International GmbH & Co. OHG – CRANE

ChemPharma & Energy

www.cranecpe.com

The full version of this report is available from
www.chlorineindustryreview.com



Euro Chlor supports a safe, sustainable and successful chlor-alkali industry for Europe.

Chlorine is an essential building block for the manufacture of numerous products that we rely on every day. Across Europe, millions of jobs are dependent on the availability of competitively priced chlorine supplies.

Chlorine chemistry is also vital for the development of the innovative materials we will need in the future.

Euro Chlor's 34 producer members operate 65 manufacturing locations in 19 European countries, representing 97% of all European production capacity.

Euro Chlor represents the interests of chlorine producers in Europe; encourages best practices in safety, health and environmental protection: and promotes the economic and social benefits of chlor-alkalis and the many industries that rely on them.

Based in Brussels, Belgium, Euro Chlor is a sector group of Cefic (European Chemical Industry Council), which represents chemical companies across Europe, directly providing 1.2 million jobs and accounting for 14.7% of world chemical production.

Euro Chlor is a member of the World Chlorine Council, a global network of regional organizations that represents producers accounting for more than 80% of worldwide chlor-alkali production capacity.

it's a
chlorine
thing.

Euro Chlor
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A sector group of Cefic 

European Chemical Industry Council - Cefic aisbl

EU Transparency Register n° 64879142323-90



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