Sustainable Progress

WORLD chlorine council®

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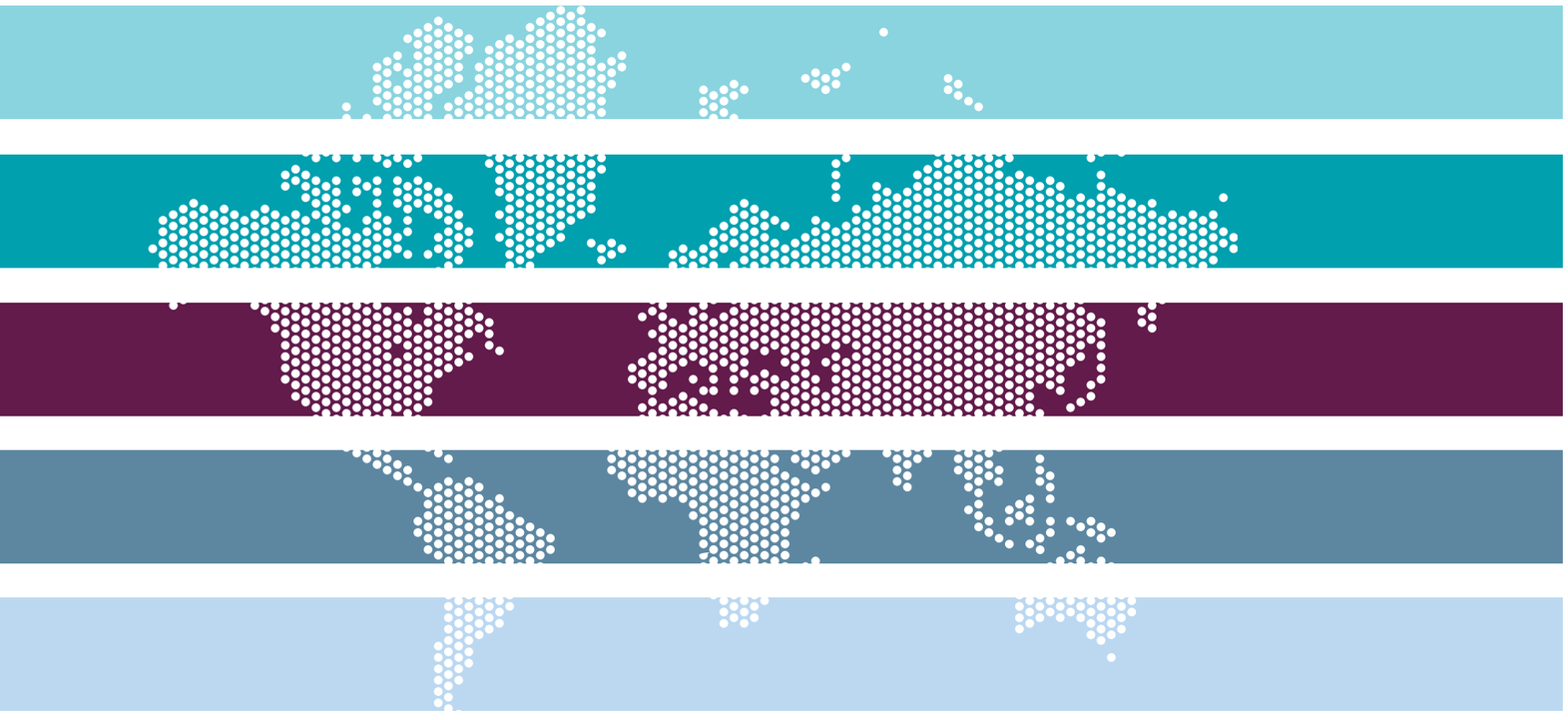

Introduction to the World Chlorine Council

The World Chlorine Council (WCC) is a global network of national and regional chlorine-related trade associations and their member companies. WCC has participation from chlor-alkali producers across North America, South America, Europe, and Asia and continues striving to include all producers worldwide. WCC primarily aims to improve the performance and sustainability of the industry by promoting responsible stewardship practices and addressing safety, health, environmental and public policy issues. It is accredited as a non-governmental organization by the United Nations General Assembly, and recognized as a major stakeholder that can provide input into the U.N. system on priority international issues.

Through Solar Impulse partners, including Solvay and Bayer MaterialScience, chlorine chemistry contributes to the manufacturing of the Solar Impulse plane's 12,000 solar cells, lightweight polyurethane foams and unbreakable polycarbonate films and sheet for the cockpit glazing.

© Solar Impulse/Jean Revillard

Progress on Sustainability: WCC's Perspective

As the world takes stock of progress towards sustainable development, WCC is pleased to present this report of the chlor-alkali sector's achievements.

We continue to see sustainability as a journey, underway but not complete, including substantial progress and the need for continued efforts. Our products remain essential solutions to many of society's greatest challenges – the need for chlorination of drinking water in times of increasing cholera outbreaks is a reminder that chlorine chemistry is still critical for basic life-supporting processes. Chlorine-based products also help supply affordable and durable housing, plentiful food and effective medicines, playing a central role in economies around the world.

At the other end of the spectrum, the use of chlorine chemistry in leading-edge technologies such as the Solar Impulse project illustrates our potential. This project aims to turn a vision to reality by flying an aircraft day and night using solar energy alone – a powerful symbol of the major efforts and technological leaps needed to ensure a sustainable future.

The photovoltaic cells on the wings of the plane are protected by a 17 micron-thick film of a high-performance coating, a copolymer of ethylene and chlorotrifluoroethylene (ECTFE). This product protects the cells from corrosion and from the harsh environment that is encountered by the plane on the ground and in the air.

As institutional frameworks for sustainability develop, it will be important to foster sustainability but avoid additional layers of bureaucracy. Efficiencies should be pursued wherever they can help promote sustainable outcomes. The private sector has technical expertise that can help inform policy decisions and improve the effectiveness of implementation. The Strategic Approach to International Chemicals Management (SAICM) provides an innovative model of how multi-stakeholder frameworks can help advance sustainable development objectives. Similarly, private-public partnerships can supplement inter-governmental activities and act as a catalyst for improved implementation.

WCC supports the International Council of Chemical Associations' (ICCA) position that sound chemicals management is best achieved through a combination

Our long-term vision is to achieve zero accidental releases and zero transportation/customer safety incidents.

of transparent, cost-effective, science-based regulation and voluntary initiatives. Industry led efforts – such as Responsible Care® and the Global Product Strategy – can be effective in helping achieve sustainable development at the global and local levels, and the institutional framework should help facilitate and encourage such initiatives. It should also help build capacity and develop institutions that support implementation at the national level.

In the future, the move towards a ‘green economy’ requires an inclusive, multidimensional approach. A solely environmental focus risks defining green jobs and green growth too narrowly. Economic growth is critical to solving environmental and social challenges, including poverty reduction. The global chemical industry – and the private sector more broadly – has a critical role to play. The private sector is the primary source of green jobs and the principal supplier of green products and services, through the innovation, commercialization and implementation of new technologies. Chemistry is essential for enabling this, since virtually all manufactured products are touched by chemistry.

The chlor-alkali industry’s dedication to continuous social, economic and environmental improvement – known as the “triple bottom line” of sustainability – remains undimmed. Efforts continue at local, regional and global levels, coupled with open and timely dialogue with all stakeholders, including regulators, elected officials, scientists, the media, investors and employees. Sharing best practices for optimizing safety and minimizing emissions remains a top priority as we move towards our long-term vision of achieving zero accidental releases, and zero transportation and customer safety incidents.

WCC has engaged positively in many national and international processes linked to chlorine chemistry over many years, including the U.N. chemical management conventions on persistent organic pollutants (POPs) and wastes. As an example, WCC is a partner in the U.N. Environment Program (UNEP) Mercury Partnership. Our commitments to phase out mercury-based chlor-alkali production, under the Global Instrument on Mercury currently under negotiation, illustrates that WCC continues to be an active traveler in this global journey towards sustainability.

Dow Chemical's Closed Loop Management of Chlorinated Solvents

Manufacturers depend on chlorinated solvents for metal cleaning and degreasing operations for aircraft, appliances, automotive, electronics and railroad applications. Chlorinated solvents require responsible design and management and handling procedures to avoid potential workplace hazards or environmental impact. One such approach has been developed by Dow Chemical's wholly-owned subsidiary, SAFECHEM, which has a state-of-the-art, closed-loop delivery system for handling chlorinated solvents. This improves process productivity while reducing risk in industrial cleaning operations. The system enables solvent to be transferred to cleaning equipment with significantly reduced risk of emissions or spills, offering a safer alternative for solvent use without sacrificing cleaning performance or requiring additional maintenance costs. The system also requires less energy and water usage, as well as less use of solvents through Dow technology that maximizes solvent life. Through this system, solvents are delivered to customers in sealed containers designed to meet road, rail and sea transport regulations. Used solvents can be transferred directly from cleaning equipment to recycling containers, greatly minimizing risk of spills or emissions. Dow also promotes safe-use parameters to the chlorinated solvents value chain, delivering communications on non-supported applications and use conditions for the solvents, and providing in-depth training for workers who use these products.

Product Benefits

Chlor-alkali producers are a vital part of the chemical industry and provide benefits in an array of sectors including healthcare, public health, energy and the environment. The industry makes a significant social contribution—and offers products and technology to improve lives and help to achieve the Millennium Development Goals.

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Healthcare:

Chlorine-based products play a key role in medical devices and pharmaceuticals. For example, in the United States, more than 90% of pharmaceuticals contain or are manufactured using chlorine, including products to treat HIV/AIDS, allergies, arthritis, cancer, depression, diabetes, heart disease, hypertension, infections, pneumonia and ulcers.

Through its use in polyvinyl chloride (PVC), chlorine also contributes to safety in tamper-resistant pharmaceutical packaging and in "blister" packs, which help extend shelf-life and make it easier for patients to take the correct dose.

An estimated one-quarter of medical devices depend on chlorine chemistry.

Chlorine-based plastics are used to make intravenous drips and blood bags, sterile tubing and packaging, prosthetics and heart catheters. Chlorine is also used to make semiconductors for diagnostic instruments. In hospitals, chlorine compounds help protect patients from infections through their use in cleaning and disinfection, and as antiseptics.

Nutrition:

Chlorine is used to manufacture crop protection chemicals, which help to boost crop yields and quality. In commercial food preparation, chlorine-based products are used for:

- Disinfection of equipment and food contact surfaces (killing food-borne bacteria such as Salmonella, Escherichia coli and Campylobacter)
- Manufacture of packaging to keep food fresh and prevent contamination.

Public safety:

Chlorine's role in public safety includes:

- Decontaminating public water supplies damaged by natural disasters, such as hurricanes, floods, tornadoes

and earthquakes, and preventing mold growth, particularly as floodwaters recede.

- Materials used in protective equipment for police, fire and ambulance services, such as bullet-resistant vests, face shields and helmets, and fire-resistant clothing.
- Communications equipment and components for emergency services, such as radios, mobile telephones and microprocessors.

Environmental protection:

Chlorine, sodium hydroxide and downstream products provide a range of environmental benefits, including:

- PVC is one of the most resource efficient materials for many applications. Many PVC products have a long life, ensuring maximum use is made of natural resources used in their manufacture. In over 50% of PVC applications, the products last over 35 years.
- PVC pipes are strong, durable and immune to corrosion, helping to minimize water loss in municipal water systems.
- Many energy efficient building products, such as foam insulation and PVC windows, are based on chlorine chemistry.
- PVC requires less oil for production and emits about 50% less carbon dioxide than some other polymers if incinerated at the end of its useful life. It can be recycled on an industrial scale for most applications.
- Clean solar energy reduces society's dependence on fossil fuels. It is harnessed by solar panels constructed of thousands of wafers of silicon, purified using chlorine chemistry.
- Sodium hydroxide neutralizes acidic environmental pollution. It is used to control and remediate acid mine drainage, pollution that can severely degrade the habitat and water quality of receiving streams.
- Used aluminum beverage cans and packaging containers represent a large source of aluminum in the municipal solid waste stream. Chlorine gas is bubbled through molten aluminum scrap during the recycling process to reduce magnesium and other impurities in the aluminum melt.
- Hydrochloric acid is used to remediate soils polluted by mining and metallurgical activities.

Safe drinking water:

Today, 783 million people do not have access to safe water sources, and more than one million children die per year due to diarrheal diseases—according to WHO/UNICEF. Some 94% of the burden of diarrheal disease is attributable to environmental and associated risk factors such as unsafe drinking water and poor sanitation and hygiene.

> "The filtration of drinking water plus the use of chlorine is probably the most significant public health advance of the millennium."
>
> *- LIFE Magazine*

Economic Benefits:

Worldwide, there are currently some 500 chlor-alkali producers and over 650 sites with a total production capacity of 58 million metric tonnes of chlorine and 62 million metric tonnes of its co-product, caustic soda (sodium hydroxide) per year. The industry directly employs more than 100,000 people worldwide and creates many more jobs in downstream and closely related industries.

Chlorine chemistry helps power national economic engines in many ways. For example, in the United States:

- Chlorine-related industries supply over 160,000 U.S. jobs
- Chlorine-related industry employees earn more than $8.8 billion in wages each year
- Roughly one-half of the chemical industry's products depend on chlorine chemistry
- The vast majority of U.S. water systems use chlorine to help provide safe drinking water
- Chlorine chemistry is used in 93 percent of top-selling U.S. pharmaceuticals and 86 percent of crop protection chemicals
- Durable, corrosion-resistant PVC pipe, a product of chlorine chemistry, is a sustainable solution for water infrastructure renewal
- Hydrogen, a co-product of the chlor-alkali process, can be used as a zero CO_2 emission fuel in plant boilers, reducing a facility's carbon footprint.

> “WCC members have **reduced their mercury emissions by 73%** since 2002.”

Energy and the Environment:

Chlorine chemistry is a critical element of sustainability, resource conservation, and green energy innovation. Examples include:

- In transportation, chlorine chemistry is an important component in the development and manufacture of materials that make vehicles lighter—thereby increasing fuel mileage.
- Unlike most other plastics, which are manufactured wholly from fossil fuels, cost-effective PVC is comprised of 57 percent chlorine, which is obtained from common salt – a quasi-infinite natural resource.
-
- Polyurethane foam insulation, manufactured using chlorine chemistry, increases the energy efficiency of home heating and air-conditioning systems, reducing energy bills and conserving natural resources.
- Energy-efficient PVC windows reduce home heating and cooling costs and fossil fuel energy-associated greenhouse gas emissions. PVC windows are low maintenance, eliminating the need for paints, stains, strippers and thinners. Research indicates manufacturing PVC windows requires one-third of the energy needed to make aluminum windows.

Green Energy Innovation:

- Chlorine chemistry plays an important role in harnessing solar energy—purifying the silicon found in grains of sand and helping transform them into solar panel chips. Wind turbine blades of chlorine-based epoxy resins help convert wind power into electricity for a clean, renewable, greenhouse gas-free energy source.
- Clean, energy-efficient hybrid vehicles contain electric motors powered by nickel metal hydride battery packs. These batteries, which last longer than the most advanced lead-acid battery, use potassium hydroxide—a co-product of chlor-alkali production—as an electrolyte.

An Industry Committed to Sustainability:

- Through advances in technology and operating practices, the chlor-alkali industry is reducing its environmental footprint:
- WCC members have reduced their mercury emissions by 73 percent since 2002.

Solvay Commissions World's Largest Proton Exchange Membrane Fuel Cell

Solvay has commissioned a 1 MegaWatt (MW) industrial demonstration fuel cell at the SolVin plant in Lillo, Antwerp, Belgium. SolVin is a 75-25 joint venture between Solvay and BASF. The Proton Exchange Membrane (PEM) fuel cell converts hydrogen produced by the plant into electricity, and generates 475 MWh in 1 month of operation. This would fulfill the electricity needs of around 1,500 families during that period. The Fuel Cell enables low value hydrogen from the electrolysis process to be used to generate electricity which benefits the overall energy efficiency of the site. Hydrogen-powered fuel cells produce only electricity and water. This industrial scale-up project – which converts the chemical energy from hydrogen into clean electricity through an electrochemical reaction with oxygen – uses Solvay's innovative specialty polymers and SolviCore's membrane electrode assemblies (MEAs). SolviCore is a 50-50 joint venture between Solvay and Umicore. The Dutch companies, NedStack and MTSA, built the fuel cell. The project was supported by WaterstofNet, the coordinator of the Project Hydrogen Region Flanders - South Netherlands, which provided EUR 1.5 million towards the total project costs of EUR 5 million.

Improved Chlorine Safety Performance

The chlor-alkali industry is committed to safety and stewardship of chlorine and products used in our industry and has the record to back it up.

Chlorine-based products provide great benefit to society. However, the industry acknowledges the safety hazards of some aspects of its chemistry. Chlorine, as a liquid, causes skin and eye burns on contact. When chlorine is released into the air as a gas, it can irritate the respiratory system, mucous membranes, eyes and skin. Hydrochloric acid and hypochlorous acid, both corrosive and potentially dangerous if mishandled, can be formed when chlorine gas reacts with moisture. An acute awareness of these hazards has spurred the industry to become one of the safest of all manufacturing sectors. The WCC safety program targets continuous improvements in global safety performance, both at facilities and during transportation. Key initiatives include:

- **WCC Incident Reporting and Tracking Program,** WCC Incident Reporting and Tracking Program, initiated by the WCC Global Safety Team in 2002. This program documents chlorine-related incidents (including accidental emissions and near misses) at fixed facilities and in transportation. The information is compiled and reported to WCC members to provide lessons that may help prevent future incidents. Currently, most data reported is from Europe, North America and Japan. Human error and corrosion of equipment are the two most common factors reported in the database. WCC is working to improve reporting from other regions and make this a truly global database of incidents.
- **Preparation and sharing of safety guidelines** Preparation and sharing of safety guidelines across national and regional associations, dissemination of safety information through the WCC Global Network, and promotion of safety to end-users through the International Council of Chemical Associations (ICCA) Responsible Care® program. This includes posters and manuals for the safe operation of equipment and handling of chlorine products, available for download from the WCC website, www.worldchlorine.org.
- **Active participation in Stewardship workshops** that are organized almost every year in different countries, including expert presentations, allowing further sharing of best safety practices.

CHLOREP and TRANSCAER; models for emergency response

For more than 30 years, the Chlorine Institute has helped emergency responders prepare for and respond to chlorine emergencies in the U.S. and Canada through its Chlorine Emergency Response Plan (CHLOREP). This program has been studied and benchmarked as a "best practice" by the chlorine industries of many countries around the world. CHLOREP quickly mobilizes industry expertise to an accident site involving chlorine. Trained emergency teams from chlorine producing, packaging and consuming plants are on alert on a 24-hour basis to handle chlorine emergencies. TRANSCAER® (Transportation Community Awareness and Emergency Response) is a voluntary American and Canadian outreach effort in Canada that focuses on assisting communities to prepare for and to respond to a possible hazardous materials transportation incident. TRANSCAER® members consist of volunteer representatives from the chemical manufacturing, transportation, distributor, and emergency response industries, as well as the government.

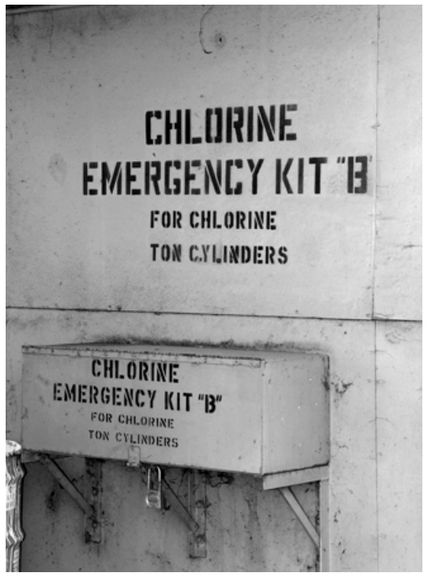
Safety at production facilities

Within chlor-alkali plants and downstream production facilities, management of chlorine is especially important to protect employees, the local community, and the environment. Facilities continuously work to improve equipment design, process control procedures and employee training. In 2009, the U.S. manufacturing industry sector reported the largest year-to-year decline injuries and illnesses since 2003, falling by 23 percent, and U.S. chlorine producers had a workplace injury and illness incidence rate that was 73 percent lower than the average for other manufacturing industries.

Transportation safety

Safe transportation of chlorine continues to be a top priority. According to 2010 data collected by the Chlorine Institute (CI), 24 percent of chlorine produced in the U.S. is transported off site. Of the total chlorine transported, 84 percent is transported by rail. In the U.S., the CI has worked in partnership with the railroads and government since 1924 to help improve transportation safety. The approach to safety is two-fold: avoidance of accidents and accidental releases of hazardous materials; and mitigating their effects if they do occur. Voluntary safety guidelines and strict government regulations cover all aspects of chlorine transportation by rail. The industry is working to ensure rail transportation safety continues to improve through safer rail operations and the development of new transportation technologies. However, in the spirit of continuous improvement, all parties need to continue assessing technical and operational enhancements.

In Europe, bulk chlorine has been shipped for more than 60 years without a single fatality. About 95 percent is used close to the production unit, and is not transported by rail or road. However, since it is used by industry to make such a diverse range of products, it is inevitable that some must be transported. Railways are the main method of transport, accounting for 77 percent of chlorine movements in Europe (excluding pipeline). Road transport for bulk supply is used only in the UK and, to a limited extent, in Spain and Portugal.



Stringent safety measures are implemented during transport. Chlorine is carried in specially-designed steel containers, ranging from cylinders carrying a few kilograms of chlorine to road and rail tank cars containing 20-60 metric tonnes.

The industry will continue to build on its strong safety record with continuous improvements in transport and distribution.

The global chlor-alkali industry will continue to work with governments and railways to explore ways to improve the safety and security of rail shipments and to address the causes of any incidents. It will also continue to cooperate with researchers and tank car manufacturers to ensure the structural integrity of chlorine tank cars and seek appropriate upgrades based on current knowledge of best safety practices and new technology.

Extending safety to the end-user

The industry is committed to ensuring safety at all stages of product lifecycles, from production to end-use and disposal. This includes helping to educate end-users on the correct handling of products. The

European Chlorinated Solvent Association (ECSA, part of Euro Chlor) started its sustainability program in 2007 with the ambitious aim of covering the whole chlorinated solvents value chain. Nine objectives were set under the three vision elements: Sustainability by product and application; Value chain engagement; and Stakeholder engagement and communication.

ECSA reviewed its substantial progress in 2011. In one example, ECSA analyzed 60 applications and summarized recommendations for a safe and sustainable use of chlorinated solvents in an online toolbox. This Product &

Application Toolbox contains recommendations for more than 350 individual activities. One of the six awareness programs with the value chain led to an Excellence Award for ECSA's contribution. The award recognized the program focusing on sustainable dry-cleaning processing (see http://www.cinet-online.net/edryclean).

This involved the international initiative, E-DryClean, which aims to create practical and easily accessible education material for the European drycleaning industry. Six e-learning modules on best practices and working methods are available, including one on perchloroethylene, for which the ECSA was the leading partner.

Euro Chlor Conference Focuses On Sustainable Development

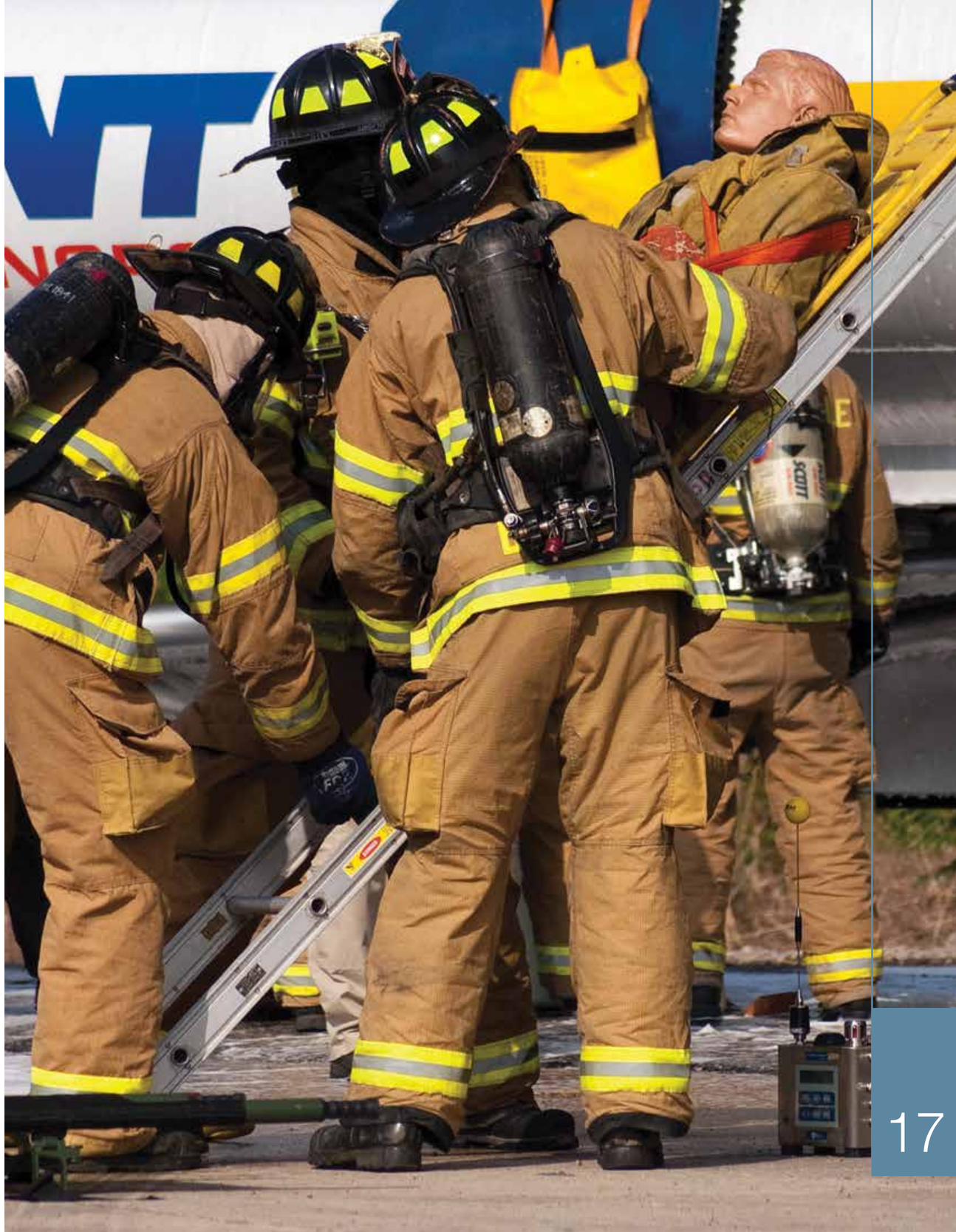
On April 5-7, 2011, Euro Chlor held its Eighth International Chlorine Technology Conference & Exhibition in Budapest, Hungary, with 330 delegates from Europe and 13 non-European countries. Forty speakers gave presentations on topics related to safety, health and environmental protection. In parallel with the event, an exhibition allowed the participants to see and discuss the recent developments in equipment and services focused on this sector.

Abiclor Trains Firefighters On Emergency Responses

On February 2-4, 2011, the Brazilian Chlor-Alkali and Derivatives Industry Association, Abiclor, was asked by the São Paulo State Firefighters to train a squad of 130 firefighters on emergency responses to chlorine incidents. The training involved classroom sessions and hands-on activities; Abiclor member Hidromar donated containers and safety equipment for the fire engines. The same program is under development with the Pernambuco State Firefighters. Abiclor members Produquímica Igarassu, Beraca Sabará and Parva will make train and make equipment donations to the firefighters. Based on the success of this program, Abiclor plans to offer similar training to other Brazilian state firefighters.

Abiclor Transportation Seminars Highlight Safety

Abiclor also holds annual transportation safety seminars in São Paulo, Brazil, including one on November 10, 2010. There are typically 90-110 attendees from throughout Brazil and other South American countries, representing industry, packaging companies and the transportation sector.



Haiti Turns to Chlorine Chemistry When Disaster Strikes

On January 12, 2010, a devastating earthquake struck Haiti, killing and injuring thousands of the country's citizens. Yet the disaster did not end when the earth stopped trembling. Safe drinking water, never a luxury in Haiti to begin with, became scarcer as much of the country's infrastructure was destroyed and cholera and other waterborne diseases crept back into the water supply. According to International Action, in just one city, Jacmel, 22 percent of people reported to be afflicted with cholera have died since the outbreak in 2010. But things are beginning to turn around thanks to donations from around the world, including from the Chlorine Chemistry Division of the American Chemistry Council. International Action is installing chlorinators and water tanks at 54 schools and 20 community water sites to protect the citizens of Jacmel from cholera and other waterborne diseases. The organization reported that these projects will help protect 236,000 Haitians living in this area. This is just one more example of how chlorine chemistry plays an important role in public safety.

Production Technology

The chlor-alkali sector is committed to transitioning to newer production technologies under sound business management approaches.

The mercury cell process

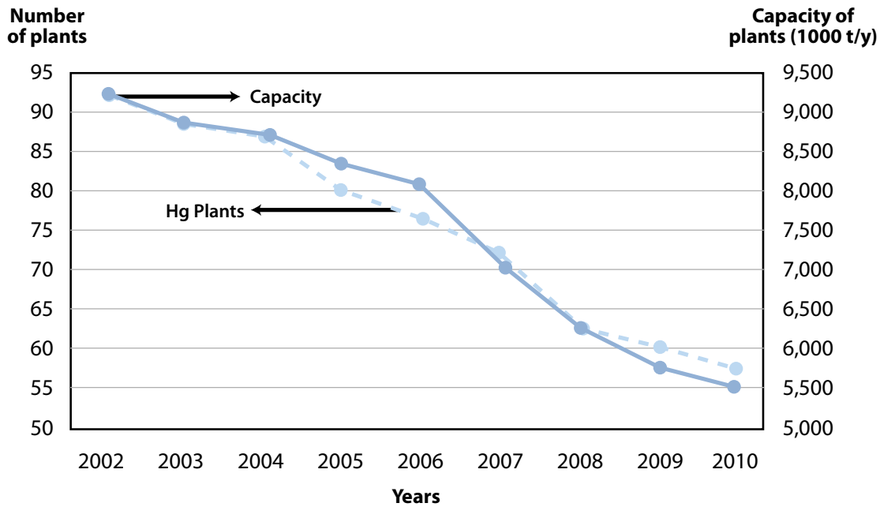
The mercury cell process is one of three manufacturing processes used by the chlor-alkali sector. The others are based on diaphragm technology and membrane technology. Today, elemental mercury is used in mercury cell technology for chlor-alkali production in around 100 facilities worldwide. Strict safety procedures and process controls are followed to prevent workplace exposure and to minimize emissions of mercury.

WCC embraced early on both regional and global initiatives to address mercury releases to the environment, including the current United Nations Environment Program's (UNEP) negotiations towards a global mercury instrument. WCC is a strong supporter of the Mercury Convention negotiations.

Our members are active supporters of the UNEP's Mercury Program and its Partnership on the Mercury Reduction in the Chlor-Alkali Sector. This Partnership builds upon the industry's long-standing commitment to share best practices for reducing mercury use and releases from mercury-cell chlor-alkali facilities.

Global mercury-based production capacity, 2002-2010
(in 1000 tonnes chlorine per annum)

Number of plants and capacity of mercury electrolysis units in USA/ Canada/Mexico, Europe, Russia, India and Brazil/Argentina/Uruguay

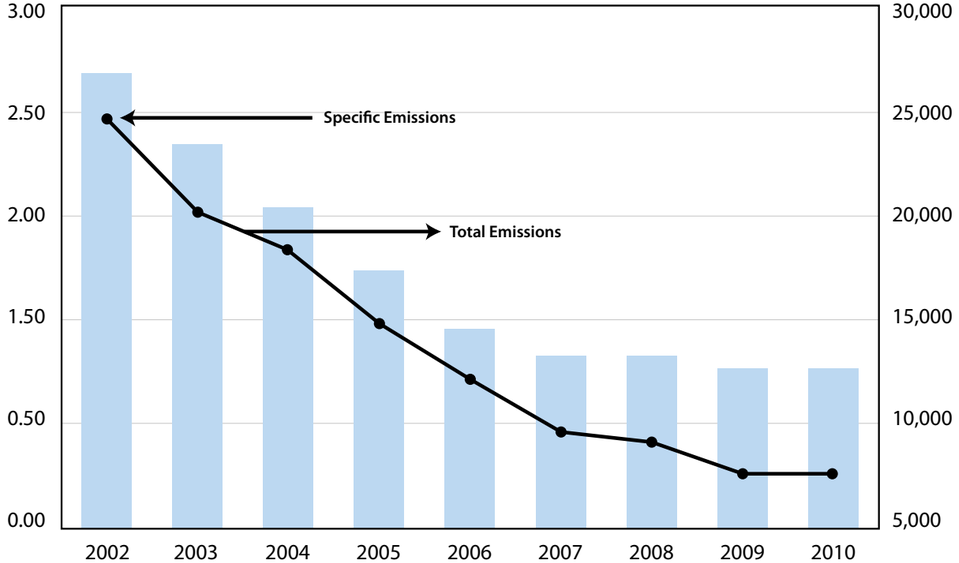


WCC recognizes that mercury is a chemical of global concern and the industry is moving to mercury-free technologies as existing plants reach the end of their economic lives. Transitioning however, will take time. As an example, the member companies of Euro Chlor have signed a voluntary commitment that will eliminate chlor-alkali mercury cell production by 2020. Due to the high capital investment necessary for the conversion to membrane technology and the high variability of factors influencing the profitability of such projects, funding mechanisms are needed to support conversion.

Key facts:

- The chlor-alkali sector accounts for less than one percent of total global natural and man-made mercury emissions. Chlorine production is a very small source of mercury emissions today.
- WCC and its member associations will continue promoting utilization of best available techniques (BAT) and best environmental practices (BEP) at existing facilities until their closure or transition.
- WCC members have reduced their mercury emissions by 73 percent since 2002.
- The industry supports best practices, including:
  - **Controlled Supply of Mercury to Chlor-alkali Facilities:** The use of mercury should be considered essential for chlor-alkali production until mercury-cell facilities are transitioned or closed.
  - **Monitoring of Mercury-containing Wastes:** Mercury containing wastes should be managed in an environmentally sound way and controlled by national authorities. Basel Convention Guidelines should be taken into account, and national legislation and regulations should be applied.
  - **Managing Mercury Surplus from Decommissioned Cells:** The end-of-life mercury from shutdown or converted cells is 99.9 percent pure and equivalent to virgin mercury. End-of-life mercury should be managed in an environmentally sound manner and in line with the global Responsible Care® principles of the chemical industry—ensuring WCC member companies follow best practices when transporting, storing, and disposing of mercury.

Global mercury emissions from Chlor-alkali production, 2002-2010



The chlor-alkali sector is transitioning to non-mercury technology and has already achieved a 40 percent reduction in mercury cell capacity since 2002.

Diaphragm technology

The diaphragm process of chlor-alkali production relies mainly on tightly controlled use of the chrysotile form of asbestos. To protect human health, facilities are operated according to industry guidelines and best practices, and the chrysotile asbestos is sourced from companies that comply with national regulations and implement the Asbestos International Association's guidelines. Member companies participate in the Asbestos International Association responsible-use initiative, and are committed to ensuring that the controlled use of chrysotile asbestos is in compliance with national laws and the World Health Organization's recommended permissible exposure limit. More recently, non-asbestos diaphragms (using fluorocarbon polymeric fibres) have been introduced. The new materials extend the lifetime of cells.

Membrane Technology

Membrane technology results from advances in the polymer industry. The technology yields a high quality product that demands approximately 25-30% less electricity than the mercury technology, but it requires additional energy (usually steam) to concentrate the caustic from 32% solution to the commercial grade of 50%. Membrane technology innovation is focusing primarily on electricity consumption reduction by improving membranes and cells design. Despite the high investment costs for of converting to this technology, many chlor-alkali facilities have volunteered to convert mercury-based technology to membrane over the next decade.

All production methods

WCC is committed to promotion of best practices and industry guidance, including BAT

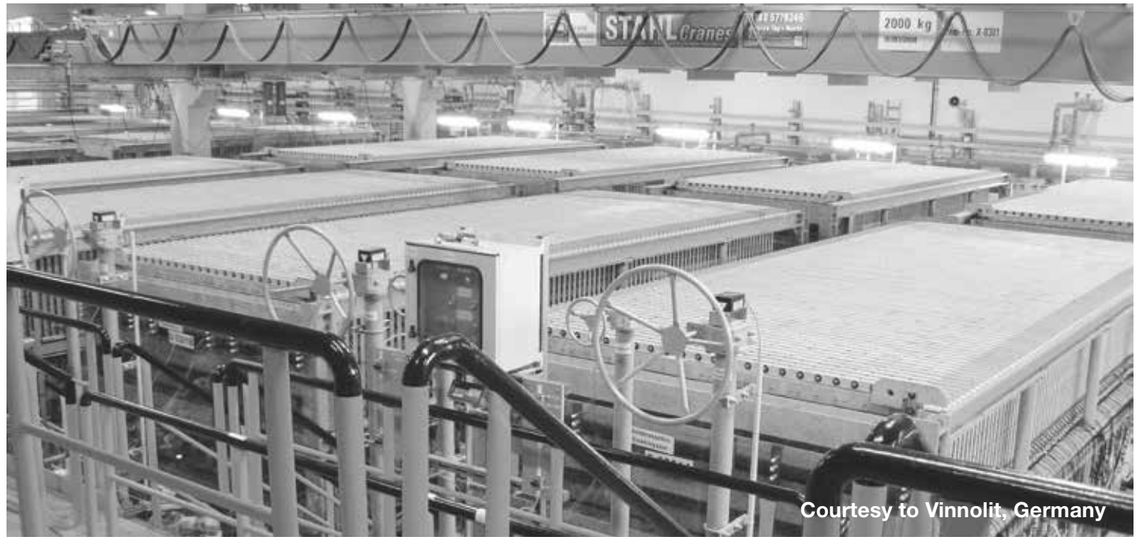
and BEP for chlor-alkali production on a global basis. Specific actions include:

- Organization of Stewardship Workshops in key emerging regions to share BAT/BEP guidelines for chlor-alkali facilities
- Sharing of information on emerging technologies and practices to enhance chlor-alkali production, extending beyond current BAT/BEP guidelines to include other production related developments and innovations (e.g., recycling of hydrogen chloride, use of cogeneration and steam)
- Translation and dissemination of industry guidance documents at the regional and global level
- Promotion of technical exchanges and transfers.

How we manage our mission chemicals

The chlor-alkali sector is primarily focused on the production of chlorine and sodium hydroxide, basic chemicals vital to the full spectrum of chemistry and to a modern economy and lifestyle. Our mission chemicals include substances used in the chlor-alkali manufacturing process and chlorinated substances in the value chain associated with our business activities.

While some aspects of our industry present challenges in a sustainability context, particularly our use of mercury and asbestos in some production processes, we are committed to safe management of substances throughout their lifecycle. Our vision for these mission chemicals is to manage responsibly all chemicals used in our businesses, communicate openly with stakeholders about chemicals management and work to be recognized for product stewardship of our chemicals consistent the standards of



Courtesy to Vinnolit, Germany

Responsible Care® and the ICCA Global Product Strategy.
Responsible Care® is the chemical industry's unique global initiative that promotes continuous improvement in health, safety and environmental performance, together with open and transparent communication with stakeholders. Responsible Care® embraces the development and application of sustainable chemistry, helping our industry contribute to sustainable development while allowing us to meet the world's growing need for essential chemicals and the products those chemicals make possible. Through Responsible Care®, the chemical industry is reporting and tracking its progress on critical elements of product stewardship and is making further improvements to its current processes.

WCC is aligned with and has been committed to the Responsible Care® ethic for nearly two decades.

Responsible Care® has fostered the development of the ICCA Global Product Strategy (GPS) which seeks to improve the industry's management of chemicals including the communication of chemical risks throughout the supply chain. GPS advocates for a combination of regulations and voluntary programs aimed at harmonizing the global level of product safety assessment by:

- Defining a "base set of information" for chemicals in commerce
- Sharing of relevant information for safety assessment between companies
- Promoting a tiered process for evaluating risk and identifying appropriate risk management actions for chemicals in commerce
- Extending the guidance for safety assessment (e.g. ICCA Product Stewardship Guidelines) on a global scale
- Helping to define safe use conditions for chemicals and provide guidance to companies to enable them to meet safe use conditions
- Calling for measuring industry performance and public reporting
- Improving product stewardship cooperation with downstream customers of the chemical industry
- Supporting partnerships with intergovernmental organizations and others to enhance product stewardship
- Enhancing outreach and dialogue with customers, the public and other stakeholders.

WCC is committed to the GPS for all chemicals in our business sector, including:

- Participation in the best practice approach for a base set of hazard and exposure information adequate to assess the safety of our chemicals.
- A new approach to facilitate the sharing of relevant information for risk assessment of these chemicals with governments, other stakeholders, and the public, without cost compensation.
- The management of chemicals is best achieved through a balanced combination of regulation and industry-driven initiatives.

As part of the GPS, WCC member companies will add to and update the information in the online GPS Chemicals Portal.

Both Responsible Care® and the GPS are key components of the chemical industry's contribution to the UNEP Strategic Approach to International Chemicals Management (SAICM). Also, under the High Production Volume program of the Organization for Economic Cooperation and Development (OECD), governments and industry have developed or are in the process of developing comprehensive scientific information for the assessment of 125 chlorinated substances.

WORLD chlorine council®

WCC Members

Full & Associated Member Producer Associations

Alkali Manufacturer's Association of India (AMAI)
Canadian Chlorine Chemistry Council (C4)
China Chlor Alkali Industry Association (CCAIA)
Chlorine Chemistry Division of the American Chemistry Council (CCD)
The Chlorine Institute (CI)
Clorosur
Euro Chlor
Japan Soda Industry Association (JSIA)

Pending Members (No Voting Privileges)

Asociacion Nacional de la Industria Quimica
Korea Chlor Alkali Industry Association (KCAIA)
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