

An affiliate of



Find out more about chlorine
on Chlorine Online at

www.eurochlor.org



EURO CHLOR

KEY FACTS ABOUT
CHLORINE

Euro Chlor®

Avenue E Van Nieuwenhuysse 4, box 2
B-1160 Brussels - Belgium
eurochlor@cefic.be

2011

2011

± 2/3

About two thirds of European chlorine
production is used in engineering materials
– polymers, resins and elastomers.



INFORMATION 01

INDUSTRY

EURO CHLOR

- Chlorine is produced with three different technologies. The membrane technology now accounts for 51.2% followed by the mercury process (31.8%) and the diaphragm process (14%). The shift towards membrane technology is in line with Euro Chlor's voluntary agreement to phase out the installed mercury capacity by 2020.
- About two thirds of European chlorine production is used in engineering materials – polymers, resins and elastomers. The largest single end use (34%) continues to be PVC plastic for primarily the construction, automotive, electronic and electrical industries.
- The manufacturing processes of many chemicals, plastics and medicines use chlorine, although the end product is chlorine-free, such as the plastics polyurethane and polycarbonate which have increasing numbers of applications.
- The alkali caustic soda is an important co-product of chlorine manufacture. For every tonne of chlorine made, about 1.1 tonnes of caustic soda and 315 m³ of hydrogen are produced. The caustic soda is used in various industries (e.g. metallurgy, aluminium, glass, soap, detergents and textiles). Hydrogen is mostly recycled as a chemical raw material or fuel.

+ 55%

The chlor-alkali sector underpins more than 55% of European chemical industry turnover (2009: almost 660 billion euro).



04

INFORMATION 02

ECONOMICS

EURO CHLOR

- The chlor-alkali sector underpins more than 55% of European chemical industry turnover (2009: almost 660 billion euro).
- More than 19 million tonnes of chlorine, caustic soda and hydrogen are produced each year at 70 manufacturing locations across Europe. The sector employs about 39,000 people in 21 countries.
- Chlorine is produced by leading electricity through brine. Electricity is used as a raw material and as such cannot be substituted. The average energy consumption is about 3.4 MWh/t of chlorine produced. Electricity represents up to 50% of the cash cost of production. This makes the chlor-alkali industry an energy-intensive industry.
- Chlorine-based construction materials like polyurethane insulation and PVC products help save energy and reduce CO₂ emissions, delivering part of the solution to the climate change. There are no direct greenhouse gas emissions in the chlorine manufacturing process, but depending of the fuel used there are CO₂ emissions related to the generation of electricity.
- The EU and global legislation dealing with climate change and greenhouse gas emissions could significantly affect the competitiveness of the European chlor-alkali industry compared to producers located in regions which are not subject to similar climate change measures.

KEY FACTS ABOUT CHLORINE

05

-75% -78%

Emissions of chlorinated organic chemicals from plants to air have been cut 75% since 2001 and to water by 78%.



06

INFORMATION 03

ENVIRONMENT

EURO CHLOR

- Emissions of chlorinated organic chemicals from plants to air have been cut 75% since 2001 and to water by 78%.
- Mercury (Hg) emissions have been reduced 98% since 1977. In 1998, the Western European industry committed to a voluntary emissions target of 1g/tonne/chlorine capacity on a national basis by 2007 with no individual plant exceeding 1.5g/t capacity. Emissions now stand at 0.88g Hg/t chlorine capacity (2010). Eastern European producers have committed to the same target.
- About 95% of all chlorine manufactured in Western Europe is used or converted to other products on the same site. The small amount of chlorine that is moved is mainly transported by rail. Whenever possible, plants are placed together with other processing facilities at the same location.

KEY FACTS ABOUT CHLORINE

07

+90%

More than 90% of European drinking water is made safe with the help of chlorine, which disinfects right up to the tap.



08

INFORMATION 04

HEALTH

EURO CHLOR

- More than 90% of European drinking water is made safe with the help of chlorine, which disinfects right up to the tap. Chlorine plays a key role in controlling pathogens such as typhoid, cholera and diarrhoea. Globally, up to 1.6 million children die each year of diarrhoea caused by waterborne microbes (WHO, 2007).
- PVC plastic made with chlorine is used in 25% of medical devices. These include blood bags, sterile tubing, heart catheters and prosthetics.
- Most medicines, including many life-saving drugs, are synthesised using chlorine chemistry.
- Chlorine is used in household bleach, disinfectants and antiseptics to combat a wide range of microbes in homes, hospitals, swimming pools, restaurants and other public places.

KEY FACTS ABOUT CHLORINE

09

Millions

are protected by Chlorine, decontaminating public water supplies damaged by natural disasters, such as floods, tornadoes and earthquakes.



10

INFORMATION 05

PUBLIC SAFETY

EURO CHLOR

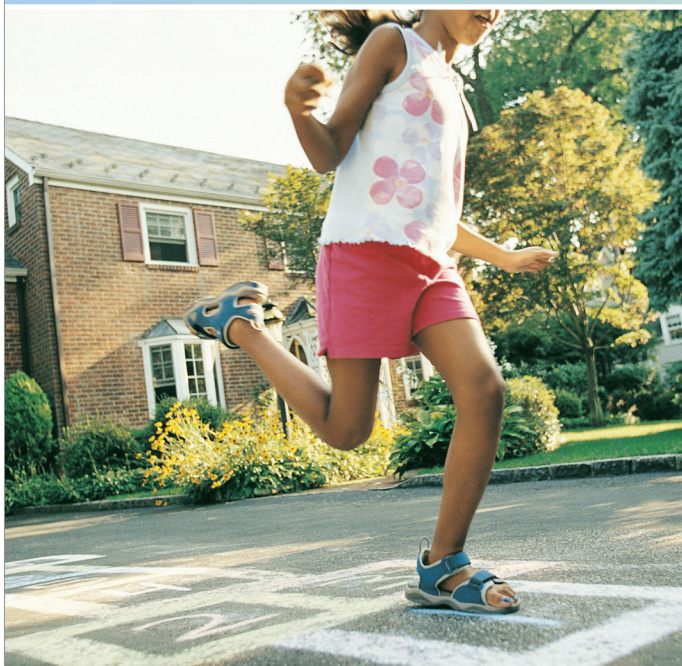
- Chlorine decontaminates public water supplies damaged by natural disasters, such as floods, tornadoes and earthquakes.
- Protective equipment used by the police, fire and ambulance services is made with materials dependent on chlorine. Examples: bullet-resistant vests, face shields and helmets.
- Communications equipment and components used by emergency services are also made with chlorine-based materials. Examples: radios, mobile telephones and microprocessors.

KEY FACTS ABOUT CHLORINE

11

34%

of Chlorine production is used in home construction for PVC window frames and pipes, insulation, concrete, adhesives, paints and carpets.



12

INFORMATION 06

QUALITY OF LIFE

EURO CHLOR

- Chlorine chemistry is used in home construction for PVC window frames and pipes, insulation, concrete, adhesives, paints and carpets.
- Consumer products that depend on chlorine chemistry include toiletries and cosmetics, contact lenses, computers, televisions and compact discs.
- About half of crop protection chemicals used to boost yields and quality are based on chlorine chemistry.
- Many leisure activities rely on equipment made using chlorine: soccer balls, tents, waterproof clothing, skateboards, tennis rackets and skis.
- Automotive components using chlorine include upholstery, bumpers and mats, dashboards, fan and alternator belts, hoses, gaskets and seals.

KEY FACTS ABOUT CHLORINE

13

99.5%

Chlorine is the 10th most abundant of the 15 elements which make up 99.5% of the human body.



14

INFORMATION 07

CHLORINE IN NATURE

EURO CHLOR

- Chlorine is the 10th most abundant of the 15 elements which make up 99.5% of the human body. Chlorinated compounds are found in our blood, skin, and teeth and, as hydrochloric acid, in our digestive system.
- Chlorine is one of the most common elements in nature; more than 2,300 naturally-occurring chlorine compounds have been identified.
- Key natural sources of organochlorines are the oceans, forest fires, volcanoes and living organisms including bacteria, fungi, plants and marine organisms.
- The sea is the source of life. Salt, composed of sodium and chlorine, makes up 2.9% of the world's oceans. Salt brine is the main raw material to produce chlorine. Less than one third of global salt production stems from seawater, most comes from rock salt mines.

KEY FACTS ABOUT CHLORINE

15