The European Chlor-Alkali industry

1. An overview of the Chlor-Alkali industry in Europe

Chlorine gas, caustic soda and hydrogen are the three basic substances that our industry produces, based on a solution of common salt (sodium chloride) in water through which an electric current is passed (a common process which you may remember from your school-days as *electrolysis*). The electrochemical production process utilised in the Chlor-Alkali industry appears at first glance to be relatively simple, but here, electricity is not just an energy source, it is a vital raw material, without which the reaction cannot take place. This is our industry’s biggest interest area which Euro Chlor monitors very closely. Although the final electrolysis reaction remains the same, today three established technologies are used to produce chlorine. By the end of 2015, the membrane technology represented about 64% of the chlorine production capacity in Europe, mercury-based production still accounting for nearly 20% and the third one, diaphragm technology, nearly 14%.

Euro Chlor itself is the Brussels-based business association representing more than 90% of chlor-alkali producers in the EU and EFTA regions, employing about 7500 people at 66 manufacturing locations. Tens of thousands of jobs in Europe are directly or indirectly related to chlorine and its co-product caustic soda (sodium hydroxide).

The Chlor-Alkali industry is one of the basic industry sectors on whose products most other industrial sectors rely, because chlorine and caustic soda both are very reactive molecules. The best-known chlorine applications are drinking water, swimming pool disinfection and waste water treatment. However chlorine is indispensable for the production of the plastic PVC (*polyvinylchloride*), and chlorinated molecules intervene in the production processes of the plastics polycarbonate and polyurethanes. With regards caustic soda, this helps in extracting the metal aluminium from its ore, *bauxite*. Industry sectors relying strongly on chlorine based chemistry are also diverse; from the automotive and pharmaceutical industries to construction.

2. Developing innovative breakthroughs and turning new ideas into products and solutions is the task of chemical companies; but a supportive environment of modern evidence-based policy is also essential

It is the nature of the chemical industry to be innovative. Our continuous and creative research leads to ever more potentially promising molecules, products and applications. That being said, chemical research is also very expensive. The EU chemical industry spent 9.1 million euros in R&D (2015), but this is a long-term activity with no guarantees for a successful return. Furthermore, EU chemicals sales have increased by nearly 60% in the last twenty years, but their world market share has halved, from 32.3% in 1995 to 14.7% in 2015. (Figures: Cefic)

In order to further boost European chemicals development and production, the regulatory context is of crucial importance. Factual and evidence-based policies should return to law-making. Take for instance the EU Biocidal Products Regulation (BPR). Biocides are essential
to society, protecting human health, keeping insect-borne diseases and urban pests under control and in making our products last longer. However, the EU legal and regulatory framework on biocides is one of the strictest worldwide. In its current design and implementation, the BPR does not allow for a holistic assessment of new substances, taking into account concrete socio-economic benefits in conjunction with actual risks and possible risk mitigation measures. REACH is also of interest and thanks to the regulation, we are accumulating more data than ever about the hazards of our substances. This is enabling an exceptional level of safety in their application. Despite this, it is still not uncommon for facts to be ignored during decision-making and this lack of evidence-based policy in Europe on environmental issues undermines the Union’s desire to lead. Truly evidence-based policy making is essential in creating a level-playing field with different interests around the table.

3. The Chlor-Alkali manufacturing sector continues to be one of the energy-intensive industries in the EU. What are the implications of the same and your suggestions on improving the energy efficiency & cost-effectiveness?

Europe’s chemistry is world-class in terms of energy efficiency, with constant improvements still noted. Fuel and power consumption in the EU chemical industry has fallen by 22% over the last 24 years. Over the same period, and taking into account EU chemicals production figures, the EU chemicals energy intensity (energy input per unit chemicals production) has been slashed in half. (Figures: Cefic)

As I already alluded to earlier, due to the nature of the chlor-alkali production technology (electrolysis), electricity is an essential raw material, meaning that – according to the laws of thermodynamics - its use cannot be significantly reduced. Despite this though, the overall chlor-alkali electricity consumption has dropped by roughly ten per cent since 2001 due to energy efficiency improvements. The switch from mercury-based production technology to the more energy-efficient membrane technology, the increased re-use of hydrogen and locally applied efficiency measures are the main reasons for such progress.

However, the cost-effectiveness must be improved as this is an essential factor in our sector’s competitiveness. European and national electricity prices keep on rising, even if in some cases the electricity production cost goes down. In Germany, it is estimated that over the period 2010-25, electricity production cost could be halved, but reallocation charges within their Energy Policy Law will quadruple! Referring also to the second question, this demonstrates that the current EU energy policy is not realistic. A truly evidence-based policy would stimulate innovation opportunities that can actually be achieved.

4. The chlorine industry in Europe and factors affecting the competitiveness of the industry.

These past few years have clearly emphasized that the competitiveness of the European Chlor-Alkali industry indeed continues to suffer. Investment leakage is a reality, energy policy has increased electricity costs without achieving the intended goals of CO2 reduction and regulatory burden in Europe is high. Addressing these specific concerns remains a top priority for the entire chemical industry.

5. Policy landscape that governs the Chlor-Alkali industry in Europe. Suggestions for improvement?
Today, the manufacturing industry generates only about 15% of the European Gross Domestic Product (GDP). Restoring industry’s contribution to GDP back to 20% should be a real goal. Manufacturing is a key economic backbone of the entire economy in Europe and improving this, would have an overall positive effect. In this context one could point at the initiatives already taken by the incoming Trump administration in the US, where DOW CEO Liveris was appointed chair of the Manufacturing Industry Council to advise the president.

6. Challenges faced by the Chlor-Alkali industry in Europe

As hinted at before, the competitiveness of our sector remains our biggest challenge, which can be derived from our key raw material, electricity. Indeed, the costs of this 'material' itself is composed of production costs, reallocation charges and grid costs. The strategy of the policy makers is to keep prices high in order to make 'renewables' more competitive. This would only work if it was a global initiative, but this is clearly not the case. This continues to challenge the competitiveness of the European Chlor-Alkali industry.

A specific issue for the Chlor-Alkali sector in Europe is the phasing-out of mercury-based production technology. In 2001, about 55% of the total installed production capacity was mercury-based, the rest being based on membrane and diaphragm technologies. A phase out of mercury capacity has been going on for several decades, supported by a voluntary agreement between Euro Chlor and its member companies. The conversion of mercury to membrane technology needs investments with pay-back times of up to 20 years, depending on conditions, which poses significant challenges to our members. European regulation to cease mercury based production capacity by the end of this year has accelerated this phasing out. Euro Chlor is assisting this phase out and plant decommissioning by sharing experiences, best practices and practical advice during workshops, technical meetings and the provision of guidance documents.

7. Any advice for Chlor-Alkali manufacturers in emerging markets?

It is part of Euro Chlor mission statement to assist and support member companies in matters of advocacy, sustainability, environmental care, safety, health, communications and certain product linked legislations. Our federation does not engage in commercial and market activities and so as such cannot comment directly on this. However, Euro Chlor is an active member organisation of the World Chlorine Council. This international alliance of chlor-alkali manufacturers is sharing best-practices and fosters a safe and sustainable global chlorine industry.