


**Chlor-alkali
industry review**

2021-2022



**Euro Chlor on its
own transition
pathway**

Note: The content from this year's Industry Review (covering September 2021-August 2022) reflects the four main elements of our Mid-Century Strategy (MCS). Out of 16 key parameters, seven have been reported in our Sustainability Programme since 2001 and are marked with an  icon so they can be compared with previous editions.

We are delighted to announce that this year's contribution from our members (to the 2021 Euro Chlor Sustainability Questionnaire) was almost complete, covering 98.6% of Euro Chlor member's capacity in 2021. The Euro Chlor team will continue its efforts to keep this high participation rate. Under the EU's 'RePowerEU' acceleration of the Green Deal, our commitment to sustainability and also climate neutrality becomes even more crucial.



This report is also available from:

<https://chlorineindustryreview.com>

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Foreword

Tracing our own Transition Pathway...

I am proud of how much Euro Chlor has achieved this past year. We have been addressing the hugely ambitious EU regulatory agenda, while at the same time transitioning back to the office after the Covid-19 pandemic and dealing with the new situation caused by the war in the Ukraine. As you can read throughout this Industry Review, much is in flux and intense collaboration has been carried out in partnership with Cefic on our different files, especially energy, hydrogen and the chlorine benchmark. Our Committees and Working Groups have held numerous meetings, we have new Chairs for some of these and are working to maximise the participation of our busy members in the most relevant regulatory dossiers. A huge thanks to everyone involved.

Importantly, as Wouter mentions on the next page, the Euro Chlor Management Committee held two strategic meetings to identify which key areas of our **Mid-Century Strategy for a Sustainable Chlor-Alkali Industry (MCS)** (<https://www.eurochlor.org/mcs>) should be prioritised due to the current various challenges facing our industry in Europe. Whilst DG GROW is developing transition pathways for many sectors to achieve the twin green and digital transition, we shape our own pathway into the future.

We have also held two successful events over the past 12 months (*see page 7*); the hybrid **Euro Chlor 2021 Annual General Assembly** last November and the face-to-face **Euro Chlor 11th International Chlorine Technology Conference and Exhibition** in May this year. We launched new publications, most notably our 'cradle-to-gate' **Eco-profile** study, which is both valuable for our downstream stakeholders and helps provide a data-rich baseline for our ongoing MCS and sustainability activities (*see page 8*).

Following the launch of our **third 10-year Sustainability Programme (for 2021-2030)** at the above-mentioned Annual General Assembly, we have successfully integrated nine new Key Performance Indicators (KPIs) into this year's Industry Review, which focus on priorities identified in the MCS. These essential new KPIs, including transport incidents, production capacity serving as grid balancing and carbon footprint of our production, will help us remain safe and competitive, while transitioning towards climate neutrality and full circularity.

Marleen Pauwels

Euro Chlor Manager
Executive Director Halogens Industry Sector

... While building on our progress and handing over the baton

Over the past two years as Chair, I have enjoyed working with the Euro Chlor membership to follow up on all the areas of the MCS, including my twin priorities of safety and hydrogen. Much has been achieved already and I am confident to hand over the leadership in good shape to our new Chair, Johan Van Den Broeck.

Euro Chlor has stepped up a gear over the past year, especially since the Management Committee defined and developed some key priority trends to focus on. Already covered in our MCS elements, these relate to the increasing energy price differences between the EU and other regions, renewable energy challenges and investigations into important products for, and from, our industry (see page 6). This work aims at keeping pace with the current economic, environmental and regulatory changes in the EU whilst enhancing our way of working by building on our strengths. The relevant Euro Chlor Committees and Working Groups are now quickly developing action plans to address them. I wish Johan all the best in following up on their progress.

Wouter Bleukx (Inovyn)

Chairman of the
Management Committee



Thanks to Wouter for his dedicated and sustained support to Euro Chlor over the past two years, in particular his championing of the Safe Loading and Unloading Commitment (see page 13). He has been regularly advising the Euro Chlor team on key topics, and I hope to continue this legacy.

I will also closely monitor the process that the Euro Chlor Regulatory Affairs Committee, Energy and Hydrogen Task Forces, in particular, are following to reinforce their priorities with dynamic new Chairs and more interactive members to cope with the busy EU agenda. We expect to see various industry transition pathways in the next 12 months which may also require our attention.

In parallel, the REACH restriction agenda will continue to be addressed throughout our value chain. With all of the above, I look forward to taking over the intense collaboration with the Euro Chlor team and the entire membership.

Johan Van Den Broeck (Vynova)

Vice-Chairman of the
Management Committee





Our strategy

Management Committee scenarios developed to keep us steady during the transition

The Euro Chlor Management Committee held a special session at the end of April 2022 to identify several priority trends that could impact our sector, most notably:

1. Energy prices remaining at the same high level as they are now or increasing even further, until a 'delta' is reached that would make companies stop their EU activities and/or move outside the EU;
2. Increased demand for flexibility and renewable energy, as well as high expectations for hydrogen;
3. Challenges and opportunities related to increasing restrictions of certain chemicals and increased recycling.

The first is being picked up by the Euro Chlor Energy and Hydrogen Task Forces, who discussed it in a face-to-face workshop, which has led to studies to be carried out on energy price differences and Energy Market Design, continued hydrogen advocacy and a focus on the Carbon Border Adjustment Mechanism (CBAM).

The second one is a combined effort of the Energy and Hydrogen Task Forces and the General Technical Committee (GTC). The first two groups will look into the regulatory and market implications and options and the GTC will focus on the technical capability to increase flexible operations of the production installations, including the effects for upstream, downstream, storage and product quality.

The third trend will be covered by the Regulatory Affairs Committee, who are discussing how to potentially support up- and downstream associations in their advocacy work.

Other topics that may also impact our sector include the effects of globalisation, and the EU's plans for the sustainable finance taxonomy and aspects of the Chemical Strategy for Sustainability (CSS).

Meanwhile, work on all other MCS priorities continues unabated, as detailed under the four elements (Safety Leader, Competitive Supplier, Climate Neutral Player and Circularity Champion) in the following pages of this Industry Review.

Our events

Successful hybrid Annual General Assembly

Chair Wouter Bleukx opened the Annual General Assembly meeting on 26 November 2021 by launching Euro Chlor's third 10-year sustainability programme and giving highlights from the past year. An update was also provided on the MCS, focusing on the progress already made under the four elements that had been featured in the 2020-2021 Industry Review (and are now followed up in this publication).

Two engaging external energy-focused speakers also presented; Dr Willem Huisman (Cefic) talked about the European Clean Hydrogen Alliance, whilst Philip Cole of Wind Europe gave an overview of the association's activities. The event also elected Johan Van Den Broeck from Vynova as the new Management Committee Vice-Chair.

Overview of 11th International Chlorine Technology Conference and Exhibition

Following two consecutive years of postponement due to the Covid-19 pandemic, 280 delegates from 26 nationalities were present in Warsaw, Poland on 3-5 May 2022 at the Euro Chlor 11th International Chlorine Technology Conference and Exhibition. Marleen Pauwels kicked off the event and introduced Wouter Bleukx, who set out the progress of the Euro Chlor MCS, whilst Ton Manders gave some results of the Euro Chlor third 10-year Sustainability Programme.

Henry Warren of IHS Markit talked about the industries that drive chlorine demand and gave an overview of the European chlorine market. Two more technical sessions followed, highlighting the MCS elements of Safety Leader and Climate Neutral Player. These sessions were a mix of presentations by Euro Chlor members and staff on key topics and partners on their technological developments.

Feedback received was very positive and everyone is looking forward to the next event in 2025 at the latest.



Our publications launched

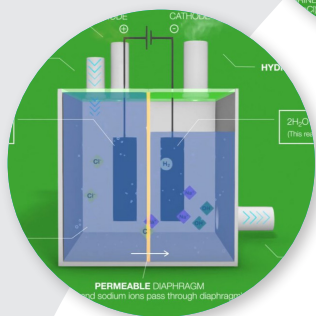
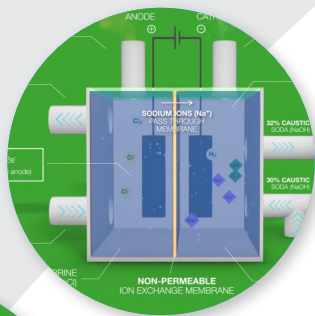
Euro Chlor launches 2022 Eco-profile study...

The 2022 Euro Chlor Eco-profile, published in February 2022, sets out the environmental impacts along the production chain from 'cradle-to-gate'. Since the last report was issued in 2013, we are proud to announce that:

- Mercury technology has been phased out;
- The Global Warming Potential (GWP) for chlorine, sodium hydroxide and sodium hypochlorite has decreased by around 20–25% due to changes in grid electricity GWP and less electricity use for electrolysis due to the mercury phase out;
- For hydrogen, an improvement of 44% was noted, because vented hydrogen is no longer considered as a greenhouse gas;
- Ozone Depletion Potential (ODP) decreased by about 50% for all products.

... and two new animations illustrate membrane and diaphragm cell processes

- <https://www.eurochlor.org/about-chlor-alkali/how-are-chlorine-and-caustic-soda-made/membrane-cell-process/>
- <https://www.eurochlor.org/about-chlor-alkali/how-are-chlorine-and-caustic-soda-made/diaphragm-cell-process/>



In Europe there are two key ways to make chlor-alkali chemistry; via membrane and diaphragm technologies. In April 2022, Euro Chlor published two new animations to illustrate these processes at the following links:

Safety Leader



The Safety Leader priorities have progressed over this past year in line with the positive indicators.

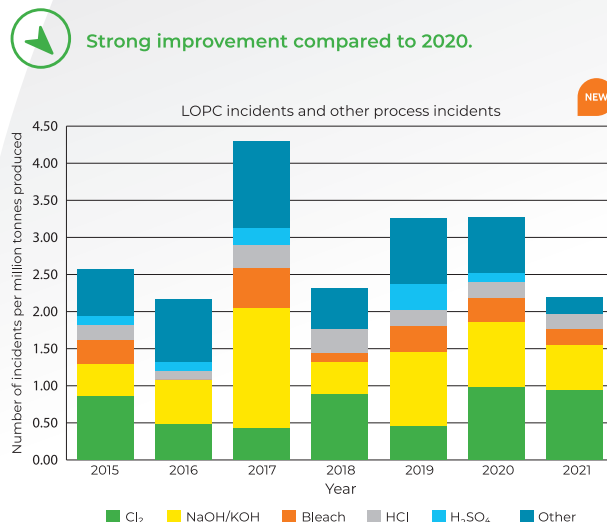
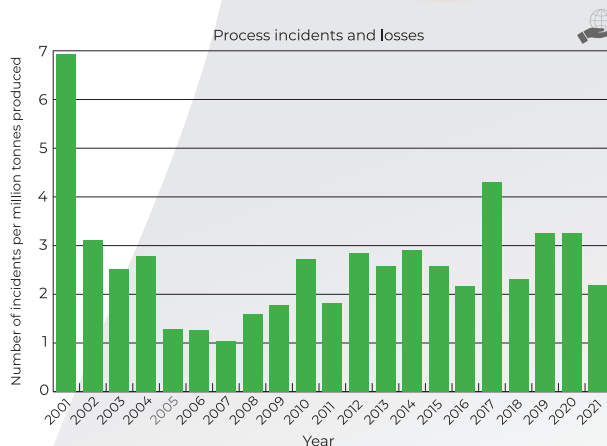
Ton Manders, Technical & Safety Director



Process Incidents and losses and LOPC incidents per chemical

As always, safety remains at the top of Euro Chlor's agenda. In 2021, our process incidents and losses decreased to 2.18 incidents per million tonnes of chlorine (from 3.25 in 2020). This translates, in absolute numbers, to 21 process incidents reported via our annual Sustainability Questionnaire. As we can see in the first graph, the results fluctuate per year. Since the start of our third Sustainability Programme, we now also report the Loss of Primary Containment (LOPC) incidents for each chemical (*second graph*), which have also decreased over the past year.

Since these figures do not correspond with our vision of zero incidents, Euro Chlor and its members are continuing to implement ways to reach this vision. One such initiative is Euro Chlor's **safety training programme** for members and partners. This was first launched in 2021, with a third round of eleven 90-minute Safety Training sessions held from January to early-April 2022. Plans are now being developed for two new training programmes; one for transport companies and the second for downstream users.



Strong improvement compared to 2020.



Improvement compared to 2020.



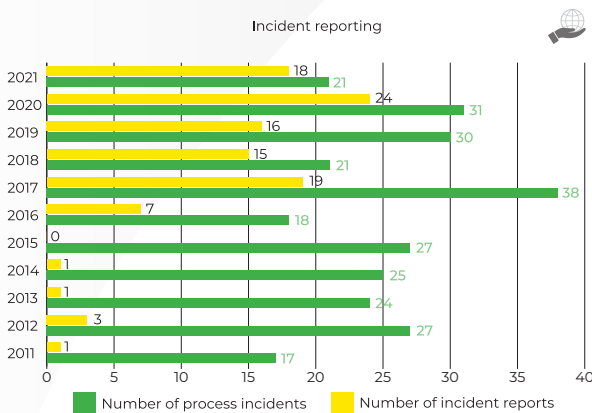
Safety Leader



Interactive safety game developed

The second safety initiative is the development of an **interactive safety game**, which took a huge step forward over the past year. Two sets of face-to-face tests were held with operators and facilitators with positive feedback received. This has led to the production of the final game boxes, which is now underway. Once the boxes are ready, the game facilitators will be trained.

Incident reporting



 Increase in the coverage rate of incident reports.

Following over 10 years of commitment and consistent efforts by Euro Chlor members, the General Technical Committee (GTC) and GEST (Working Group Production, Storage and Transport Safety), the incident reporting rate has hugely increased from 6% in 2011 to 86% in 2021. Although there has been an improvement since last year's level of 77%, continued work is needed to reach the desired level of 100%.

Another positive development is that over the past year Euro Chlor received six incident reports based on incidents that are below the reporting thresholds. Such reports are crucial to allow the GTC and GEST to discuss and share the lessons learned, not only from the more serious incidents, but also from the minor ones and the near misses. This enables Euro Chlor to enhance its documents so that members can avoid similar future incidents.

Occupational safety

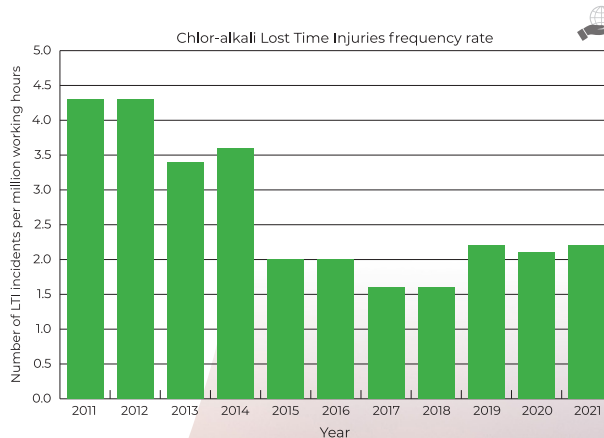
Lost Time Injuries (LTIs) for member company staff remained at a similar level in 2021 (with 2.16 per million working hours) compared to 2020 (2.14 per million working hours). The past seven years have seen LTI levels fluctuate between 1.6 and 2.3 per million working hours. Even though this represents a reduction from previous years, Euro Chlor will continue to work towards its goal of zero LTIs via the previously-mentioned safety initiatives.

Colleague and contractor health remains a high priority for the HWG

Euro Chlor's Health Working Group (HWG) is pleased to announce a successful conclusion to its mercury exposure monitoring programme. Since 1991, members have reported mercury in urine data for their colleagues and contractors. Data confirms that exposure has now reached practically zero. This is a testament to the hard work of all members.

Additionally, guidance documents related to the health hazards of our products have been updated based on questions from members in the Safety Trainings (see page 9). This is also being informed by members who note that many customers are removing their safety showers in favour of bottles of neutralising agent (used during caustic burns). Euro Chlor maintains that these bottles should never completely replace a safety shower.

The HWG will soon update its Electromagnetic Field (EMF) guidance documents based on new advice and the latest science. It is also reviewing the chlorine inhalation survey due to the reduced numbers of returns in recent years.



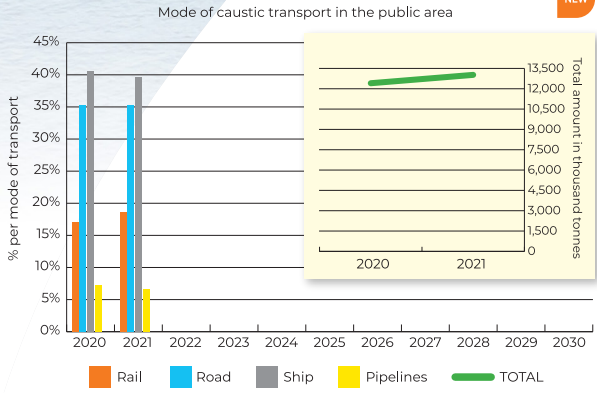
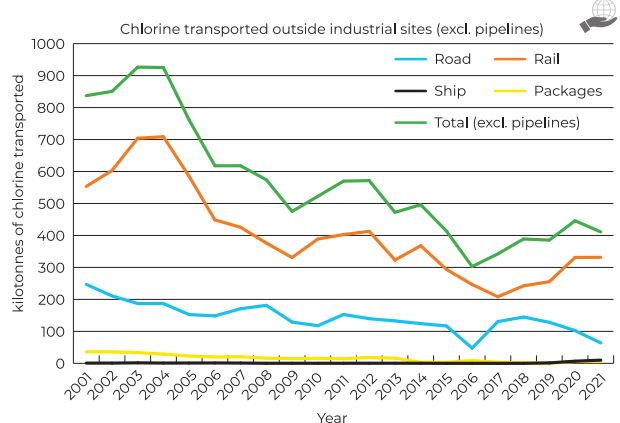
Stable number of LTIs (member staff + contractors now reported together as one figure).





Transportation of chlorine

The graph below shows a slight decrease in the percentage of chlorine transported via road or rail (from 4.8% in 2020 to 4.3% in 2021).



Decrease in chlorine transportation.

Transportation of caustic

In the third Sustainability Programme, we also started to report the amount of caustic being transported through public areas, with the total increasing to 13 million tonnes in 2021 from 12.4 million tonnes in 2020. The main transport means are by ship (40.5%) and road (35.2%).

Increase in caustic transportation.

Safety Leader



Transport incidents for chlor-alkali related products

Another new KPI in the third Sustainability Programme is transport incidents for other chlor-alkali related products in addition to chlorine. While the number of reported transport incidents with caustic remained on the same level as 2020, the number for hydrochloric acid increased from zero to 1.44 per million tonnes being transported and for sodium hypochlorite from zero to 0.86 per million tonnes.

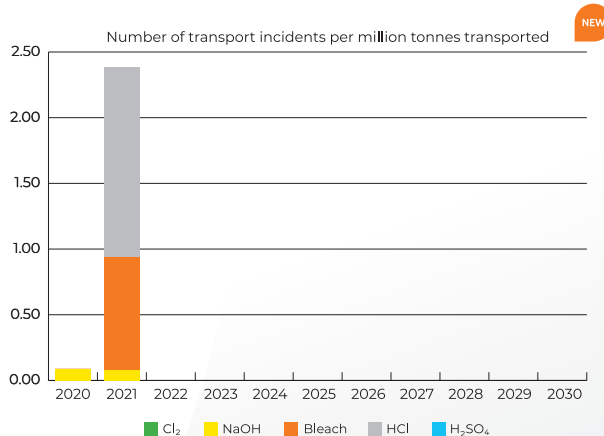
Safe loading and unloading implementation

In January 2021, Euro Chlor members were tasked with implementing the Euro Chlor commitment on safe loading and unloading of chlor-alkali related products and informing the GTC on progress made. Wouter Bleukx, Euro Chlor Chair, stressed the importance of this commitment and the related GEST 18/494 document (available in Dutch, French, Italian, Portuguese, English, German and Polish) at the Annual General Assembly last November. This GEST document is in the last phase of updating, following a serious incident at one of the member's customers.



Highlights at:

<https://chlorineindustryreview.com/safety>



Increase in the number of transport incidents.



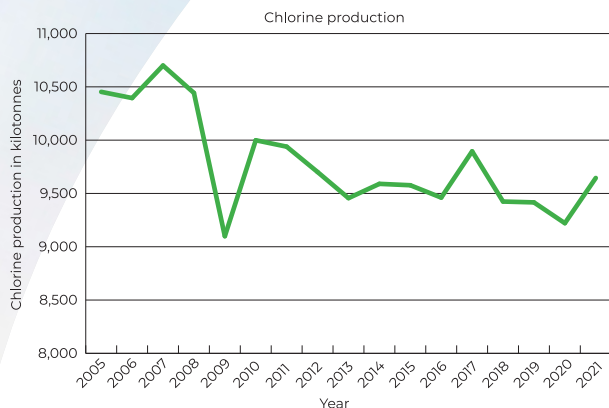


Membership expands along the value chain

Moving towards climate neutrality and circularity, especially in projects relating to sustainability and hydrogen, requires a close collaboration along the value chain. This is why we are delighted to note that Euro Chlor received six new partner applications over the past year. We regularly report on members' and partners' news on the Euro Chlor website at <https://www.eurochlor.org/news-events/member-news>.

 6 new partners applied in the last 12 months.

2021 Chlorine Production



According to figures reported by our members to Cefic, 9,645 kilotonnes of chlorine were produced in 2021, which is 4.6% higher than 2020. This is most likely due to industry recovering after the Covid-19 pandemic. Utilisation rate, meanwhile, rose from 79.5% in 2020 to 82.5% in 2021. Installed capacity increased over the past year by almost 1%.

Competitive Supplier



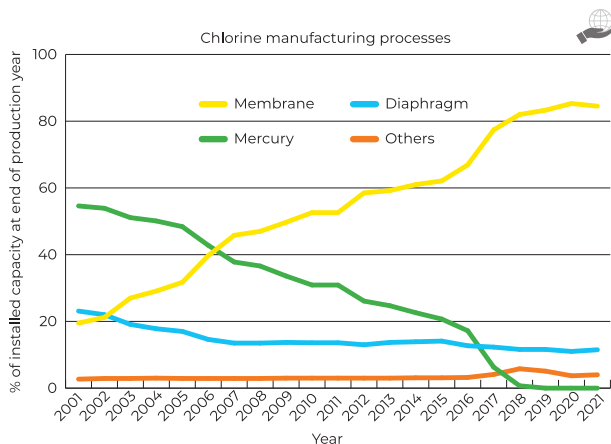
Chlorine production recovered after the Covid-19 crisis and intense efforts continue to safeguard access to cost-competitive energy.

Wouter Bleukx, Chairman of the Management Committee



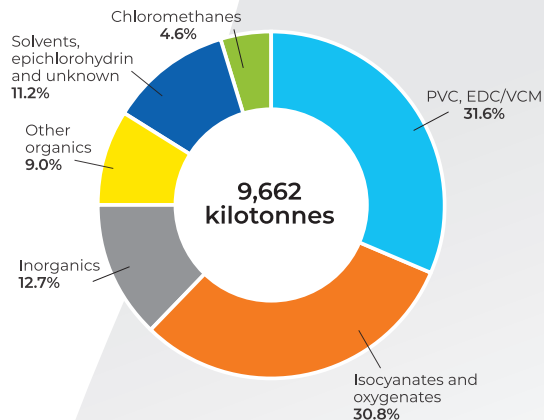
Manufacturing technology

Membrane remains the dominant technology to produce chlor-alkali in Europe, representing 84.5% of installed EU capacity. Diaphragm technology, meanwhile, represents 11.5% of capacity and the remaining 4.0% covers chlorine-alcoholate production, hydrochloric acid conversion to chlorine, metal production and chlorine and caustic production without hydrogen as a by-product.

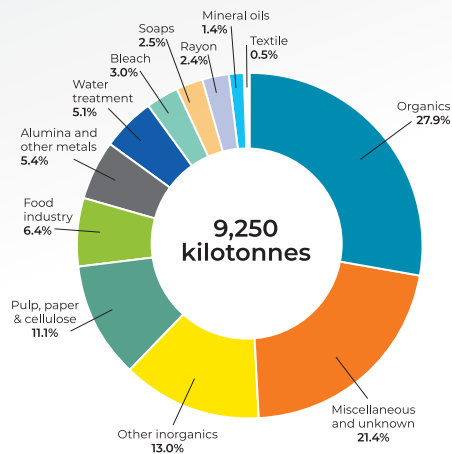


84.5% of European chlor-alkali uses membrane-based production technology.

European chlorine applications 2021



European caustic soda applications 2021

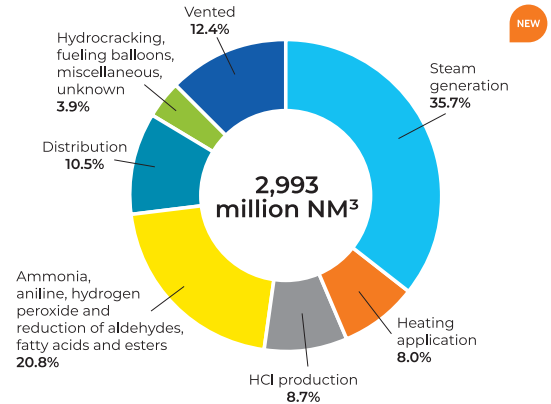




Competitive Supplier



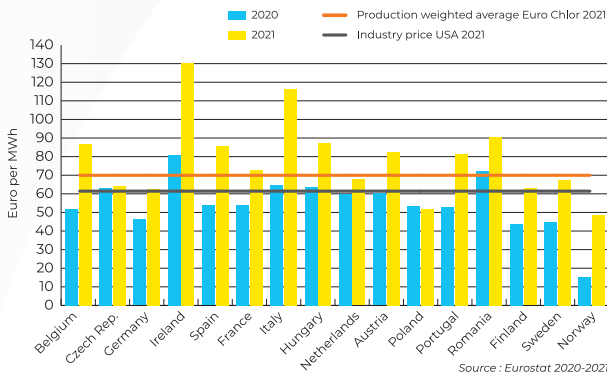
European hydrogen applications 2021



In 2021, Euro Chlor also started to measure the applications of our hydrogen as shown here.

Note: Figure for hydrogen vented varies from that on page 27 due to difference in products covered and different reporting lines.

Electricity price for consumers between 70-150 GWh/year in 2020 and 2021 (excl. VAT and other recoverable taxes and levies) NEW



Electricity and CO₂ costs

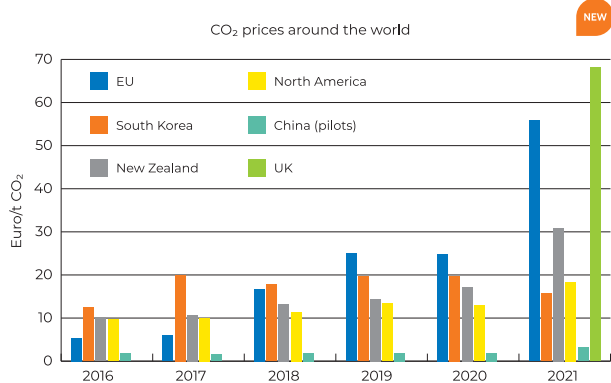
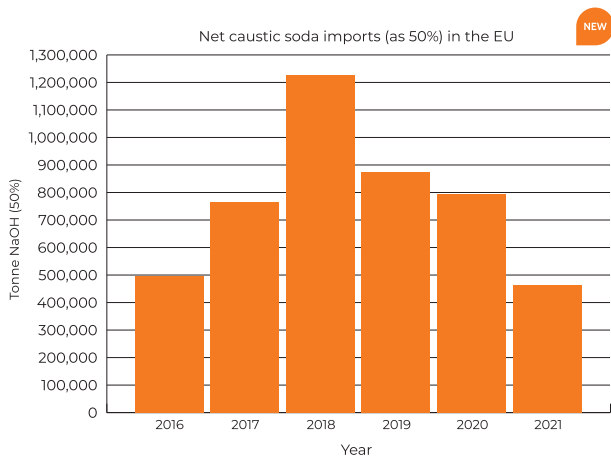
In order to measure our competitiveness in the third Sustainability Programme, we are now publishing data on the cost of electricity in Europe compared to the USA and the cost of CO₂ in Europe compared to other regions in the world.

Data on electricity reflect the average situation of 2021, but the situation has completely changed (giving an even larger difference) since the beginning of 2022, mainly caused by the war in the Ukraine.

Net caustic soda imports

Another new competitiveness measure is the level of net imports of 50% caustic soda into the EU.

These have decreased since 2018, following an increase from 2016-2018, which was mainly linked to the conversion of mercury to membrane technology.



	Country	Company	Site	Total (kilotonnes chlorine)	D	M	Others
1	Austria	Donau Chemie	Brückl	77		77	
Austria Total				77	0	77	0
3	Belgium	INOVYN	Lillo	500		500	
4	Belgium	INOVYN	Jemeppe	174		174	
5	Belgium	Vynova	Tessengerlo	400		400	
Belgium Total				1,074	0	1,074	0
7	Czech Republic	Spolek (Spolchemie)	Ústí nad Labem	78		78	
Czech Republic Total				78	0	78	0
9	Finland	Kemira	Joutseno	75		75	
Finland Total				75	0	75	0
10	France	Vynova PPC	Thann	42		42	
11	France	Vencorex	Pont de Claix	119		119	
12	France	KEM ONE	Fos	333	178	155	
13	France	Arkema	Jarrie	75		75	
14	France	KEM ONE	Lavera	341		341	
15	France	Arkema	Saint-Auban	20		20	
16	France	MSSA	Pomblière	42			42
18	France	INOVYN	Tavaux	370		370	
19	France	Kuhlmann France	Loos	35		35	
France Total				1,377	178	1,157	42
20	Germany	BASF	Ludwigshafen	595*			
21	Germany	Covestro	Dormagen	480		400	80
22	Germany	Covestro	Leverkusen	390		390	
23	Germany	Covestro	Krefeld-Ürdingen	290		290	
24	Germany	Covestro	Brunsbüttel	220			220
25	Germany	Dow	Schkopau	252		252	
26	Germany	Westlake Vinnolit	Hürth-Knapsack	250		250	
27	Germany	CABB Group	Gersthofen	57		55	2
28	Germany	Dow	Stade	1,624	1,024	600	
29	Germany	Neolyse Ibbenbüren GmbH	Ibbenbüren	82		82	
30	Germany	Nobian	Bitterfeld	99		99	
31	Germany	Evonik Performance Materials	Lülsdorf	77			77
33	Germany	Nobian	Frankfurt	283		283	
34	Germany	INOVYN	Rheinberg	220	110	110	
35	Germany	VESTOLIT	Marl	260		260	
36	Germany	Westlake Vinnolit	Gendorf	205		205	

*Distribution unknown

Competitive Supplier



Chlorine production plants 1st January 2022 capacities

Process:

D = diaphragm

M = membrane

“Others” includes HCl electrolysis, ODC, molten salt electrolysis, alcoholates.

Non Euro Chlor members are indicated in italics.



Country	Company	Site	Total (kilotonnes chlorine)	D	M	Others
37 <i>Germany</i>	<i>Wacker Chemie</i>	<i>Burghausen</i>	55		55	
96 <i>Germany</i>	<i>LEUNA-Harze</i>	<i>Leuna</i>	15		15	
Germany Total			5,454	1,134	3,346	379
94 Greece	Kapachim	Inofita Viotias	10		10	
Greece Total			10	0	10	0
39 Hungary	BorsodChem	Kazincbarcika	480		384	96
Hungary Total			480	0	384	96
40 Ireland	Micro Bio	Fermoy	11		11	
Ireland Total			11	0	11	0
41 Italy	Altair Chimica (ESSECO GROUP)	Saline di Volterra	75		75	
42 Italy	Società Chimica Bussi (GIG)	Bussi	18		18	
44 Italy	Società Chimica Assemini (GIG)	Assemini	27		27	
49 Italy	INOVYN	Rosignano	150		150	
50 Italy	Hydrochem Italia	Pieve Vergonte	42		42	
93 Italy	Fater	Campochiaro	20		20	
99 Italy	Caffaro Green Chemicals (GIG)	Torviscosa	24		24	
Italy Total			356	0	356	0
51 <i>The Netherlands</i>	<i>Nobian</i>	<i>Botlek</i>	637		637	
52 <i>The Netherlands</i>	<i>Nobian</i>	<i>Delfzijl</i>	121		121	
54 <i>The Netherlands</i>	<i>Sabic</i>	<i>Bergen op Zoom</i>	89		89	
The Netherlands Total			847	0	847	0

	Country	Company	Site	Total (kilotonnes chlorine)	D	M	Others
55	Norway	Borregaard	Sarpsborg	40		40	
56	Norway	Elkem	Bremanger	11		11	
57	Norway	INOVYN	Rafnes	315		315	
Norway Total				366	0	366	0
58	Poland	PCC Rokita	Brzeg Dolny	209		209	
60	Poland	Anwil	Wloclawek	195		195	
Poland Total				404	0	404	0
62	Portugal	Bondalti Chemicals	Estarreja	142		94	48
Portugal Total				142	0	94	48
91	Romania	Chimcomplex	Râmnicu Vâlcea	106		106	
92	Romania	Chimcomplex	Borzești	102		102	
Romania Total				208	0	208	0
63	Slovak Republic	Fortischem	Nováky	70		70	
Slovak Republic Total				70	0	70	0
88	Slovenia	TKI Hrastnik	Hrastnik	16		16	
Slovenia Total				16	0	16	0
64	Spain	Electroquímica Onubense	Huelva/Palos de la Frontera	44		44	
65	Spain	Ercros	Sabiñanigo	45		45	
66	Spain	Ercros	Vila-seca	172		172	
67	Spain	Electroquímica de Hernani	Hernani	30		30	
70	Spain	Química del Cinca	Monzón	50		50	
72	Spain	Bondalti Chemicals	Torrelavega	68		68	
100	Spain	Biomca Química	Santa Cruz de Tenerife	3		3	
Spain Total				412	0	412	0
75	Sweden	INOVYN	Stenungsund	123		123	
Sweden Total				123	0	123	0
77	Switzerland	CABB Group	Pratteln	47		47	
Switzerland Total				47	0	47	0
85	UK	Brenntag	Thetford	7		7	
97	UK	Industrial Chemicals Ltd	West Thurrock	44		44	
98	UK	Runcorn MCP	Runcorn	430		430	
UK Total				481	0	481	0
Grand Total				12,108	1,312	9,636	565
Per process					11.4%	83.7%	4.9%

Competitive Supplier



RAC working on milestones along the transition pathway

Euro Chlor's Regulatory Affairs Committee (RAC) has been closely collaborating with Cefic as it navigates all the topics in the EU Chemical Strategy for Sustainability (CSS). The review of the REACH regulation, the update of the Industrial Emissions Directive (IED), application of an Essential Use Concept and Mixture Assessment Factor (MAF) and Safe and Sustainable by Design (SSbD) are all dossiers which may have an impact on our sector going forward. As there is also the potential for ECHA studies on PVC and its additives to begin in late 2022, as well as the upcoming broad PFAS restriction proposal due in January 2023, RAC remains busy following up on many regulatory files.

RAC has also been advising the Management Committee and Energy and Hydrogen Task Forces on advocacy options for the range of energy regulatory files detailed below.

Fit for 55 topics and potential consequences for Euro Chlor

Euro Chlor's Energy Task Force has been investigating the potential challenges and opportunities for our sector from the 'Fit for 55' package. Key legislative files include the European Commission's Energy Efficiency Directive (EED), Renewable Energy Directive (RED), Climate, Environmental protection and Energy (CEEAG) and Energy Taxation Directive (ETD). Many are under revision.

The group is also investigating emerging topics around reducing reliance on Russian energy supplies (*as published under the 'REPowerEU' action plan outlined on page 23*) and the potential review of the Electricity Market design. These will both have an impact on energy regulations, potentially leading to demands for us to be more flexible in our production.

In addition, the group is keeping watch on developments in the Carbon Border Adjustment Mechanism (CBAM), which aims to maintain European competitiveness while mitigating the risks of carbon leakage. As this file is highly political, Euro Chlor works with Cefic to keep members informed as things develop. Here we focus on the treatment of indirect emissions that are important to our sector.



Competitive Supplier



Engaging members and Member States for chlorine benchmark and activities on ETS revision

However, in the last revision, a relatively niche technology (ODC) was used as the reference, since it uses less energy to produce 1 tonne of chlorine but does not produce hydrogen as a by-product. In December 2021, Euro Chlor asked DG COMP (and followed up with several reminders) to reconsider this whilst keeping members informed, who coordinated with their national authorities. Today we await further clarification from DG COMP around the size of the chlorine benchmark and the role of the hydrogen benchmark.

The ETS Directive that forms the basis for this indirect compensation is also subject to revision. The European Parliament wants to include indirect emissions into the scope of the CBAM and asks the European Commission for the development of methods to calculate embedded emissions.

The European Council and the European Parliament finalised their positions on ETS, along with CBAM and the Social Climate Fund in June. These will be negotiated during trilogues in the upcoming months. The legislative procedure is scheduled to be concluded in autumn 2022.

Maintaining compensation for indirect costs coming from the EU Emission Trade System (ETS) is a priority within the Competitive Supplier element of Euro Chlor's MCS as electricity is one of the key ingredients for chlor-alkali production. The indirect cost compensation (which uses the chlorine benchmark) is related to the ETS. In May 2021, Euro Chlor submitted a response to question the value of the draft efficiency benchmark value proposed by DG COMP of the European Commission for phase IV of the EU ETS and subsequently received encouraging feedback.

Increasing awareness on Euro Chlor's high-quality low carbon hydrogen and ensuring official classification as 'renewable' or at least 'low-carbon'

Following the launch of the 'Fit for 55' package in July 2021, renewable hydrogen (part of the Renewable Fuels of Non-Biological Origin (RFNBOs)), has been the subject of intense debate within various EU regulatory files.

Euro Chlor responded to the public consultations on two Delegated Acts clarifying the rules applicable to renewable hydrogen and setting the overall regulatory framework. Our main remark was that the conditions to be called 'renewable' were too stringent. Euro Chlor also commented on the method used to allocate the greenhouse gas emissions to the different products we co-produce. This is directly linked to the label our hydrogen can obtain. We will follow up on the publication of the final Delegated Acts and the subsequent two-month scrutiny period for the European Parliament and Council.

In addition to the RFNBO discussion, the European Commission published the 'REPowerEU' action plan in May 2022. It is clear that there will be even more demand for renewable and low-carbon hydrogen. The Euro Chlor Hydrogen Task Force has looked into how the chlor-alkali sector could contribute to the new objectives proposed.

To raise awareness amongst policymakers, Euro Chlor held two meetings with DG ENER in late 2021 about the challenges and opportunities of the high-quality, low-carbon hydrogen members produce as a by-product. This already included the barriers around Power Purchase Agreements (PPAs) to declare chlor-alkali hydrogen as renewable.

To complement this, Euro Chlor produced a video on hydrogen and updated infographic showing how our hydrogen is high purity, low carbon and available today. More information is available at <https://www.eurochlor.org/about-chlor-alkali/what-is-hydrogen>.

The Hydrogen Task Force continues to investigate how we can make further progress in raising awareness and ensuring a favourable regulatory framework for our valuable by-product.



17. CAREERS

Competitive Supplier





New communications activities launched

Taking '17' as our inspiration (from chlorine's position on the chemical Periodic Table of elements), **Euro Chlor's 17 Chlor-Alkali Careers programme** presents 17 real Europeans, whose work contributes to producing chlor-alkali chemicals.

Over the past year, Euro Chlor launched three new 17 Careers videos at <https://www.eurochlor.org/17careers>. These feature Lena from Covestro and Diana and Filipa from Bondalti, bringing the total so far to five.

Website and social media overview

2x
 Increase in people engaging with our posts on Twitter in the last 12 months.

1,474
 followers - our biggest source of audiences from social media to our website.

We updated our website <https://www.eurochlor.org> regularly with our new publications, videos, news on events, member news, etc. Many of these were reflected on our social media:

<https://linkedin.com/company/eurochlor>

<https://twitter.com/eurochlor>

<https://facebook.com/eurochlor>



Highlights at:

<https://chlorineindustryreview.com/competitiveness>

Climate Neutral Player



Energy consumption

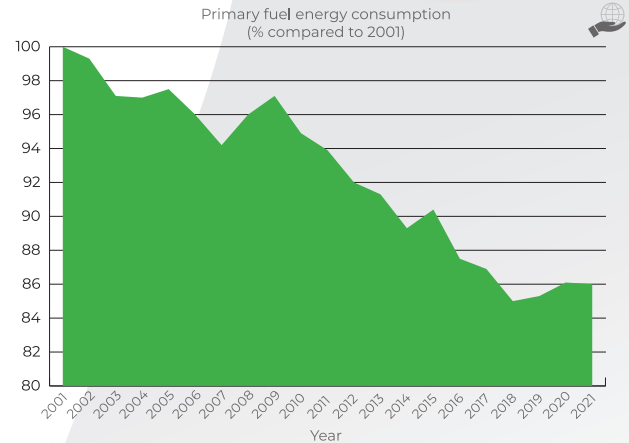
Primary energy consumption remained at roughly the same level as in 2020 (86.0% in 2021 compared to 86.1% in 2020), taking 2001 as the reference year.

Electricity and steam consumption

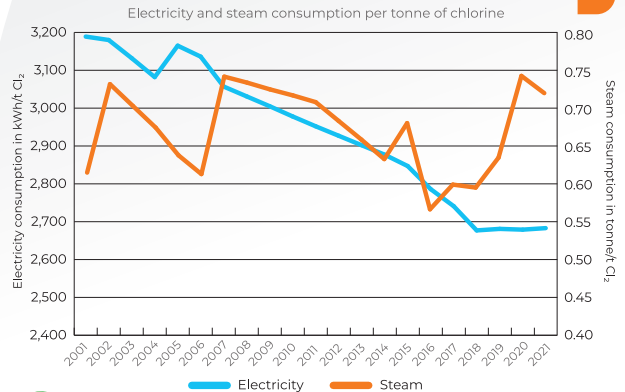
The weighted average electricity consumption stayed on the same level as 2020, while the weighted average steam consumption, a new KPI introduced in the third Sustainability Programme, declined slightly. The latter is most likely caused by the higher operating levels of the production installations.

REPowerEU impacts our industry; we are working hard to help Europe meet its goals.

Kristof May, Regulatory Affairs Manager



Almost stable primary fuel energy consumption.

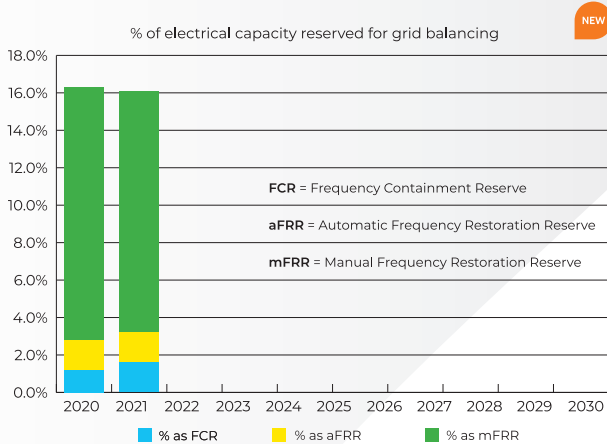


Almost stable electricity and steam consumption.

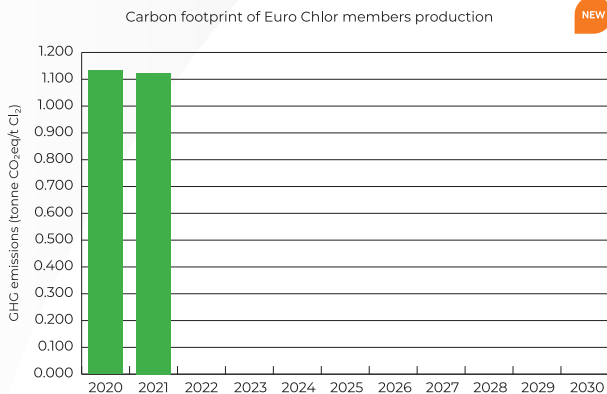
Climate Neutral Player



Grid balancing



Slight decrease in electrical capacity.



Slight reduction in greenhouse gas emissions.

Increasing renewable electricity production with wind and solar also raises volatility. This requires more support solutions to maintain stability in the electricity grid to prevent black-outs. Chlor-alkali production units can partly contribute to this, but this capability is limited by products needed for customers and the limited ability to store chlorine.

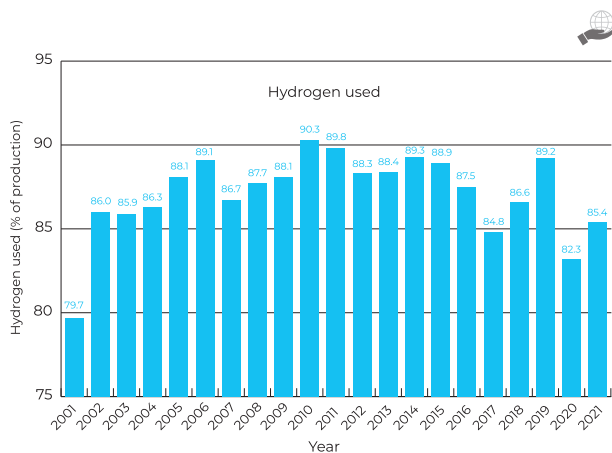
In our third Sustainability Programme, we report on the grid balancing support delivered by members as a percentage of the total installed electricity demand capacity. In 2021, 16% of the installed electrical capacity was available for grid balancing, which is a slight decrease from the 2020 level of 16.3%.

Carbon footprint reduction

The EU27 has the ambition to become climate neutral by 2050. Our carbon footprint is presented in our new Eco-profile study (see page 8). Since we will not publish an Eco-profile study every year, we now measure progress on our carbon footprint reduction in our third Sustainability Programme. We report the scope 1 and 2 CO₂ emissions from member production units for chlor-alkali and hydrogen. In 2021, greenhouse gas emissions reduced by around 0.8% compared to 2020, so there is still some way to go to reach our goal of zero by 2050.

Hydrogen use

Euro Chlor produces around 270,000 tonnes/year of hydrogen on average. This year, hydrogen utilisation increased from 83.2% in 2020 to 85.4% in 2021. We are gently moving towards our ambition to use 100% by 2030.



Note: Figure for hydrogen vented varies from that on page 16 due to difference in products covered and different reporting lines.



Highlights at:

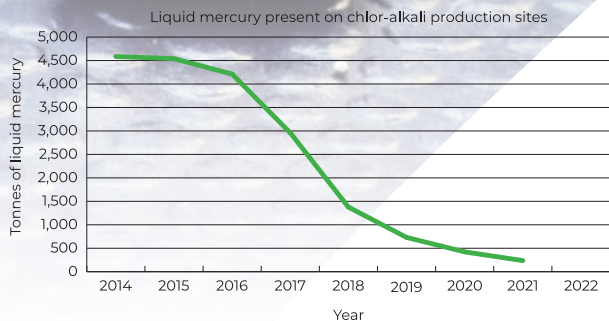
<https://chlorineindustryreview.com/climate neutrality>



Euro Chlor members approaching end of mercury conversion

Following the phase-out of mercury technology by the end of 2017, any remaining liquid mercury must be converted to mercury sulfide and stored in a salt mine by the end of 2022. As we approach this regulatory deadline, we note that in the last year 251 tonnes of mercury were converted. Approximately 237* tonnes of mercury are still present at those sites which formerly operated chlor-alkali mercury technology.

Note: Mercury for alcoholate production is not included in these figures.



Waste from the production process

In our third Sustainability Programme, we report on the amount of waste generated by members. The amount of hazardous waste reduced in 2021 from 4.3 kg per tonne chlorine to 1.5 and the non-hazardous waste reduced from 3.8 tonnes per tonne of chlorine to 2.4.



Reduction in hazardous waste.

Circularity Champion



Euro Chlor has started to measure the waste from our production processes and to investigate PFAS in our value chain.

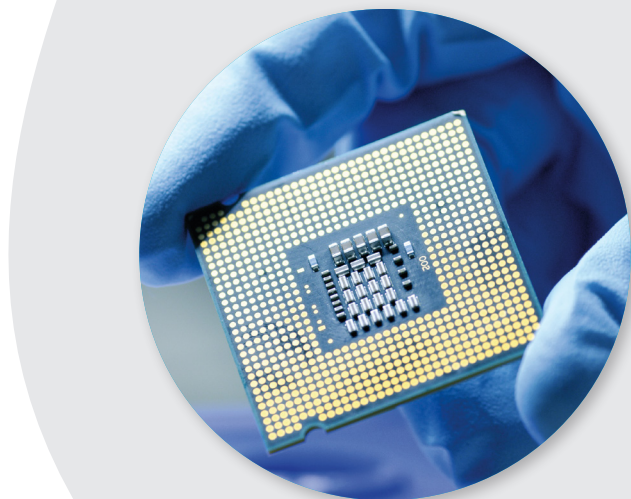
Richard Malchow, GTC Chair



Ensuring our safe and sustainable use of fluorinated materials

There are some concerns that per- and polyfluoroalkyl substances (PFAS) persist in the environment and/or may have negative impacts on human health. Authorities are seeking to restrict such substances. Due to the broad definition of PFAS in the EU, there is a possibility that fluorinated materials used in our plants may be captured by this action. The Euro Chlor PFAS Working Group (part of the GTC) has identified that such fluorine-containing substances may be present in a range of key materials used in the production of chlor-alkali (such as membranes/ diaphragms/ greases/ filter packing materials etc.).

To ensure that our sector is not adding to any environmental or human burden of PFAS, Euro Chlor is working with advanced analytical laboratories in the Netherlands and Germany to study the presence of any 'PFAS' in the incoming and outgoing water, as well as in some key liquid products. The PFAS Working Group is also working with suppliers to better understand the responsible manufacture, use and end-of-life of PFAS-containing materials.



Highlights at:

<https://chlorineindustryreview.com/circularity>



The Halogens Industry Sector Board nicely feeds into the synergy between our Sector Groups and the Cefic policy departments.

Marleen Pauwels, Executive Director



nominates new Management Committee Chair

The European Chlorinated Solvents Association (ECSA) nominated a new Chair at its Management Committee meeting in November 2021. Isabelle Gourdon of Kem One replaces Thorsten Schulz of Nobian, who had been the Chair for the past year. Meanwhile, at the productive General Technical Working Group (GTWG), members discussed ECSA communications, as well as the various ongoing regulatory activities. They also took a detailed look at the European Single Assessment Document (ESAD) 2022 questionnaire on Chlorinated Solvents, simplifying and shortening it thoroughly to mirror today's regulatory landscape and quality certification schemes.

This work was followed up at the next meeting in May 2022, where the group made progress on several relevant files, including REACH, the Ozone Depleting Substances (ODS) Regulation and the IED. See <https://www.chlorinated-solvents.eu> for more details.



Highlights at:

<https://chlorineindustryreview.com/halogens-news>

Jacques Sturm of Vynova hosts second Halogens Industry Sector Board

On 21 June 2022, the second Halogens Industry Sector Board took place for the 10 Halogens Sector Group (SG) Chairs and their respective SG Managers, the Halogens Coordination Group (HCG) members and the Board Secretariat (Marleen Pauwels and Catherine Potter). Jacques Sturm of Vynova chaired the meeting, which covered many topics of relevance to the members, including taxonomy and sustainable finance, CLP/ REACH revision, the PFAS restriction process, Industrial Emissions Directive (IED) revision and the BREF, energy-related topics and enforcement.

Highlights from other Halogens sector groups

Information on the other Halogens Sector Groups can be found on their websites:

- Chloro Alkanes Sector Group - <https://www.halogens.eu/about-us/casg>
- Chloroformates Sector Group - <https://www.chloroformates.eu>
- European FluoroCarbons Technical Committee (EFCTC) - <https://www.fluorocarbons.org>
- Eurofluor (CTEF, Comité Technique Européen du Fluor) - <https://www.eurofluor.org>
- European Sulphuric Acid Association (ESA) - <https://www.sulphuric-acid.eu>
- Fluorinated Products and PFAS for Europe (FPP4EU) - <https://www.fpp4eu.eu>
- Potassium Sector Group - <https://www.halogens.eu/about-us/psg>
- Sodium Chlorate Sector Group - <https://www.halogens.eu/about-us/scsg>

Collaboration and Outreach

We continued to reach out to members, partners and key downstream user associations.

Catherine Potter, Communications Manager

Over the past year, the Covid-19 crisis continued to impact Europe and the rest of the world. The Euro Chlor and Cefic team continued to adapt accordingly, combining working from home with a return to the office to maintain operationality and availability during normal working hours and adapting a 'new kind of normal' with all its stakeholders.

The secretariat continued its series of 'online roadshow' meetings with members to discuss Euro Chlor and the MCS, as well as the individual company priorities, to ensure collaboration continued. The Euro Chlor Working Groups and Committees also carried on meeting virtually to progress and endorse our key activities.

Connecting with our downstream stakeholders

This past year, we also kept developing our connections with our downstream stakeholders, most notably in meetings with the European Council of Vinyl Manufacturers (ECVM) and the European Diisocyanate & Polyol Producers Association (ISOPA).

Euro Chlor provided support to ECVM with their PVC dossiers, including a presentation at the ECVM Production Committee meeting in mid-June 2022, and supporting their Legacy Additives Group.

Meanwhile, communications collaboration increased with ISOPA following the recruitment of their new Communications Manager.



Highlights at:

<https://chlorineindustryreview.com/collaboration>



Members

Altair Chimica SpA

<http://www.altairchimica.com>

Anwil SA

<http://www.anwil.pl>

Arkema S.A.

<https://www.arkema.com/en>

BASF SE

<http://www.BASF.com>

Biomca Química SL

<http://www.biomcaquimica.com>

Bondalti Chemicals SA

<http://www.bondalti.com>

Borregaard AS

<http://www.borregaard.com>

BorsodChem Zrt.

<http://www.borsodchem-group.com>

Brenntag UK Ltd

<http://www.brenntag.co.uk>

CABB Group

<http://www.cabb-chemicals.com>

Caffaro Green Chemicals Srl

<https://www.www.caffaroindustrie.com>

Chimcomplex SA

<http://www.chimcomplex.ro>

Covestro AG

<http://www.covestro.com>

Donau Chemie AG

<http://www.donau-chemie.com>

Dow Deutschland Anlagengesellschaft mbH

<http://www.dow.de>

Electroquímica de Hernani

<http://www.eheresa.com/es>

Electroquímica Onubense, S.L.

<http://www.electroquimicaonubense.es>

Ercros SA

<http://www.ercros.es>

Evonik Performance Materials GmbH

<http://www.evonik.com>

Fater S.p.A.

<http://www.fater.it>

Industrial Chemicals Limited (ICL)

<http://www.icgl.co.uk>

INOVYN ChlorVinyls Limited

<http://www.inovyn.com>

Kapachim SA

<http://www.kapachim.com>

Kemira Oyj

<http://www.kemira.com>

KEM ONE

<http://www.kemone.com>

Kuhlmann Europe

<http://www.kuhlmann-europe.com/en>

Micro Bio (Irl.) Ltd.

<http://www.microbio.ie>

MSSA SAS

<http://www.metauxspeciaux.fr>

Nobian

<http://www.nobian.com>

PCC Rokita SA

<https://www.pcc.rokita.pl>

Química del Cinca SLU

<http://www.qcinca.es>

Società Chimica Assemini Srl

<https://www.chimicassemini.it>

Società Chimica Bussi S.p.A.

<http://www.chimicabussi.it>

Spolek pro chemickou a hutni výrobu, a.s. (Spolchemie)

<http://www.spolchemie.cz>

Vencorex

<http://www.vencorex.com>

VESTOLIT GmbH (Orbia)

<http://www.vestolit.de>

Vynova Group

<https://www.vynova-group.com>

Westlake Vinnolit GmbH & Co. KG

<https://www.westlakevinnolit.com>



Partners

Adama Makhtshim Ltd

<http://www.adama.com/en>

AGC Chemicals Europe Ltd.

<http://www.agcce.com>

Ak-Kim Kimya Sanayi ve Tic. A.S.

<http://www.akkim.com/tr/en>

Al Kout Industrial Project Co

<https://alkoutprojects.com>

Al-Baha Company for Caustic and Chlorine Industry LLC

<https://bccj-jo.com>

ANE - asociación nacional de electroquímica

<https://www.cloro.info/en/>

Angelini A.C.R.A.F. S.p.A.

<http://www.angelini.it>

Applitek NV/SA

<http://www.applitek.com>

AQUAGROUP AG

<http://www.aquagroup.com>

Armstrong Chemtec Group

<http://www.rmarmstrong.com>

Arxada AG

<https://www.arxada.com>

Asahi Kasei Europe GmbH

<https://www.asahi-kasei.eu>

Axiall, LLC - Westlake Chemical

<https://www.westlake.com>

Banner Chemicals Limited

<https://www.bannerchemicals.com>

BARCHEMICALS SRL

<https://www.barchemicalsgroup.com>

BATREC INDUSTRIE AG

<https://www.batrec.ch>

BELL-O-SEAL VALVES P. LIMITED

<http://bellowseal.co.in>

Blackhall Engineering Limited

<https://www.shawvalves.co.uk>

Bluestar (Beijing) Chemical Machinery Co., Ltd.

<http://www.bcmc.chemchina.com>

BOCHEMIE a.s.

<https://www.bochemie.cz/en>

CARBUROS METALICOS SA

<http://www.carburos.com>

CBee Europe Ltd - The Clorox Company

<https://www.clorox.com>

Charam Techno Chemical & Equipments (P) Ltd.

<https://www.charamtech.com>

Chemieanlagenbau Chemnitz GmbH (C.A.C.)

<http://www.cac-chem.de>

Chemoform AG

<http://www.chemoform.com>

CIA - Chemicals Industries Association Ltd

<http://www.cia.org.uk>

Coogee Chlor Alkali Pty Ltd

<http://www.coogee.com.au>

De Nora Deutschland GmbH

<https://www.denora.com>

Descote

<http://www.descote.com>

DSD Chemtech Projects & Services GmbH

<http://www.dsd-chemtech.com>

DUPONT ASTURIAS, S.L.

<http://www.dupont.com>

ERAMET SANDOUILLE SAS

<https://www.eramet.com/en>

Essencia ASBL

<https://www.essencia.be>

Eu Salt aisbl (European Salt Producers' Association)

<https://eusalt.com>

Eynard Robin

<http://www.groupe.eynardrobin.com>

FEDERCHIMICA - Federazione Nazionale dell' Industria Chimica

<http://www.federchimica.it>

Forxar Industries (P) Ltd.

<https://www.forxarind.com>

Garlock GmbH, an EnPro Industries company

<https://www.garlock.com/en>

Gazechim

<http://www.gazechim.com>

GEMÜ GEBR. MÜLLER APPARATEBAU GMBH & CO. KG

https://www.gemu-group.com/en_EN

GHC Gerling, Holz & Co Handels GmbH

<http://www.ghc.com>

HELM AG

<http://www.helmag.com>



Partners

Hunt & Mitton Valve Company

<https://www.huntandmitton.com>

Huntsman (Europe) BVBA

<https://www.huntsman.com>

Hydrus Hygiene Ltd

<https://hydrus-hygiene.com>

IKEM - Innovation and Chemical Industries in Sweden

<http://www.ikem.se>

INQUIDE S.A.

<https://www.fluidra.com>

IXOM

<https://www.ixom.com>

Jiangsu Ancan Technology Co., Ltd.

<https://www.ancan-cn.com>

Jordan Bromine Company Limited - JBC

<https://www.jordanbromine.com>

Kronos Worldwide, Inc.

<https://www.kronostio2.com/en>

Kurotec-KTS Kunststofftechnik Stade GmbH

<http://www.en.kurotec-kts.de>

LOMBARDA H Srl

<https://www.lombardah.com>

Lonza Group AG

<https://www.lonza.com>

Lubrizol Advanced Materials Europe BVBA

<https://www.lubrizol.com>

MAVESZ - Hungarian Chemical Industry Association

<https://mavesz.hu/>

Mersen Pgy SAS

<https://www.mersen.com>

META Régénération

<https://meta-regeneration.fr>

Nankai Chemical Co., Ltd.

<https://www.nankai-chem.co.jp/top/nankai-chemical-top/>

Neeltran, Inc.

<https://www.neeltran.com>

Nippon Soda - Nisso

<https://www.nippon-soda.co.jp/e/>

NOVACID

<https://www.seqens.com/en>

Nuberg Engineering Limited

<https://www.nubergepc.com>

Olin - BC Switzerland GmbH

<https://www.olin.com>

Permascand AB

<https://www.permascand.com>

Pfeiffer Chemie-Armaturenbau GmbH

<https://www.pfeiffer-armaturen.com>

Phönix Valve Group GmbH

<https://www.phoenix-valvegroup.com>

Powell Fabrication & Manufacturing LLC.

<https://www.powellsolutions.com>

Prince Rubber & Plastics Co., Inc.

<https://www.princep.com>

Qatar Vinyl Company (QVC) Q.P.J.S.C.

<https://qapco.com/qvc/>

Recherche 2000 Inc. - R2

<https://r2.ca>

Richter Chemie-Technik GmbH

<https://www.richter-ct.com>

Salco Products, Inc.

<https://www.salcoproducts.com>

SALINEN AUSTRIA AG

<https://www.salinen.com/en>

Sasol Chemicals, a division of Sasol South Africa (Pty) Ltd

<https://www.sasol.com>

SAVINO BARBERA Srl

<https://www.savinobarbera.com>

SCHP - Association of Chemical Industry of the Czech Republic

<https://www.schp.cz>

Scienceindustries

<https://www.scienceindustries.ch>

Senior Aerospace Ermeto

<https://www.senior-aerospace-ermeto.com>

SGL Carbon GmbH

<https://www.sglcarbon.com>

SIEM Supranite

<https://siem.fr>

Sinopec Europa GmbH

<http://www.sinopecgroup.com/group/en>

Sojitz Europe plc

<https://www.europe.sojitz.com>

SPOLANA s.r.o

<https://www.spolana.cz/En>

STEULER-KCH GmbH

<https://www.steuler-kch.de>

Syngenta Crop Protection Monthey SA

<https://www.syngenta.ch>

T. EN Technip Energies France SAS

<https://www.technipenergies.com>

Teijin Aramid BV

<https://www.teijinaramid.com>

thyssenkrupp nucera AG & Co. KGaA

<https://thyssenkrupp-nucera.com>

Tosoh Corporation

<https://www.tosoh.com>

Tronox Pigments (Holland) B.V.

<https://www.tronox.com>

UNILEVER-KNORR S.A.

<https://www.unilever.com>

Van den Heuvel Watertechnologie bv

<http://www.vdhwater.com>

Vantage Leuna GmbH

<https://www.vantage-leuna.de>

VCI - Verband der Chemischen Industrie e.V.

<https://www.vci.de>

Veltek Associates, Inc. - VAI®

<https://sterile.com/>

VNCI - Vereniging van de Nederlandse Chemische Industrie

<https://www.vnci.nl>

Westlake Epoxy B.V.

<https://www.westlakeepoxy.com>

Wood Italiana S.r.l.

<https://www.woodplc.com>

Xomox International GmbH & Co. OHG - Crane ChemPharma & Energy

<https://cranecpe.com>



Highlights of this report are available from:

<https://chlorineindustryreview.com>

Euro Chlor supports a safe, competitive and green chlor-alkali industry for Europe.

Chlor-alkali 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 chlor-alkali supplies.

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

Euro Chlor's 37 producing members operate 62 manufacturing locations in 19 European countries, representing 97% of all European production capacity.

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

Based in Brussels, Belgium, Euro Chlor is a Sector Group of Cefic (European Chemical Industry Council) within the Halogens Industry Sector.

Euro Chlor is a member of the World Chlorine Council, a global network of regional organisations that represents producers accounting for more than 85% of worldwide chlor-alkali production capacity.



<https://linkedin.com/company/eurochlor>



<https://twitter.com/eurochlor>



<https://facebook.com/eurochlor>



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