



chemsec

# CHEMSCORE

2021

**Ranking the world's top 50 chemical producers on their  
work to reduce their chemical footprint**

## Introduction

Chemicals are an essential part of the global economy – hazardous chemicals are not.

A recent [UNEP report](#) estimates that in 2016, pollution from selected hazardous chemicals has cost 1.6 million lives. People are particularly at risk when at work – in 2015 it is estimated that almost 1 million workers died as a result of exposure to hazardous chemical substances.

UNEP also finds that chemical pollution threatens ecosystem functions by adversely affecting pollinators, contributing to ocean dead zones, contaminating soils, accelerating antimicrobial resistance, and increasing pressure on coral reefs.

And people are concerned. According to an [EU Commission survey](#), 85% of European citizens stated they are worried about how chemicals affect their health, and 90% are worried about how chemicals affect the environment.

Why should hazardous chemicals matter to investors? Chemicals are big business. [UNEP](#) has stated that the size of the global chemical industry exceeded \$5 trillion in 2017, and this is projected to double by 2030.

The global chemical industry is huge. Many millions of tons of chemicals are produced each year, and a huge proportion of them are hazardous. In fact, [73%](#) of all Europe's chemicals are hazardous to human health and/or the environment – equivalent to 220 million tonnes.

An alternative is possible – of chemical companies' with significantly reduced hazardous chemicals portfolios, increased transparency in product ingredients, and taking significant steps towards a genuinely sustainable, circular economy.

**Eugenie Mathieu, Senior Analyst and Earth  
Pillar Lead at Aviva Investors:**

[QUOTE CARD ASSET]

*"The chemical industry has a significant environmental footprint. At a time of climate crisis and the devastating decline in biodiversity globally, investors expect the industry to reduce its impact on the environment and human health. As an investor, we are keen to identify which chemical companies are leading in the transition to a more sustainable future by providing solutions and greater transparency, and which are stuck in 'business as usual'."*

ChemScore, the annual ranking of the 50 largest global chemical companies based on their environmental impact and treatment of hazardous chemicals, sets the benchmark for a sustainable chemicals industry. It provides investors with information to assess which companies have strong chemicals management strategies, and which do not.

The gap between chemical companies' marketing campaigns and their actions is yawning ever wider. 38 out of the 50 companies (76%) analysed score positively for active marketing of greener, eco-friendlier, sustainable products on their website. Yet no companies at all were found to have public information on global hazardous chemicals production; just 4 out of 50 (8%) showed evidence of a public strategy with plans to phase out existing hazardous chemicals; and all continue to produce a range of hazardous chemicals in dangerously high quantities.

In this second annual edition, **Indorama** (Thailand) tops the rankings, followed by **DSM** (Netherlands) – scoring 28.8 and 27.9 points respectively out of 48. Both rank highly for demonstrating a lack of controversies, and for developing safer chemicals through circular production. However, **Indorama** has still seen a drop of 4 points from last year for its hazardous chemical portfolio, due to acquiring new business from a company which produces SIN-listed chemicals.

**Sinopec** (China) and **Formosa** (Taiwan) come joint last, scoring a miserly 3.6 points out of a possible 48. Both are making very little effort to develop safer chemicals, and greatly lack transparency over the hazardous chemicals they produce. However, all companies show room for improvement – just three companies out of 50 scored more than half (24) out of a possible 48.

This factsheet will outline the global rankings and methodology behind our scores, as well as some key case studies, differences between global regions, the human impacts of hazardous chemicals, and our recommendations to chemical companies and investors.

## Scores

This second edition of the ChemScore, produced by independent non-profit ChemSec, has analysed:

- Companies' **hazardous chemical portfolio**;
- Chemical companies' **development of safer chemicals** and **circular products**;
- **Chemical management** and **company transparency**;
- Companies' response to **controversies, lawsuits** and **regulation**.

COMPANY	COUNTRY	SCORE	GRADE	COMPANY	COUNTRY	SCORE	GRADE
Indorama	THA TH	28.8	B-	Ecolab	USA US	12.3	D+
DSM	NLD NL	27.9	B-	Lanxess AG	DEU DE	12.0	D+
Air Products	USA US	24.8	B-	Asahi Kasei Corp	JPN JP	11.6	D+
Avery Dennison	USA US	22.6	C+	Lotte Chemical	KOR KR	11.4	D+
Johnson Matthey	GBR GB	20.2	C	Mosaic	USA US	11.4	D+
Toray Industries	JAP JP	18.2	C	Sasol	ZAF ZA	11.2	D+
Air Liquide	FRA FR	18.0	C	PPG Industries	USA US	11.0	D+
Linde	DEU DE	17.5	C	Eastman Chemical	USA US	11.0	D+
Mitsubishi PLC	JPN JP	17.4	C	Shin-Etsu Chem	JPN JP	11.0	D+
Lyondell Basell	NLD NL	17.2	C	Bayer	DEU DE	10.6	D+
Akzo Nobel	NLD NL	16.6	C	Dow	USA US	10.5	D+
Sherwin-Williams	USA US	16.6	C	Corteva	USA US	10.4	D+
Yara Intl.	NOR NO	16.1	C-	Dupont Nemours	USA US	10.4	D+
Covestro	DEU DE	16.0	C-	Showa Denko	JPN JP	10.1	D+
Mitsui Chemicals	JPN JP	15.9	C-	Tosoh Corp	JPN JP	9.7	D+
Sumitomo Chem	JPN JP	15.7	C-	Umicore	BEL BE	9.2	D+
Nan Ya Plastics	TWN TW	15.1	C-	3M	USA US	9.2	D+
BASF	DEU DE	15.0	C-	Arkema	FRA FR	9.0	D+
Nutrien	CAN CA	14.6	C-	Solvay	BEL BE	8.0	D
Evonik Industries	DEU DE	14.0	C-	DIC Corp	JPN JP	8.0	D
Nitto Denko	JPN JP	13.8	C-	PTT Global Chem	THA TH	7.1	D
SABIC	SAU SA	13.2	C-	Hanwha Solutions	KOR KR	5.1	D
Westlake Chem	USA US	12.7	D+	Wanhua Chem	CHN CN	4.5	D-
Braskem	BRA BR	12.5	D+	Formosa Chem	TWN TW	3.6	D-
LG Chem	KOR KR	12.4	D+	Sinopec Shang-A	CHN CN	3.6	D-

## Hazardous chemicals

ChemScore analyses several key hazardous chemical groups:

- [SIN](#) (Substitute It Now) substances, a category for hazardous chemicals which pose an immediate threat to human health and the environment;
- [PIC](#) (Prior Informed Consent, UN Rotterdam Convention) chemicals, certain hazardous substances which are banned or severely restricted in EU trade;
- [HHP](#) (Highly Hazardous Pesticides), a list of chemicals compiled by Pesticide Action Network, and is based on publicly available sources from governments and international organisations, which present particularly high levels of acute or chronic hazards to health or the environment;
- [REACH](#) candidate list chemicals, a category of chemical substances of very high concern according to the European Chemicals Agency (ECHA), and against which regulation is approaching;
- [REACH](#) authorisation list chemicals, a category of chemicals of very high concern according to the ECHA, and against which regulation is imminent;
- [POP](#) (Persistent Organic Pollutants, UN Stockholm Convention), a list of globally banned persistent chemicals known to cause serious risks to human health and the environment.

## REGIONAL AVERAGES BAR CHART

It is worth noting that some chemicals are worse than others. For persistent chemicals, the risk of huge future liabilities is a very probable scenario. For other chemicals, regulation is approaching (REACH candidate list) or imminent (REACH authorisation list). Certain substances are therefore weighted more heavily when calculating the total hazard score for each company.

### Regional trends

European companies perform better (with an average score of 15.1) in comparison with other global regions such as US & Canada (with an average score of 13.6) and Asia (with an average score of 11.8). But the differences between regions are minor – all perform poorly.

Very low transparency around chemical companies in Asia (not simply Asian companies, but also production sites of US/EU companies located there) is one reason behind these regional differences. Though the precise chemicals being produced remains undisclosed, it is widely assumed that much of their production is not sustainable. There remains no official authority database, and weak chemicals legislation across the region.

Toray (Japan) – a basic materials manufacturer creating plastic resins, fine chemicals, carbon fibre composite materials and pharmaceutical products – is the company which has advanced the most since last year’s ChemScore ranking. Toray is one of the global leaders in its usage of circular products and innovations, as well as starting to use clearer language in reference to its production.

In the EU, new and emerging legislation such as the [2020 Chemical Strategy](#) has put the circular economy, and sustainability more broadly, on the agenda. However, it is still new and lacking in defined regulation and concrete actions for chemical companies to take. Such actions may emerge in the medium term as regulation becomes clearer.

However, the US is caught in the middle, with weaker legislation compared to the EU and lack of incentives for chemical companies to ‘go green’.

**Sonja Haider, Senior Business and Investors Advisor at ChemSec:**  
[QUOTE CARD ASSET]

*“Almost all major chemical companies have made claims to be green – yet very few have implemented the action to back this up. Year on year the industry continues to produce hazardous chemicals, and is failing to enact sustainable practices, even despite an ever more urgent environmental crisis and tightening international regulations. Chemicals are an essential part of modern everyday life – but the health of our people and ecosystems can no longer be an afterthought.”*

## A potential chemical leader

It's clear that even the top performers in the ChemScore ranking – such as **Indorama** (Thailand) and **DSM** (Netherlands) are still a long way from being considered sustainable chemical companies. Needless to say, the industry laggards are light years behind. So just how feasible is it to achieve a high score? **Corbion** (Netherlands), a company focussing on biochemicals, is outside the top 50 largest chemical companies in the world (with a revenue of \$1.2 billion in 2020), so beyond the scope of ChemScore's ranking. Nonetheless, in an independent assessment of ChemScore's criteria, it scores 43 out of a possible 48 – a whole 14 points above the highest-ranking company, **Indorama** (Thailand).

## LEADERS AND LAGGARDS ASSET (WITH LOGOS)

What makes it a world leader – a benchmark for other companies to follow? The company has sustainability written into its DNA. Like in other sectors, this company is set up to produce sustainable products – from natural cosmetics like Dr. Hauschka or organic food like Whole Foods Market. That means its business and product portfolio is possible without hazardous chemicals, scoring maximum points in this section. Corbion is also developing safer chemicals, working towards full transparency, and has a positive public track record. There are still some areas for the company to work on – but this sets a benchmark for other companies to follow.

**Emine Isciel, Head of Climate and Environment,  
Storebrand Asset Management:  
[QUOTE CARD ASSET]**

"For the past decade, ESG investors have focused mainly on climate change and carbon emissions. But these issues are not isolated; the sustainable investor's perspective needs to be more holistic. The chemical industry is not only a huge energy consumer – many of the chemicals it produces also have detrimental effects on human health and the environment. At the same time, the chemical industry is also an enabler; the world needs it to be progressive and help solve the climate crisis."

### Why are hazardous chemicals so bad?

Modern life has brought hazardous chemicals into our homes and everyday lives, with measurable levels of hundreds of man-made chemicals routinely found in people of all ages and locations around the world. The computer or mobile phone that you're using to read this text will contain flame retardants to prevent it from catching fire, and the same goes for the sofa you're sitting on or the carpet beneath your feet.

If you bought street food this week, the glossy wrapping or Styrofoam packaging it came in was most certainly treated with PFAS, also known as 'forever chemicals', to prevent the contents

from sticking to it, and if you were wearing your waterproof jacket that day because of the weather, you were exposed to the same kind of chemicals.

These are just two groups of problematic chemicals that we're exposed to on a daily basis. The reality is that we're constantly exposed to a cocktail of chemicals that are hazardous to either us or the environment in some way.

Scientists have, for example, linked the fact that [men in the Western world produce half as much sperm](#) as they did 40 years ago due to exposure to toxic chemicals. Studies show that exposure to toxic chemicals results in girls entering puberty earlier, increasing the risk of getting breast cancer later in life. Other studies link exposure to toxic chemicals to a loss of four to five IQ points in children.

As for the environment, hazardous chemicals and other pollutants such as plastic waste and pharmaceutical pollutants are released in large quantities across the Earth, accumulating in nature and wildlife and threatening to disrupt fragile ecosystems. [A recent expedition](#) to the Antarctic found microplastic waste and persistent hazardous chemicals in even the most remote and pristine habitats of the Antarctic.

## RECOMMENDATIONS ASSET

## Recommendations

ChemScore offers three very clear general recommendations to chemical companies:

- Companies must **reduce their hazardous chemical portfolio by innovating safer alternatives** – since last year's inaugural evaluation, we have seen very little movement from the chemical industry in this area.
- A **circular economy needs an active chemical industry** at the start of the supply chain to provide material that can be reused and recycled. The race has started, but must be accelerated.
- Much **more transparency** is needed in order for investors to feel safe supporting chemical companies, and to understand which hazardous chemicals companies they are currently producing.

## Methodology

Chemical companies are scored on four key criteria:

### **Hazardous chemical portfolio:**

- Hazardous chemicals damage human health, pollute the environment and lead to loss of biodiversity. Their production is a strong indicator for exposure to financial risks due to regulation, the potential of future litigations due to workers' health, consumer exposure and potential spills, as well as customers' needs for non-toxic or low-toxicity products. This category assesses the total production of hazardous chemicals by each company, weighted on the basis of the company's total revenue according to Bloomberg data.
- To obtain the final score in this category, each hazardous chemical in a company portfolio is counted and multiplied by its hazard mark, divided by the company's revenue for a weighted hazard penalty. A revenue multiplier was applied based on the share of production (0-100%) in the EU/US, as indicated in financial reports. The higher the share of production of chemicals within the EU and US, the more favourable the multiplier. Any chemical producer that is willing to publicly share information with us about its full production outside the EU and US is encouraged to do so, and receives additional weighting.

### **Development of safer chemicals and circular products:**

- A circular economy can only truly be sustainable when products do not contain hazardous ingredients. Therefore, chemical companies must have full control of their product ingredients and how their products serve society and a more sustainable world. Companies must walk the talk by ensuring safer products and installing circular processes right from the design stage.
- Categories assessed include: Method in place to screen and assess the environmental sustainability of its products; Systematic tool to assess its products intrinsic properties; Application of strict cut-off hazard criteria for the development of new products; Active marketing of greener, eco-friendlier, sustainable products on website; Active marketing of less toxic alternatives evaluated by ChemSec; Circular product (or process) innovation; Using biobased or renewable resources without occupying extra land or competition with food production; Using or producing recycled feedstock without using or producing recycle as fuel; Reduction of generated waste.

### **Management and transparency:**

- A good chemicals management system is fundamental, especially for companies producing a large share of hazardous substances. A transparent approach to product ingredients as well as public commitments to phase out certain substances is a good indication of the direction in which a company is moving.
- Categories assessed include: Produces only sustainable products; Public strategy with (timed) phase-out plans for existing hazardous chemicals beyond regulatory compliance; Availability of Safety Data Sheets for products in compliance with GHS publicly available in a structured way for majority of products; Code of ethics and supplier code of conduct; Response to ChemSec letter; Public information on global hazardous chemicals production; Circular economy program in place; SMART circular economy targets; Ambition and transparency of developing and applying CE metrics to own company and/or products/processes.

### **Impact and controversies:**

- Companies must ensure they meet the requirements of international and national environmental legislation, protect occupational health and the right of communities to live in a healthy and sustainable environment. A company should demonstrate its effectiveness of safety and control measures with the absence of fatal or serious accidents involving workers and community members. Measurements to prevent spills and environmental pollution are shown by the absence of media coverage and litigations.