chemsec
CHEMSCORE

Company name: **Linde**

Final grade: **C (from A+ to D-)**

Total score: **18 points (out of 48)**

Introduction:

ChemScore is an initiative from NGO ChemSec that aims to capture and rank the world's largest chemical companies' efforts to reduce their production of toxic chemicals and boost investments in safer, greener alternatives. The world's 50 largest global stock-listed chemical companies are ranked in four separate categories. The 2021 ranking marks the second iteration of ChemScore. Some noteworthy changes in this iteration are that it includes even more hazardous chemical groups in category 1, and also circular economy criteria in category 2 and 3.

1. Hazardous product portfolio:

Category rationale: Hazardous chemicals have severe negative implications on human health, pollute the environment and create loss of biodiversity. The production of hazardous chemicals is a strong indicator for exposure to financial risks, due to regulatory measures or potential future litigations connected to workers' health, consumer exposure, accidents and spills, as well as customers' needs for non-toxic or low-toxic products. A product portfolio with a low hazard profile is considerably less susceptible to all these issues. This category assesses each company's total production of hazardous chemicals, weighted against the company's total revenue. Lower production of hazardous chemicals renders a higher category score. Note: The total revenue of each company is used for weighting the score, even if some companies have business units that are not related to chemicals

What chemical data is included?

All information in ChemScore builds on information in the public domain, such as production of industrial chemicals in the EU and US, including the production of all the companies' respective subsidiaries on these continents. EU production data comes from the European Chemicals Agency (ECHA), and US data from US EPA Chemical Data Reporting under TSCA. In this context, "production" refers to the number of individual chemicals – not the volume.

New additions for 2021 to this criteria are three more groups of hazardous chemicals:

1.Highly persistent substances listed in the Stockholm Convention, POPs (Persistent Organic Pollutants)
2.Substances listed in the Rotterdam Convention on PIC (Prior Informed Consent)
3.HHP (Highly Hazardous Pesticides), as identified by the Pesticide Action Network

What is not included?

•The production of hazardous chemicals outside the EU and US, since it can't be obtained from public sources. Our ranking of the hazardous product portfolio is only based on production in EU and US markets.
•The production of pharmaceuticals. Since this sector is treated as a separate sector by investors, we have not included it in ChemScore.
•Information about the specific production volumes (tonnes/year), and revenue for each hazardous substance, since this data is not publicly available.

Final Score:

Each hazardous chemical in a company portfolio is counted and multiplied by its hazard mark, adding up to a total hazard mark. This number is then divided by the company's revenue in billion USD, resulting in a weighted hazard penalty, which determines the category score. It is necessary to balance different companies' global production patterns (in the EU or US, where data is publicly available, vs. the rest of the world) to achieve a fair ranking. Hence, a revenue multiplier is applied, based on the share of production (0-100 percent) in the EU/US, as indicated in the company's financial report. This means that the higher the share of chemicals production 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.

Total maximum score in this category:	**18**
Company's score in this category:	**8**

Criteria:	Hazard marks:	Points awarded:	Source:	Rationale for inclusion of criteria:	How we judged the fulfilment of the criteria:	Result:
Number of SIN List chemicals, POPs, PICs and HHP substances produced	1 mark per chemical	N/A See calculation below	https://sinproducers.chemsec.org/	The SIN List is a list of very hazardous chemicals used in a wide variety of products and manufacturing processes around the globe. The SIN List is developed by non-profit ChemSec, in close collaboration with scientists and technical experts. The list is based on credible, publicly available information from existing databases and scientific studies. Inclusion on the SIN List is based on the same criteria as the EU's legislative framework for chemicals: REACH. Therefore, a substance being put on the SIN List is a strong signal that it will be placed on the REACH Candidate List, facing strict regulation in the EU. As an additional dimension, the production of POPs (Persistent Organic Pollutants) listed in the Stockholm Convention, PIC (Prior Informed Consent) substances listed in the Rotterdam Convention, and Highly Hazardous Pesticides, HHP, as identified by the Pesticide Action Network, have been included.	ChemSec keeps a record of all producers of SIN-listed chemicals in a publicly available database, tailored for investors, called the SIN Producers List. This lists the total number of SIN chemicals produced by each chemical company, including subsidiaries. Also, the legal status of the chemical can be found in this database, visualising the steps towards a ban: the EU REACH Candidate List and – one step further – the REACH Authorisation List. The information used comes from registration dossiers submitted to the European Chemicals Agency (ECHA) and Chemical Data Reporting (CDR) from the US EPA. POPs, PICs and HHPs (if not already covered by the SIN list) have been included in the SIN Producers list as well, under a separate appendix.	4
Number of EU REACH Candidate List chemicals produced	1 additional mark per chemical	N/A See calculation below	https://sinproducers.chemsec.org/	REACH, the EU's legislative framework for chemicals, is in many respects the leading chemicals legislation in the world. The REACH Candidate List is the first step towards strict regulation of particularly hazardous substances, in legal terms called Substances of Very High Concern (SVHCs). When a chemical is included on the Candidate List, it triggers information requirements in the whole supply chain, as well as the "consumers' right to know" principle. It is also the first step towards Authorisation.	ChemSec keeps a record of all producers of SIN-listed chemicals in a publicly available database, tailored for investors, called the SIN Producers List. The SIN chemicals that are on the REACH Candidate List are tagged and will add 1 additional hazard mark per substance.	0
Number of chemicals produced on EU's REACH Authorisation List and/or POP substances	2 additional marks per chemical	N/A See calculation below	https://sinproducers.chemsec.org/ and https://sinsearch.chemsec.org/	A substance on the EU REACH Authorisation List is prohibited within the EU, unless a specific authorisation has been granted by the EU Commission. Applying for authorisation is time-consuming and costly, and the grant is time-limited. Without an authorisation, the chemical has to be phased out by the stated sunset date. POP substances are banned globally, unless specifically exempted in the Stockholm Convention.	ChemSec keeps a record of all producers of SIN-listed chemicals in a publicly available database, tailored for investors, called the SIN Producers List. SIN chemicals that are POPs or listed on the REACH Authorisation List are tagged individually and will add 2 additional hazard marks to the total hazard mark per substance.	0
Number of persistent chemicals produced on the SIN List and POP substances	2 additional marks per chemical	N/A See calculation below	https://sinproducers.chemsec.org/ and https://sinsearch.chemsec.org/	Persistent chemicals are particularly problematic, since they don't break down. Instead, they accumulate in humans and/or the environment. Because of this, persistent chemicals should be of extra concern for investors. Substances not considered a problem today might become huge liabilities in the future, with regard to clean-up and compensation costs, as well as legal responsibilities.	Information on persistent chemicals that meet the REACH criteria can be found in the SIN List. This is cross-referenced with the SIN Producers List, to find producers of such chemicals. Further, POP substances are per definition persistent and are also counted here. Persistent substances will add 2 additional hazard marks per substance.	0
Total hazard mark				The total number of hazardous chemicals times (x) their individual hazard mark renders a total hazard mark for each producer.		4
Company's total revenue in billion USD				Revenue is an indication of the size of a chemicals producer.		27,19
Weighted hazard penalty				To get a fair weighting of the hazardous chemicals production, the total hazard marks is divided by the company's revenue in billion USD. The result determines the category score.	[Total hazard marks]/[Revenue]=[Weighted hazard penalty]	0,15

Category score

Weighted hazard penalty:	>2.85	≤2.85	≤2.55	≤2.25	≤2	≤1.75	≤1,5	≤1.3	≤1.1	≤0.9	≤0.75	≤0.6	≤0.45	≤0.35	≤0.25	≤0.15	≤0.1	≤0.05	0
Category score:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Result: 15

Percentage of EU/US revenue	Since this is a global benchmark, it is important to balance the uncertainty with regard to chemical production taking place outside of the EU/US markets, where legislation is often less strict and data not publicly available. The "Category score" from above is therefore multiplied by the share of production (0-100 percent) in the EU/US, as indicated in the company's annual report. Higher EU/US production means less uncertainty with regard to the total production of hazardous chemicals. We therefore factor in the percentage of EU/US revenue as a multiplier. For example: 100 percent EU/US production means that the company gets the full category score from the table above, while 20 percent EU/US production means that it gets only 20 percent of the category score. However, please note that this number could be set to 100 percent by providing a response to criteria 3.6 below.	50%
Final category 1 score	[Category score]*[Percentage EU/US revenue]	**8**

2. Development of safer chemicals and circular products

Category rationale: Better and less toxic products are needed to protect human health, reduce carbon dioxide emissions, and stop pollution as well as the degradation of biodiversity. A circular economy can only be truly sustainable when products don't contain hazardous ingredients. Therefore, chemical companies need to have full control of their product ingredients, and know the answers to how their products serve society and a more sustainable world. Companies need to walk their talk by ensuring safer products right from the design stage and actively market them. The approach to these issues is paramount to create a foundation for healthy profits in the future, as well as avoid costly last-minute substitution forced by regulation. To transition from the extraction of resources and depletion of natural capital to a circular economy, the chemical industry needs to make sure it can deliver safer alternatives, as well as make increased use of renewable resources, while also reducing its waste generation.

New additions for 2021 to this criteria are:
- Circular products and processes, products enabling circular economy (criteria 2.6)
- Biobased or renewable resources (criteria 2.7)
- Reduction of waste generation (criteria 2.8)

Additional minor changes made in ChemScore 2021:
- For products listed on ChemSec Marketplace, only 1 point can be achieved (in 2020 up to 3 points) (criteria 2.5)
- Use of GreenScreen and Green Chemical Principles have been joined with other criteria (included in criteria 2.2)

Total maximum score in this category: **12**

Company's score in this category: **2**

Criteria:	Points awarded:	Source:	Rationale for inclusion of criteria:	How we judged fulfilment of the criteria:	Result:
2.1. The company has a method in place to screen and assess the environmental sustainability of its products	1 point	Sustainability report, website, internet research Search words used: "product stewardship", "hazardous", "SVHC", "product assessment"	Large chemical companies have a huge variety of products for various sectors. These companies need to have an overview of which products contribute to a sustainable future and which products still pose a threat to human health and the environment. Knowledge of its product portfolio is the starting point for any company aiming to improve its environmental sustainability, like less use of resources, water, energy and hazardous chemicals.	Through screening of the company's website and sustainability reports, we have looked for any indication that it has and makes use of a methodology to assess its own product portfolio with regard to its sustainability. Any mentioning of such a process has been enough to score.	1
2.2. The assessment method or screening includes the intrinsic hazards of the company's products	2 points	Sustainability report, website, internet research Search words used: "product stewardship", "SVHC", "GreenScreen"	Being a sustainable chemical company is more than caring about energy efficiency and water and waste management. The core products – the chemicals – can pose severe threats due to their toxic properties. It is therefore essential that companies include the toxicity of ingredients in their definition of sustainability. Internal methods, or external tools like GreenScreen, provide an evaluation for chemicals based on intrinsic hazards.	If the company has an outspoken methodology to assess the intrinsic properties of its products, it will be rewarded. Any indication or mentioning that hazard makes up part of the assessment is enough to score. Or, if a company has been found to make systematic use of GreenScreen or other similar assessments through annual/sustainability reports or websites, points are rewarded.	0
2.3. Application of strict cut-off hazard criteria for the development of new products (SVHC criteria)	2 points	Sustainability report, website, internet research, Search words used: "product stewardship", "hazardous", "SVHC", "substitution"	Hazardous chemicals need to be eliminated from products in order to move towards a safer product portfolio and a circular economy. Once toxicity is part of a company screening, it is relevant to know what the company defines as toxic. This is called cut-off criteria. For ChemScore, we require newly designed products to explicitly exclude SVHC properties: persistence (PBT/PMT/POP), endocrine-disrupting (EDC) and carcinogenic, mutagenic and reprotoxic (CMR) (1A/1B). These toxic properties were chosen to reflect the current regulatory landscape and uncertainties regarding future bans and litigations.	We searched the company website and its annual/sustainability report to see if it uses cut-off criteria for new products. Meaning that it will not put new products with Persistent, EDC or CMR (1A/1B) properties on the market. Any indication of such cut-off criteria is enough to score. Many known hazardous substances are not banned. Therefore, general statements that the company "complies with regulation" is not enough to score.	0
2.4. Active marketing of self-proclaimed greener, eco-friendlier sustainable products on website	1 point	Sustainability report, website Search words used: "green products", "alternatives", "eco-friendly", "energy-efficient", "water-efficient", "circular"	Even if screening of product portfolios is the first step towards sustainability, manufacturing and active marketing of greener or safer products need to follow. Some companies are sincerely transforming their product portfolio, while others just showcase examples or pilot products. Active marketing of sustainable products, like products using less resources, energy, water and non-hazardous chemicals, is a hallmark of a forward-looking chemical company. And as regulation gets stricter and stricter, this is where the future profits will lie.	Does the company have a section on its website or in its annual/sustainability report where it actively pushes for safer or more sustainable products? It must mention environmentally preferred products, more sustainable products, safer or less hazardous products, or use similar phrasings to be awarded in this category.	1
2.5. Active marketing of less toxic alternatives, evaluated by ChemSec	1 point	https://marketplace.chemsec.org/	Actively advertising non-toxic chemicals, e.g. safer alternatives, to engage customers is an indication that a company has verified safer alternatives. Here, ChemSec Marketplace – the only existing online platform of safer alternatives – is used.	ChemSec keeps a record of producers of safer alternatives in a publicly available database called ChemSec Marketplace. Points will be awarded for any company that has at least one entry on Marketplace.	0
2.6. Offering of circular products or processes, enabling circularity	2 points	Sustainability report, website Search words used: "circular", "recycling"	Developing circular products and processes, or products that can enable circularity, requires deep know-how and a lot of resources. Companies that already have a fully recyclable product in their portfolio, or a process to get product resources back, should be encouraged to steer innovation further in the same direction.	Does the company offer a product with a circular end-of-life concept or a product that enables its customers to design circular products? If those products or concepts involve hazardous chemicals, no points are awarded.	0
2.7. Using biobased/renewable resources	1 point	Sustainability report, website Search words used: "bio-based", "renewable", "bio-mass"	Generally speaking, using bio-based and/or renewable resources is better than fossil-based. However, to avoid other environmental and social problems, it's important that the feedstock isn't competing with the production of food, or involves non-sustainable farming practices or land-use.	Does the company mention on its website or in its annual/sustainability report that it uses bio-based or renewable feedstocks? It must also be clear that the feedstock does not compete with food production or requires extra land-use.	0
2.8 Using or producing recycled feedstock	1 point	Sustainability report, website Search words used: "recycling", "recyclate"	Reusing materials and resources is imperative to increase resource efficiency and transition towards a circular economy. However, to avoid other environmental problems, it's important that the recycled materials are sourced and treated in a sustainable way and make a positive contribution to the circular economy. Only mature recycling practices, with a proven track record, that do not circulate hazardous substances have been included.	Does the company mention on its website or in its annual/sustainability report that it produces or uses recycled feedstocks? Only proven recycling practices used at scale, such as mechanical recycling, are rewarded. It must also be mentioned that the produced recycled product does not contain any hazardous substances. From our perspective, chemical recycling is too immature (high energy use, misleading use of mass-balance approach, etc.) and is therefore not rewarded.	0
2.9. Reduction of generated waste	1 point	Sustainability report, website	The reduction of generated waste can be seen as an indicator for a higher process efficiency and atom economy. Indirectly, it could serve as a measure for the efficiency of the production (industrial symbiosis).	We compare the last two consecutive years for changes in waste and hazardous waste production. To be rewarded a point, the (hazardous) waste generated must have decreased. Where possible, generated waste/production unit has been used.	0

3. Management & Transparency

Category rationale: A good chemicals management system is fundamental for a chemicals company, especially for those with a large share of hazardous substances in production. A transparent approach to product ingredients, as well public commitments to phase out certain substances, is a good indication of the direction in which a company is moving.

New additions for 2021 to this criteria are:
- Internal circular economy program in place (criteria 3.7)
- Does the company have clear circular economy targets? (criteria 3.8)

Additional minor changes made in ChemScore 2021:
- A company only producing sustainable products gets 2 points instead of 3 (criteria 3.1)
- Having a Code of Conduct for Employees and Suppliers awards the company 1 point instead of 2 (criteria 3.4)

Total maximum score in this category: **12**

Company's score in this category: **2**

Criteria:	Points awarded:	Source:	Rationale for inclusion of criteria:	How we judged fulfilment of the criteria:	Result:
3.1. Company only produces sustainable products	2 points	Sustainability report, website	The ultimate goal for a sustainable chemicals company is to have a product portfolio with only non-hazardous products. For this to be achieved, management and product development will have to follow a strict path towards sustainability.	Does the company have a public commitment in its annual/sustainability report or on its website that it only produces non-hazardous products?	0
3.2. Company has a public strategy with (timed) phase-out plans for existing hazardous chemicals beyond regulatory compliance	1 point, + 1 additional point for timed	Sustainability report, website	In order to become a company that only produces non-hazardous substances, the company needs to embrace a clear strategy with (timed) phase-out plans for hazardous chemicals. Simply following regulatory compliance is not enough, as many hazardous chemicals are not regulated.	Does the company have a public commitment in its annual/sustainability report or on its website to phase out existing hazardous products and replace them with safer alternatives? If the plan is timed, one additional point is awarded.	0
3.3. Availability of Safety Data Sheets for products in compliance with GHS	1 point	Company website -> Open access to SDS on the website or reference to other page	Product transparency, not only towards customers but also civil society, is important to build trust in a company and its products. (Material) Safety Data Sheets (MSDS/SDS) are an industry standard for providing information on chemicals. Here, we looked at whether this safety data is freely accessible to everyone, e.g not hidden behind a paywall or registration process.	If the company provides open access to (Material) Safety Data Sheets (MSDS/SDS), it is awarded one point here. If a majority of the SDS are available on the company's website or through an affiliated management system, it is enough to score.	1
3.4. Code of Ethics or Code of Conduct and a Supplier Code of Conduct	1 point	Sustainability report, website	The existence of a Code of Conduct or Code of Ethics provides a hint of the company's approach to management. The document should provide guidance to all employees on how to conduct business in an ethical and responsible way. Additionally, every company should have a supplier Code of Conduct, which is also enforced towards its suppliers. The document should provide guidance to all the company's suppliers on how they should conduct their business in an ethical and responsible way.	There must be a document or references to ethics codes that all employees must adhere to. Additionally, a document or reference to a Supplier Code of Conduct, or a similar standard, is necessary. Only if documents covering both employees and suppliers are present, one point is awarded.	1
3.5. Respond to our request for feedback on draft scores	1 point	Direct communication with the company	Being willing to participate in a dialogue with civil society regarding the company's chemicals management and product portfolio should be encouraged.	The company needs to respond to score one point.	0
3.6. Public information on global hazardous chemicals production	2 points	Sustainability report, website	As there is no public information available about hazardous chemicals produced outside of the EU/US, we encourage companies to publicly disclose their full production outside of the EU/US for transparency reasons. Of course, this will also affect the "Percentage of EU/US revenue" in category 1 in a favorable way by setting it to 100 percent.	Does the company either provide public information about their full production of hazardous chemicals, or provide a public statement that the non-EU/US production includes no other chemicals than the production within those markets? If provided, points are awarded.	0
3.7. Internal circular economy policy in place	1 point	Sustainability report, website	In order to make global chemical companies circular, the culture and strategy of the company must change from within. This can be done through policies or transformation programs. Employees that are aware of the concept of circular economy are more likely to apply its principles in the daily business practice.	Does the company have a public commitment in its annual/sustainability report or on its website regarding a circular economy, or does it have a department, dedicated website or annual report section on its position or contribution to a circular economy? At least one of these criteria must be in place for the point to be awarded.	0
3.8. SMART circular economy targets	2 points	Sustainability report, website	Companies that are willing to develop and apply circular economy metrics to their own portfolio and processes show an interest in a circular transformation. SMART targets are: 1. Specific (= clearly defined), 2. Measurable (= expressed with a number), 3. Achievable (= ambitious but not unrealistic), 4. Relevant (= circular economy related), and 5. Time-bound (= there's a deadline to achieve it)	Assessment of ambition and transparency of developing and applying circular economy metrics to own company and/or products/processes, with concrete targets. All five must be in place to earn two points. If only four are present, one point is awarded.	0

4. Impact & Controversies

Rationale: A good company has to ensure that it meets the requirements of international and national environmental legislation, protects occupational health and the right of communities to live in a healthy and sustainable environment. In case of a lawsuit, a company should demonstrate its ability to meet the decision of the court, ensure proper rehabilitation of the contaminated sites and provide compensation to affected communities. It should also demonstrate improvements in its chemicals management.

Total maximum score in this category: 6

Company's score in this category: 6

Criteria:	Points awarded:	Source:	Rationale for inclusion of criteria:	How we judged fulfilment of the criteria:	Result:
4.1. Actual track record of accidents and controversies	Severe impact controversies (0 points)	Information has been provided by the violation tracker project of Good Jobs First. Further, information about lawsuits associated with environmental pollution, toxic spills, land and/or water contamination and human rights violation have been found via internet research; by local NGO partners and/or affected communities. Example search words used: toxic spills, environmental degradation, water pollution, air emissions, hazardous waste, occupational health, explosions, fire, community rights, human rights	A company has to ensure that it meets the requirements of international and national environmental legislation, protects occupational health and the right of communities to live in a healthy and sustainable environment. In case of a lawsuit, a company should demonstrate its ability to meet the decision of the court, ensure proper rehabilitation of the contaminated sites and provide compensation to affected communities.	The company has been repeatedly fined for environmental pollution, toxic spills, land and/or water contamination, or human rights violation exceeding 10 million USD. Or, the company has been involved in at least one severe incident with a fatality or very large impact on the environment over the past 10 years.	
	Medium impact controversies (3 points)			The company has been fined for environmental pollution, toxic spills, land and/or water contamination, or human rights violation exceeding 1 million USD. However, the magnitude of these violations has not been severe over the past 10 years. Nor have any of the incidents resulted in a fatality.	
	Low impact controversies (6 points)			There are no, or only low impact records of environmental law violations, toxic spills, or human rights violations that the company is accountable for over the past 10 years. Nor have any of the incidents resulted in a fatality.	6