

Best practices in ChemScore

The idea of this document is to give the reader a feeling for some of the best practices that were rewarded in this year's ChemScore. It could serve as a source of inspiration for companies and investors. Both to better understand what has been achieved and how decisions have been taken to reward specific achievements and to give a better explanation. Please note that all criteria are not included, but only those where there is a notable difference between the companies' performance and which involve a qualitative assessment from ChemSec's side. For example, if a company has reduced or increased its generation of hazardous waste, is a yes/no question that would not need further explanation and is hence not included.

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2.2. Assessment method includes intrinsic hazards

Almost all companies (42) have a method that explicitly involves the assessment of the products' intrinsic hazards. The level of ambition in the individual methodologies can however differ.

Example 1: [Johnson Matthey](#)

“We assess all the potential chemical hazards in our products and provide customers with legally compliant safety data sheets. These contain information on the chemical and its hazards, along with guidelines on safe handling and what to do in the event of a spill or emergency.”

Example 2: [BASF](#)

“Basic Sustainability Requirements: We identify material sustainability lacks acting as an early-warning indicator for our product portfolio. Each solution in its respective application and region is evaluated based on corporate minimum requirements and stakeholder-specific criteria. This covers BASF’s Code of Conduct. Chemicals hazard and exposure across the life cycle, anticipated regulatory trends and sustainability ambitions along the value chain and risks for the company’s reputation.”

The methodology also includes an updated list of properties of SVHC substances (PBT, vPvB, PMT, vPvM, EDCs and Equivalent level of concern).

Example 3: [Yara](#)

“Product stewardship: To guarantee responsible management of our fertilizer products, we prioritize the principles of product stewardship. We take careful steps at every stage of the fertilizer value chain, from sourcing raw materials to production, transportation, and distribution, all the way to usage at the farm. Our product stewardship program addresses critical areas such as product safety, environmental protection, safe food production, and protection against theft and misuse. To ensure compliance, our program mandates regular assessment of health, safety, and environmental impacts across all significant product categories. These evaluations encompass the full life cycle of our products, including their use in fertilizer and industrial applications, and align with product stewardship guidelines in the fertilizer sector and relevant legislations.”

“Our Corporate HESQ team centrally tracks and manages all chemical substances of concern, taking defined responses according to the regulatory processes. We make new insights available through ongoing dialogue with representatives of politics and science, as well as the interested general public.”

2.3. Strict commitment to not develop/market new SVHC chemicals/products

Only two companies fulfil this criterion. Lanxess writes clearly, that substances having the characteristics of SVHCs are meant. For Ecolab, it is not clear if they include this wider definition, or if only the identified SVHCs, so those substances that are on the REACH candidate list are meant. In both cases, the companies are rewarded for their commitment.

Example 1: [Lanxess](#)

"We have a clear strategic focus on shifting our portfolio towards socially, environmentally and economically beneficial products. For the development of our innovative solutions, we select safer and more sustainable ingredients wherever possible. We will not develop and market new end-products containing substances > 0.1 % that have the characteristics of a substance of very high concern (SVHC). Our solutions fall into a broad range of sustainability categories contributing to a carbon neutral and non-toxic environment and to a circular economy."

Example 2: [Ecolab](#)

"In addition to eliminating SVHC-listed chemicals in current products, Ecolab's chemical ingredient policy also prohibits developing new products containing SVHCs. The foundations of sustainable design are embedded into our research and development processes to ensure safety and sustainability are integrated into our products."

2.4. Active marketing of self-proclaimed sustainable products

All but one company have self-proclaimed sustainable products, some even have a variety of product groups. What is needed to score, is that they have identified (subject to their own measuring stick) the need to market more sustainable products and also do this at least on their own website. One thing is very important to keep in mind here. And that is that all claims made about "safer" and more "sustainable products" are company-specific and have not been vetted by any external expert or authority.

Example 1: [Nutrien](#)

Nutrien provides an overview of the key environmental benefits of their different products and programs.

Nutrien's products, services and programs are described comprehensively on our website. Notable developments from 2022 are described in the sections below.

[LEARN MORE on our website](#)

Our Actions: Products, Services and Programs Summary

Here is a summary of some of our key products, services and programs that support our efforts to provide whole-acre solutions and foster a more sustainable agriculture sector.

Brief Description and Key Environmental Benefits		Carbon	Water	Soil Health	Biodiversity	Yield
PRODUCTS						
1	Advanced plant nutrition	Advanced products (such as nitrogen inhibitors and stabilizers) and Environmentally Smart Nitrogen® ("ESN") help minimize nitrogen loss to the environment and associated GHG emissions		■	■	■
		Advanced naturally derived products (such as C ² Technology and biocatalysts) enhance soil and plant function via increased nutrient availability		■	■	■
2	Crop protection	Herbicides and pesticides aim to reduce crop loss (due to diseases, weeds and pests) and maximize crop yield				■
3	Seed	Advanced plant breeding and genetics resulting in seeds that may be more resistant to pests and drought, maximizing crop yields				■
4	Animal health solutions	Our focus is on providing our growers with products that improve feed efficiency and liveweight gains and/or reduce methane emissions from livestock				■
SERVICES						
5	Digital solutions and agronomy	Our digital solutions includes Agrible®, soil testing and other data technologies to measure the impacts of agricultural practices and recommend customized solutions to each grower				■
6	Precision agriculture	Our digital precision agriculture tool, Echelon™, combines with Global Positioning System ("GPS") data to allow us to provide specific variable rate recommendations to help improve yields and soil health, while reducing nutrient loss to the environment				■
7	Nutrient management	Our recommendations include following best practices in nutrient application such as 4R Nutrient Stewardship (the Right Source of plant nutrients at the Right Rate, Right Time and Right Place) and Ferticare®				■
8	Irrigation management and water conservation practices	Our team designs systems to optimize irrigation, especially in dry zones (for example, Australia)				■
9	Vegetation, forestry and aquatics management	Nutrien Solutions provides specialized services for non-agricultural managed lands across the US				■
PROGRAMS						
10	Carbon Program	Nutrien's carbon-focused solutions are positioned to help growers implement best practices and measure outcomes to support soil carbon sequestration and reduce GHG emissions, which can be verified or certified by third parties and create a new source of income for growers				■
11	Sourcing and traceability program	Our collaborations are exploring the traceability of quality and sustainability attributes in the agriculture supply chain, from the farm field through to finished consumer product, generating premium crop value				■
12	Measurement program	Our sustainability measurement programs use the Agrible® platform and a wide range of data to calculate indicators or metrics developed by recognized industry standard organizations				■

Even if it is listed more generically, it provides a valuable and transparent insight into their “greener” products. Also, on the website they have a list of [greener solutions](#).

Example 2: [AkzoNobel](#)

Listing different product groups, depending on how they contribute to a more sustainable world in the company's view: “Our sustainable solutions add value for our customers, as well as delivering economic value to all parties in the value chain. We identify the sustainability benefits of our solutions using our Sustainable Product Portfolio Assessment (SPPA) framework. The SPPA framework is based on the World Business Council for Sustainable Development’s (WBCSD) Portfolio Sustainability Assessment and is now the leading sustainable portfolio framework tool in the chemical industry. The SPPA gives a holistic view of the sustainability characteristics of our product portfolio.”

2.5. Active marketing of less toxic alternatives

While criteria 2.4 looks at any kind of self-proclaimed “greener” products, this criterion demands that it is also verified by independent third parties. Advertisements on ChemSec Marketplace and Cradle-2-Cradle gold and platinum certifications are considered in this criterion. Other standards and certifications can be taken into account when the absence of hazardous chemicals is treated similarly to the two mentioned platforms and a third-party evaluation is performed.

Examples (number of ads):

Covestro (7), Eastman Chemical (5), Lanxess (5), Umicore (3), LG Chem (2), AkzoNobel (1), Chemours (1), Evonik (1), Indorama (1), Sasol (1), Sherwin-Williams (1), Solvay (1), PPG Industries (1).

2.6. Offering of circular end-products or processes

Developing circular products and processes, or products that can enable circularity, requires in-depth 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. Even if biobased and making use of recycled feedstocks, this is rewarded separately in 2.7 & 2.8 and hence not included in this criterion.

Example 1: [Evonik](#)

An enabling technology to facilitate recycling by allowing mono materials to be used also for more difficult packaging solutions: “With Evonik’s universal heat seal binders using DEGACRYL® HS binders, it is possible to design a mono PET packaging of the highest quality. Due to the direct adhesion properties on PET as well as great sealability against PET it is possible to substitute the widely used multilayer composites by mono-material packaging and make recycling instead of incineration possible.”

The absence of SVHCs is also [clearly declared](#): “Furthermore, all products comply with international regulations for food contact thus do not contain any SVHC substances and therefore DEGACRYL® HS can be applied in food packaging.”

Example 2: [Covestro](#)

An enabling technology to facilitate recycling by allowing also multi-layer materials to be recycled by efficient de-bonding of the adhesives used: “To open up more circular, high value recycling streams for multi-material packaging which was not accessible for recycling, we have tested new debonding technologies for polyurethane (PU)PU-glued multi-material laminates that enable the separation of the layers in flexible packaging at the end of its useful shelf life.”

Example 3: [BASF](#)

Trinamix sensing NIR - an enabling technology to better sort recycled plastic waste: “Improving on-the-spot decision-making through NIR Spectroscopy. The way to circularity starts with sorting. One of the major challenges on our path towards a circular economy is the lack of high-quality recycling worldwide. A key piece to establishing circularity lies in the first step of the recycling process: a clean on-the-spot sorting of plastic waste. By enabling

flexible plastic identification at the push of a button, our solution ensures clean plastics waste streams across recycling facilities worldwide.”

2.7. Using biobased/renewable resources

By making use of [responsibly-sourced](#) biobased or renewable feedstocks, companies can contribute to a more circular economy. However, when making such a switch, it is important not to interfere with food production or increase land use which could be extremely counterproductive from a sustainability perspective. Also, it is important to stress that the materials rewarded under this criterion should be used in their own production processes. Hence, using for example bio-based packaging from external suppliers is not counted.

Example 1: Solvay

Several products in their portfolio are bio-based, for example: “Kalix® 2000 products contain monomers from the sebacic acid chain derived from non-food competing and GMO-free (genetically modified organism) castor oil. Their [renewable content](#) is calculated according to the ASTM D6866 test method for determining bio-based carbon content.”

“...Amodel® Bios PPA, a high-performance, [bio-based polymer](#) made from non-food competing biomass, using 100% renewable electricity.”

“Jaguar product range based on guar. The Sustainable Guar Initiative aims at developing [sustainable, non-food competing guar](#) production within the Bikaner district in Rajasthan, India. This desert district is one of the largest producers of guar in India. SGI was set up by Solvay, L’Oréal, HiChem and TechnoServe (NGO)”

Example 2: Toray

Making use of the residues from the sugar industry: “Toray is also accelerating efforts to produce valuable [materials from nonedible biomass](#) in a way that does not conflict with food issues. Specifically, the Company mass-produces partially bio-based PET fibers from ethylene glycol raw materials produced from nonedible sugar cane molasses. These fibers have been used to produce non-woven material created using ultra-fine fibers, for example”

“The technology significantly improves the manufacturing of raw sugar from non-edible biomass and increases fermentation efficiency, thereby contributing to realizing a [non-fossil raw material](#).”

Example 3: Yara

The production of green hydrogen by electrolysis with renewable energy is indeed a renewable feedstock. Yara turns the produced hydrogen into ammonia which is then used as

the base for nitrogen fertilisers: “Green ammonia is produced carbon-free by using [green hydrogen](#) produced based on renewable energy.”

2.8 Using or producing recycled feedstock

By making use of properly recycled feedstocks, companies can contribute to a more circular economy. However, when making such a switch, it is important not to fall into the trap of using mass-balanced recycled materials without a physical connection (credit transfer) which could be extremely counterproductive from a sustainability perspective. Also, it is important to stress that the materials rewarded under this criterion should be used in their own production processes. Hence, using for example recycled packaging from external suppliers is not counted. In addition, a statement of a self-proclaimed absence of hazardous chemicals should be found. However, for some recycled feedstocks with well-known properties like PET bottles, it is not necessary.

Example 1: [AkzoNobel](#)

Making use of the waste stream from paper mills sludge water containing Calcium carbonate in partnership with an external company (Alucha) who extracts and upcycles it and then including it into new paints: “Using Alucha’s circular solution can take mining of calcium carbonate out of the equation. With the feedstock being paper sludge, it also upcycles part of a waste stream, contributing to the circular economy. All important factors when considering our science-based target of reducing carbon emissions by 50% across the full value chain by 2030.”

“As part of a pilot project, we carried out extensive testing with Alucha to find a suitable product. Their circular mineral is now being used as an alternative for mined calcium carbonate and clay in one of our pre-deco exterior/masonry fillers.”

Example 2: [Indorama Ventures](#)

“342,961 tons of post-consumer PET bale input in 2021.”

3.2. Public strategy with (timed) phase-out plans for hazardous chemicals

To become a company that only produces non-hazardous substances, it needs a clear phase-out plan for hazardous chemicals, and this plan needs a timeline. Just doing what regulations say isn't sufficient because many harmful chemicals aren't regulated. To get rewarded a point, the company must show aim to ambition to phase out all, or at least large groups, of its hazardous substances. If these plans have a clear timeline, the company gets the full two points.

Example 1: [3M](#)

“Exit all PFAS manufacturing by the end of 2025: 3M will discontinue manufacturing all fluoropolymers, fluorinated fluids, and PFAS-based additive products.”

Example 2: [Solvay](#)

Solvay has 2 separate phase-out targets; one general for the phase-out of SVHCs and one for fluorosurfactants: “Solvay has a target to phase out all substances of very high concern present in marketed products at a quantity of more than 0.1% by 2030, whenever feasible.”

“In 2022, Solvay announced the next step in our commitment to voluntarily phase out the use of fluorosurfactants globally: by 2026 we will manufacture nearly 100% of our fluoropolymers without fluorosurfactants, at our Spinetta Marengo site in Italy. One small product line, critical for the semiconductor and energy industries and representing less than 1% of production volume, will require further research and development to completely phase out the use of fluorosurfactants. A tightly-controlled, closed-loop and zero liquid discharge production process will be used for this production line.”

Example 3: [SABIC](#)

A newly developed chemical strategy, with different reduction scenarios for different substances. Details on the substances (names, CAS) are missing, also deadlines are not public but a first step: “The Safer Chemistry program is an integral pillar in the overall SABIC Sustainability strategy. SABIC has a deep understanding of the global imperative for responsible chemical management, and is dedicated to promoting practices that minimize negative impacts on both the environment and human health through the production and use of chemicals. The objective is to define suitable actions that reduce the hazard footprint of the products sold in the marketplace. Each potential CoC undergoes several reviews by Product Stewardship, Technology, Business, and Procurement personnel, and if viable opportunities exist, action is taken and documented. Even if action is not taken at the time, the documentation will be reviewed on a cyclic basis or if new information becomes available to warrant high-priority review.

In 2022, SABIC scrutinized the first 25 prioritized CoCs currently used in production and found opportunities to take varied action according to the following groupings:”

<u>Proposed actions to be taken on CoCs</u>	<u># (From first 25 reviewed CoCs)</u>
Substitute CoC with lower hazard profile substance	3
Stop CoC production and close or repurpose manufacturing assets	1
Eliminate raw material CoC use	3
Lower product concentration of CoC (typically 10-100%)	0
Ban use of CoC in new product design	4
Total	11

3.3 Reports on the revenue connected to SVHC substances

It is important to be transparent about how much hazardous chemicals are being produced. If the company discloses the volumes produced/used and/or revenue connected to the production of hazardous chemicals it would give a much better understanding for investors to be able to judge the financial risks connected to the production and use of such chemicals. Even if data is not disclosed on a substance level, which would be preferred, disclosure on an aggregated property level can and should be done.

Example 1: [Johnson Matthey](#)

“The number of substances we use that are regulated (such as substances of very high concern under REACH and the EU’s Restriction of Hazardous Substances Directive or substances listed under California Prop 65.) or are considered to be of international concern (such as substances controlled by the Montreal Protocol, Stockholm and Rotterdam Conventions, GHS category 1A/1B carcinogens, mutagens or reprotoxins) is limited. Approximately 5% of our sales come from products that are made using or containing such substances.”

Example 2: [LG Chem](#)

Hazardous Substances	Unit	Scope	2019	2020	2021
REACH ¹⁾ Annex 17 Substances	%	Global	17.74	29.80	16.10
REACH SVHCs ²⁾			8.40	2.39	1.57
CMR ³⁾ Substances			15.89	5.99	2.71
Hazardous Substances Risk Assessment ⁴⁾			5.92	13.59	25.09

1) Registration, Evaluation, Authorisation and Restriction of Chemicals
2) Substances of very high concern
3) Carcinogenic, mutagenic and reprotoxic chemicals
4) Percentage of substances registered among chemical substances in sales products

Example 3: [Arkema](#)

Arkema provides both the number of chemicals as well as revenue connected to it: “Outside Europe, the table above covers all the Group’s businesses except for recent acquisitions by Bostik and Coating Solutions. Products containing these substances, whether subject to authorization or on the candidate list, accounted for 2.9% of sales in 2022, down from 2.5% in 2021. This increase, despite the decrease in the number of SVHCs in the Group’s products, is attributable to the evolution of the product mix in 2022.”

ANALYSIS OF THE GROUP’S SVHCS		
Substances of Very High Concern	SVHCs contained in products placed on the market	Of which SVHCs contained in raw materials
SVHCs subject to REACH authorization	11	10
SVHCs on the REACH candidate list	47	42

3.6. Public information on global production of hazardous chemicals

SABIC discloses all substances produced globally in their “Business Overview”, whereby Eastman and Lanxess state, that they are producing the same substances globally and therefore all hazardous substances are known due to public EU and US registers. All three companies are rewarded two points for this disclosure. Arkema lists the total number of all SVHCs being produced globally and Braskem has its “Valuation book” with individual substances and substance groups with sales volumes and revenue/market. Both are good steps in the right direction but not all the way but are nonetheless rewarded 1 point each.

Example 1: [SABIC](#)

SABIC discloses its chemicals portfolio with production volumes and locations in this publicly available brochure on SABIC website in the Business overview.

Example 2: [Eastman Chemical](#)

"Our manufacturing sites in Latin America (two in Brazil) and plants in Asia (six in China, one in Malaysia, one in Korea) mirror our EU and the U.S. sites when it comes to product stewardship and product safety. No additional chemicals are produced in our manufacturing processes in Latin America and Asia. We have local sites outside the EU and U.S. regions to better serve the local markets with the same materials and products that are produced in the EU and the U.S. In Latin America and Asia, we fully comply with local legislation and provide all necessary information to the appropriate organizations to support the manufacturing and use of our products. Globally, we adhere to the same high Eastman product stewardship standards, including safety standards."

Example 3: [Lanxess](#)

"Consequently, we do not produce or market critical products (containing SVHC) globally, which we have not registered and do not market within the EU or US."

Example 4: [Arkema](#)

Arkema provides both the number of chemicals as well as revenue connected to it:

ANALYSIS OF THE GROUP'S SVHCS		
Substances of Very High Concern	SVHCs contained in products placed on the market	Of which SVHCs contained in raw materials
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SVHCs on the REACH candidate list	47	42

Example 5: [Braskem](#)

The Braskem “Valuation book” is the most detailed reporting from any company about their product portfolio. Having listed individual production volumes (tonnages) as well as connected revenue for individual substances and substances groups accounted for each market. Unfortunately, the substances groups cannot be divided into individual substances but are still awarded 1 point.

3.7. Internal circular economy policy in place

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 programmes. Employees who are aware of the concept of circular economy are more likely to apply its principles in daily business practice.

Example 1: [Yara](#)

The components of a circular economy are not located under one single headline but spread out in many places in the annual report, still it is clear and ambitious enough to be rewarded: "Our circular economy strategy is aimed at reducing our strain on natural resources and biodiversity and minimizing GHG emissions. Our focus is on promoting nutrient recycling and implementing circular practices in the pursuit of innovative packaging solutions and our procurement processes. Continuously expand our use of recycled or upcycled fertilizers."

Example 2: [Indorama Ventures](#)

An entire section on the company’s website is dedicated to circular economy, covering all sides of circularity.

3.8. Key performance indicators (KPIs) for circular economy targets

Companies that are willing to develop and apply circular economy metrics to their own portfolio and processes show an interest in a circular transformation. Any KPIs should be SMART:

- Specific (= clearly defined)
- Measurable (= expressed with a number)
- Achievable (= ambitious but not unrealistic)
- Relevant (= circular economy-related)
- Time-bound (= there is a deadline to achieve it)

All five criteria must be in place to earn two points. If only four are present, one point is rewarded. Please note that as a minimum, targets must be considered both ambitious and relevant, else it will not be rewarded at all.

Example 1: [Indorama Ventures](#)

Indorama has a number of different targets for 2025 and 2030 found in the sustainability report covering recycled feedstock, bio-based feedstocks as well as diverting waste from landfills. Clearly showing targets as well as current status for each criterion.

Example 2: [AkzoNobel](#)

“Targets linked to circular principles include:

- 1) moving towards a zero-waste company by 2030
- 2) Circular use of materials (100% by 2030)
- 3) re-using any water in our most water-intensive sites by 2030
- 4) increasing the use of recycled content in our plastic packaging to 50% by 2025.
- 5) 2030 target of more than 50% revenue coming from sustainable solutions, having achieved 39% by 2021

We report the % of used circular materials in our annual report and our website”

Example 3: [Braskem](#)

- “50% of portfolio of projects with positive impact in 2022 and target 90% in 2030
- Our [commitments](#) of increasing to 300,000 tons per year the sale of products with recycled content by 2025 and 1 million tons by 2030
- As well as preventing 1.5 million tons of plastic waste from being sent to incineration, landfills or disposed of in the environment by 2030.”

Example 4: [Solvay](#)

[Solvay One Planet Progress:](#)

