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Briefing Note: Safer Alternatives

Why they matter to financial institutions

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About this document:

This briefing note has been developed under the Private Sector Financing and Investment workstream of the Global Framework on Chemicals (GFC) Implementation Programme. It provides an introduction to safer alternatives and their relevance to financial institutions, highlighting the role of green and sustainable chemistry in reducing chemicals-related risks and impacts and creating financing and investment opportunities. It examines approaches for identifying, assessing and verifying safer alternatives, including methodologies, metrics and standards aimed at avoiding regrettable substitution. The briefing note also outlines key challenges and practical approaches for financial institutions to integrate safer alternatives into risk management, client and investee engagement, financing and investment decisions, and stakeholder collaboration. It is intended to support financial institutions in identifying credible safer alternatives and mobilising finance towards the transition to safer and more sustainable chemicals management.

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Positioning statement

This report has benefited from collaborative, multi-stakeholder input. The views expressed in this publication are those of the authors and do not necessarily reflect the views of contributing or convening organisations. Particularly, case studies included within the publication reflect the views of their contributors, and their inclusion should not imply endorsement or directed, collective action. Where current practices and relevant barriers are reported, this content does not aim to be prescriptive as to actions or decisions to be taken by individual financial organisations.

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Executive Summary

1. For financial institutions, green and sustainable chemistry is not solely an environmental agenda but a source of both risk mitigation and value creation. Green chemistry's emphasis on designing hazards out at the point of innovation reduces the likelihood that a financed product becomes a stranded asset as regulation or litigation evolves, while sustainable chemistry's wider lens, including resource efficiency, worker and community health, and circularity, encompasses exposures that investors are increasingly required to assess and disclose.

2. Substitution alone does not resolve the risk. The required response is informed, functional substitution. Informed means using the best available evidence to guide the transition; functional means evaluating non-chemical and service alternatives alongside chemical ones, rather than seeking a drop-in replacement within the same chemical class. Alternatives assessment is the structured process that supports that decision once a substitution has been decided, based on minimum criteria for demonstrating that a candidate is genuinely safer. The UNEP Framework's ten objectives give the finance community a common reference for identifying where capital directed toward safer chemistry reduces exposure to regulatory, litigation and valuation risk, and keeps open access to markets as restrictions on hazardous substances tighten.

3. Financial institutions can act across five areas: identifying sectors and clients where hazardous chemicals present material exposure (impact identification and assessment); embedding chemicals criteria in sector policies, due diligence and credit risk assessment (governance and internal policies); engaging clients or investee companies on substitution strategies, with the greatest leverage at the point a company seeks capital to make a change (client and investee engagement); directing capital toward safer chemistry innovation, commercial scale-up and process substitution, which needs finance at a scale not yet committed (capital allocation and financing); and working through industry initiatives to harmonise methodologies and improve data availability (partnerships).

4. This briefing connects to the GFC implementation programme's other cross-cutting workstreams — including those on Identification of Priority Chemicals of Concern, Green and Sustainable Chemistry Innovation, Chemical Footprint Approaches, Transparency, Traceability and Disclosure along value chains, and Reporting Standards and Frameworks — whose outputs will shape the priority substances, metrics, and disclosure standards available to financial institutions. It is the second of a two-part series of briefing notes, the first being on the topic of Hazardous Chemicals (GFC, 2026a).

A. What are safer alternatives

5. Safer alternatives are chemicals, materials, technologies, or processes that reduce or eliminate the use or generation of hazardous substances while delivering the required function. In practice, safer alternatives may involve substituting a hazardous chemical with one that poses lower risk, redesigning products using safer materials, adopting non-chemical solutions, or modifying industrial processes to prevent the formation of hazardous by-products. Where suitable safer alternatives are not yet available, they may need to be developed. Green and sustainable chemistry principles can guide this development by supporting the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances across their life cycle.

Why does it matter to the finance sector?

6. For the finance sector, a "safer alternative" is investable to the extent it can be verified: an unverified claim may defer risk rather than reduce it. Hazardous chemistry can constitute a material financial exposure even where a product remains legally permitted, through regulatory restriction, litigation and remediation costs, supply chain disruption, reputational impacts and shifting market demand.

7. Transitioning towards credible safer chemicals, materials, technologies and non-chemical solutions can help companies anticipate these pressures, reduce dependency on substances that may face future restriction or substitution, and strengthen the resilience of products and business models. Safer alternatives can also create financing opportunities for financial institutions, from advising clients on and financing reformulation and retooling, to underwriting the scale-up of green and sustainable chemistry solutions, while deepening client relationships through the transition. Credible and verified safer alternatives can help financial institutions translate an uncertain and potentially latent chemicals-related liability into an identifiable and financeable transition opportunity, while reducing the risk of regrettable substitution.

Green and sustainable chemistry

8. The field of green chemistry was formally established by Anastas and Warner (1998), whose twelve principles provided chemists and engineers with guiding principles for designing products and processes that reduce toxicity, waste and energy consumption. While these principles governed laboratory and process design, the wider chemical sector lacked an overarching global reference framework to define “sustainable” outcomes across full product life cycles. Other frameworks, including OECD methodologies and chemical hazard-assessment tools, provide criteria for assessing whether one chemical

or alternative is safer than another based on its hazardous properties. However, determining whether an alternative is sustainable requires a broader assessment of its environmental, social and economic impacts across the life cycle. Criteria and approaches for assessing these wider sustainability considerations have been less consistently defined and harmonised. The UNEP Green and Sustainable Chemistry Framework Manual (UNEP, 2020, 2022) was welcomed as the intergovernmental common reference for what green and sustainable chemistry seeks to achieve.

9. The UNEP Green and Sustainable Chemistry Framework Manual drew on analysis of stakeholder submissions and on the Global Chemicals Outlook II (UNEP, 2019) and was developed with inputs from more than 100 stakeholders from government, industry, academia and civil society (UNEP, 2020, 2022). It was developed at the request of UNEA 4 in 2019 and has been welcomed by the following UNEA 5 in 2022 (UNEP, n.d.). The Framework provides ten Green and Sustainable Chemistry objectives and guiding considerations that constitute a reference for stakeholders, including financial institutions (UNEP, 2020). The objectives are explicitly non-hierarchical and overlapping, and they are non-binding reference guidance rather than a certification standard.

10. Green chemistry, defined as "*the utilisation of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacturing and application of chemical products*" (Anastas & Warner, 1998) is guided by scientific principles focused on chemistry innovation. Green chemistry focuses on the design of new chemicals and processes from first principles before market authorisation. Chemical substitution involves the identification of safer alternatives that can replace a hazardous chemical already in commerce with a safer one.

11. Sustainable chemistry covers a wider set of topics including advanced manufacturing, safe working conditions, local communities and human rights, consumption and disposal patterns, ethics, and new business and service models (UNEP, 2020). The OECD defined sustainable chemistry as "*a scientific concept that seeks to improve the efficiency with which natural resources are used to meet human needs for chemical products and services*" (OECD, 2018). The UNEP Framework Manual bridges the two, treating green chemistry and green engineering as the scientific and technological foundation and adding humanitarian aims, enabling system conditions and wider goals. It serves as an important bridge between green chemistry and sustainable chemistry approaches, which have distinct origins and policy evolution.

Table 1. The ten green and sustainable chemistry objectives and guiding considerations (UNEP, 2020).

No.	Objective	Guiding consideration
1	Minimizing chemical hazards	Design of chemicals with minimised or no hazard properties for use in materials, products and production processes ("benign by design").
2	Avoiding regrettable substitutions and alternatives	Develop safe and sustainable alternatives for chemicals of concern through material and product innovations that do not create negative trade-offs.
3	Sustainable sourcing of resources and feedstocks	Use of sustainably sourced resources, materials and feedstocks without creating negative trade-offs.
4	Advancing sustainability of production processes	Use green and sustainable chemistry innovation to improve resource efficiency, pollution prevention and waste minimization in industrial processes.
5	Advancing sustainability of products	Use green and sustainable chemistry innovation to create sustainable products and consumption with minimised or no chemical hazard potential.
6	Minimizing chemical releases and pollution	Reduce chemical releases throughout the life cycle of chemicals and products.
7	Enabling non-toxic circularity	Use of chemistry innovations to enable non-toxic circular material flows and sustainable supply and value chains throughout the life cycle.
8	Maximizing social benefits	Consider social factors, high standards of ethics, education and justice in chemistry innovation.
9	Protecting workers, consumers and vulnerable populations	Safeguard the health of workers, consumers and vulnerable groups in formal and informal sectors, including through implementation of the Globally Harmonized System.
10	Developing solutions for sustainability challenges	Focus chemistry innovation to help address societal and sustainability challenges, including food security, human wellbeing, climate change, biodiversity, pollution and supply-chain resilience.

Avoiding regrettable substitution

12. The transition toward safer alternatives is complicated by the risk of “regrettable substitution”, which involves replacing a *chemical* where the alternative turns out either to result in similar or worse *potential environmental impacts* than the replaced chemical, or to involve shifting the burden of the impact to another entity. Well-documented cases span several chemical families. Bisphenol A was replaced in plastics by structurally similar bisphenols S and F, which laboratory studies indicate may have hormonal activity of a potency comparable to the substance they replaced (Rochester & Bolden, 2015; UNEP, 2019). Di(2-ethylhexyl) phthalate was substituted as a PVC plasticiser by diisononyl phthalate, for which animal testing indicates possible carcinogenicity and endocrine disruption (Tomar et al., 2013, as cited in UNEP, 2019). Polybrominated diphenyl ether flame retardants, restricted for persistence, neurotoxicity, reproductive toxicity and carcinogenicity, were replaced in part by chlorinated organophosphate esters, whose biomarkers in United States urine samples rose approximately fifteen-fold between 2002/03 and 2014/15 (UNEP, 2019).

13. Long-chain PFAS have been phased out in favour of shorter-chain alternatives like GenX chemicals, for which the United States Environmental Protection Agency's final toxicity assessment identified effects on the liver, kidneys, immune system and offspring development, together with suggestive evidence of carcinogenic potential, at a chronic reference dose approximately 27 times lower than its own 2018 draft value (US EPA, 2021). In agriculture, parathion was replaced by other organophosphates, listed in Annex A of the Stockholm Convention at the twelfth Conference of the Parties in May 2025 with time-limited specific exemptions. Parties expanded the exemptions from the seven uses recommended by the POPs Review Committee to 22; the amendment entered into force on 9 October 2026, and the exemptions run for five years from that date (Secretariat of the BRS Conventions, 2025).

BOX 1 – The financial implications of regrettable substitution

Viewed through a financial lens each of these cases can represent capital deployed for a transition that delivered little durable risk reduction. Replacing one hazardous chemical with a structurally or functionally similar one still incurs the full cost of change (reformulation, re-qualification, capital retooling, and supply-chain adjustment), yet can leave the underlying hazard, and therefore the exposure to future regulation, litigation, and market rejection, largely intact. Where the substitute begins to follow the same restriction trajectory as the chemical it replaced, the asset can strand a second time. The transition cost is effectively paid twice: once for the regrettable substitute and again for the eventual credible alternative. Regrettable substitution therefore converts what should be a one-time transition into a potential recurring cost and a persistent, unpriced balance-sheet risk. For financial institutions the implication is direct: the value of an alternative lies not in the act of switching but in the durability of the hazard reduction it achieves, and rigorous, hazard-based alternatives assessment is what protects the capital committed to a transition.

14. A substitution made on the basis of a functional alternative assessment can reduce the risk by evaluating the range of chemical structures, production technologies, product design options and non-chemical alternatives capable of delivering the required function, rather than searching for a drop-in replacement within the same chemical class (UNEP, 2019). Grouping applies the same logic at regulatory level, involving the assessment of chemicals with similar structure or technical function together so that restriction of one member of the group does not redirect demand to another (UNEP, 2019). Alternatives assessment combines both, weighing hazard and exposure potential alongside performance and cost (OECD, 2021; UNEP, 2019).

B. Finding and assessing alternatives

15. Alternatives assessments typically examine hazard profiles, exposure pathways, performance requirements, and life-cycle impacts of potential substitutes. Financial institutions require clear definitions and screening frameworks to identify which chemical innovations genuinely reduce impacts to human health and the environment. Without common criteria for what constitutes a “safer alternative”, a lender or investor may finance a substitution that later requires further investment or creates new regulatory, litigation or market exposure, resulting in mispriced risk and potentially stranded capital. Conversely, institutions may miss credible financing opportunities where they lack the information needed to distinguish genuinely safer solutions from other substitutes. A structured framework can help financial institutions integrate chemicals impacts and risks into lending, investment, and stewardship decisions while improving comparability across portfolios. Common criteria reduce ambiguity in screening, enable consistent portfolio-level reporting, and prevent the financing of substitutes that merely shift hazards.

Assessment methodologies

16. Several frameworks provide structured methodologies for identifying genuinely safer substitutes and avoiding regrettable substitution. The OECD Substitution and Alternatives Assessment Toolbox compiles hazard tools and data sources alongside exposure assessment, life-cycle assessment, economic and social considerations, substitution case studies, and third-party frameworks and rating systems (OECD, n.d.). The Interstate Chemicals Clearinghouse Alternatives Assessment Guide sets out three assessment frameworks of differing depth and integrates environmental justice and climate change considerations into the process (IC2, 2025). Alternatives assessment is also addressed extensively in UNEP’s Global Chemicals Outlook II (UNEP, 2019) and through the Society of Environmental Toxicology and Chemistry (SETAC), which supports the advancement and application of alternatives assessment and provides technical guidance on the approach. Applied consistently these frameworks can give financial institutions clearer signals for capital allocation and reduce the risk of financing substitutes that may later prove harmful.

17. The OECD *Guidance on Key Considerations for the Identification and Selection of Safer Chemical Alternatives* (2021) is a non-binding guidance that provides a widely referenced definition of a safer alternative outside the pesticide-specific literature. The guidance directs assessors to authoritative lists of restricted and priority substances to screen out problematic alternatives. The OECD Substitution and Alternatives Assessment Toolbox (SAAToolbox) compiles related resources and databases for practitioners.

18. Safe and Sustainable by Design (SSbD) is the European Union's framework for applying green and sustainable chemistry principles across the life cycle. It embeds safety and life-cycle sustainability criteria at the earliest design stages of chemicals, materials and products rather than at market entry, requiring that they be safe for human health and the environment and sustainable from raw-material extraction through production, use and end-of-life. To meet its ambition SSbD needs assessment metrics that can be aggregated across steps, streamlined methods suited to short industrial design cycles, and biophysical benchmarks (Fantke, 2025).

19. In China, the national standard *General Principles for Eco-design Product Assessment* (GB/T 32161-2015) defines eco-design as applying whole-life-cycle thinking at the product design and development stage, including minimizing raw materials containing toxic and harmful substances (General Administration of Quality Supervision, Inspection and Quarantine & Standardization Administration of China, 2015). The *Industrial Products Green Design Guidelines (2026 Edition)*, issued in April 2026 by the Ministry of Industry and Information Technology alongside four other administrative agencies, set out 126 design solutions across 15 industries and call for avoiding or minimizing toxic and hazardous substances in raw materials (Ministry of Industry and Information Technology et al., 2026). Internationally, the OECD's Safe(r) and Sustainable Innovation Approach combines safe(r) and sustainable by design with regulatory preparedness and early dialogue between innovators and regulators, so far applied primarily to nanomaterials and other advanced materials (OECD, 2020, n.d.). In Japan, the Ministry of the Environment published the final *National Action Plan for the Implementation of the Global Framework on Chemicals* in April 2025, which covers life-cycle management of chemicals and policies to encourage safer alternatives (Ministry of the Environment, Japan, 2025).

BOX 2: Pesticide specific guidance

The UNEP *Guidelines on Alternatives to Highly Hazardous Pesticides* (2023) embed substitution within the internationally recognised hierarchy of risk management, applied from most to least preferred: prevention, meaning avoiding the registration and marketing of HHPs; elimination of HHPs already in use; engineering controls, through containment and physical barriers; administrative controls, through training, procedures and restricted access; and personal protective equipment as a last resort where hazardous materials remain in use. Nine criteria evaluate a candidate alternative: efficacy; availability and means of application; hazardousness and toxicity relative to the pesticide replaced; durability against resistance; technical feasibility in the farming context, including training; cost-effectiveness on a full-cost basis including health and environmental externalities; registration status in the relevant jurisdiction; trade risks, including maximum residue limit compliance in destination markets; and the incentives and disincentives that favour or disfavour the alternative (UNEP, 2023). The last three are direct credit considerations. An alternative that performs well but is unregistered in the borrower's jurisdiction cannot support a transition project, and one that breaches destination-market residue limits transfers the risk into the offtake contract. For finance the sequence matters: comparative assessment comes before an alternative can anchor a bankable or investable transition project.

Harmonized methodologies and metrics

20. Harmonizing methodologies can improve comparability of results, reduce duplication of efforts, and provide financial institutions with clearer signals on which innovations represent credible safer chemistry solutions. A harmonized, science-based approach can also make proposed financing or investment frameworks easier to validate internally and externally, providing a common evidence base for discussions with risk teams, investment committees, boards, clients and other market participants. This can reduce the time and resources required to establish confidence in an approach, facilitate decision-making and ultimately accelerate the deployment of finance towards credible safer alternatives.

21. Several methodologies are already in use. GreenScreen for Safer Chemicals is an open-source tool that evaluates substances across 18 endpoints, including ozone-depleting potential and global-warming potential (Clean Production Action, 2026). It underpins the Chemical Footprint Project, whose investor signatories represent over USD 3 trillion in assets under management and whose purchaser signatories represent over USD 1 trillion in procurement power (Clean Production Action, 2024). USEtox, a scientific consensus model (Rosenbaum, R.K. et al., 2008), enables the comparison of alternative pesticides and other chemicals according to emissions toxicity and environmental partitioning, supporting the evaluation of human and ecotoxicity impacts across alternatives.

22. The Chemicals Footprint Approaches Workstream, convened under the GFC Implementation Program 'Industry Engagement and Action along value chains' ahead of the GFC first International Conference, aims to strengthen the transparency, comparability, and global effectiveness of chemical footprint approaches. Its work covers harmonizing chemical footprint terminology, defining scope and principles of a chemical footprint, and initiating work towards developing an international standard, grounded in a robust, science-based systems approach. The Chemicals Footprint Approaches Workstream developed a terminology and methodological framework responding to the absence of broadly agreed terminology and a standardized methodology for chemical footprint assessments, intended to inform the GFC first International Conference, while laying the foundation for a future international standard (GFC, 2026b).

Finance metrics

23. For financial institutions, chemicals-related metrics can support assessment of companies' exposure to hazardous substances, associated financial risks, and progress towards safer alternatives. Existing sustainability reporting frameworks provide part of the underlying information needed for such analysis. ESRS provides information on pollution, substances of concern and substances of very high concern (SVHCs) (ESRS E2) and on material sustainability-related risks, opportunities and financial effects (ESRS 2 SBM-3). IFRS S1 and the industry-based SASB Standards –e.g. on the chemicals industry-, GRI Standards, and TNFD also provide relevant chemicals- and pollution-related information, as described in the section below. At portfolio level, company information from these sources and other relevant sources could underpin metrics for financing or investment decisions.

24. A range of non-governmental organisations and voluntary initiatives also develop chemicals-specific metrics and methodologies that can provide additional information for financial analysis. This work highlights that for financial institutions, harmonized hazard methodologies become decision-useful when they are expressed as a small set of comparable, company-level outcome metrics. Three emerging metrics may be particularly relevant to capital allocation and stewardship:

- the share of a company's chemical inventory that has undergone full hazard characterization — a measure of how much of the portfolio's chemical exposure is actually known;
- revenue dependence on hazardous chemicals — the potential financial impacts of regulatory changes, litigation, and shifts in demand; and
- revenue derived from verified safer chemistries — the value created as substitution proceeds.

25. Together these indicators can let an investor distinguish a company that is future-proofing its portfolio from one that remains exposed to the next restriction or liability. The Safer Chemistry Impact Fund (SCI Fund) expresses these three outcomes in an aligned, comparable form intended to be decision-ready across companies and sectors (Safer Chemistry Impact Fund, 2024). However, few companies report these metrics today. Of 40 chemical companies assessed by ChemScore in 2025, 15 disclosed revenue from substances of very high concern and 5 stated an intention to increase their share of sales from safer solutions (ChemSec, 2025).

26. These indicators can provide useful signals of chemicals-related risks and of progress towards safer alternatives but are not measures of overall financial performance or investment attractiveness on their own. Where material, financial institutions may also consider the costs and benefits of transition, changes in product performance and market demand, and the potential for new environmental or other adverse impacts associated with alternatives.

27. The underlying data draw on complementary infrastructure: company disclosure through CDP (CDP, n.d.) and the Chemical Footprint Project (CFP) Survey (Clean Production Action, 2024); verified substance-level hazard data through ChemFORWARD (ChemFORWARD, 2026) and GreenScreen (Clean Production Action, 2026); producer-level hazard and revenue-exposure ratings through ChemSec's ChemScore (ChemSec, 2025) and its SIN List of substances of concern (ChemSec, n.d.). Most of these metrics and data sources come from a single ecosystem of non-governmental organisations and voluntary initiatives. Their links to standardised disclosure frameworks such as SASB/ISSB, ESRS or GRI, are therefore important for uptake. The GFC Chemical Footprint Approaches workstream provides a multistakeholder platform for harmonizing terminology and moving various chemical footprint approaches toward a common international standard, which would further strengthen their comparability for finance.

Verification and certification

28. Credible verification mechanisms can confirm that alternatives meet defined safety and sustainability criteria to strengthen investor confidence and improve accountability across chemical value chains. The United States Environmental Protection Agency certifies products against its Safer Choice and Design for the Environment Standard and publishes the Safer Chemical Ingredients List, evaluating ingredients within functional classes such as surfactants, solvents and chelating agents so that formulators can select the lowest-hazard option for a given function (US EPA, 2024). Certification now covers close to 2,000 products, and the Safer Chemical Ingredients List holds over 1,000 chemicals, offering an operational, investor-visible signal of commitment (US EPA, 2024). ChemFORWARD, a pre-competitive Chemical Hazard Data Trust, supplies pre-assessed

substance-level hazard data and integrates OECD alternatives guidance, reducing the data-collection burden on individual firms while improving consistency (ChemFORWARD, 2026). GreenScreen Certified provides another example of third-party verification, with its higher certification levels requiring comprehensive ingredient-level hazard assessment and progressively stronger safer-chemistry criteria. Such certification can provide financial institutions with additional evidence that safer formulation claims have been independently assessed, rather than relying solely on company claims or the exclusion of selected chemicals of concern.

C. How can financial institutions respond

29. Financial institutions have an important role to play in accelerating the transition towards safer alternatives. Beyond managing chemicals-related risks, they can help mobilize capital, influence corporate practices, and support innovation that reduces the use and generation of hazardous substances. Integrating safer alternatives into financing and investment decisions requires action across multiple aspects of a financial institution's business model from identifying priority impacts and embedding chemicals considerations into internal policies, to engaging clients, directing capital, measuring progress, and collaborating with external stakeholders.

Challenges for financial institutions

30. While safer alternatives present significant opportunities to reduce chemicals-related risks and support sustainable economic transitions, financial institutions face a number of challenges in identifying, assessing and financing these solutions. Limited data, inconsistent methodologies and metrics, evolving standards and commercial uncertainties can all constrain investment decisions and make it difficult to distinguish credible safer alternatives from regrettable substitutions.

31. **Data and transparency barriers:** Financial institutions face significant data gaps when assessing chemical risks. Globally, more than 350,000 chemicals and mixtures are registered for production and use, many lacking comprehensive hazard data or toxicity assessments (Wang, Z. et al., 2020). These information gaps make it difficult to determine whether proposed substitutes are genuinely safer. Chemical supply chains often lack transparency because ingredient information, toxicity data, and process details may be treated as confidential business information. In addition, there is often limited visibility into how and where chemicals are used across complex supply chains, including the production and sourcing of chemical precursors and their presence in intermediate and finished products. These gaps can make it difficult for financial institutions to trace

chemical exposure through clients and value chains, assess associated risks, and identify credible safer alternatives.

32. **Absence of decision-useful metrics:** Financial institutions can decide which evidence provides enough confidence for specific decisions, such as client or investee company engagement, deep-dive assessments, and whether to finance or invest in an activity or not. Each institution sets the level of confidence it needs to meet its stated goals, while disclosure standards can set a common baseline. Financial institutions could benefit from a small set of standardized, comparable, company-level metrics that translate chemical hazard into financial signals, such as those mentioned above, to benchmark performance, price risk and track transition progress across portfolios. At present, generic ESG disclosure is insufficient for chemicals due diligence (Perrot, 2026), and investors building portfolio-level metrics have been unable to incorporate company-level revenue from hazardous chemicals because data are limited and producers use inconsistent definitions. Companies reducing their reliance on hazardous chemistry can therefore be hard to distinguish from those exposed to the next restriction or liability.

33. **Assessment complexity:** Determining whether a substitute reduces overall risk requires evaluating hazard, exposure, and life-cycle impacts. Data gaps and uncertainty can complicate identification of the safest alternative, increasing the risk of regrettable substitution. Alternatives assessments require multidisciplinary analysis involving toxicology, exposure science, materials engineering, and life-cycle assessment. Financial institutions often lack this specialized expertise, making it challenging to evaluate emerging safer chemistry solutions.

34. **Lack of standardized criteria:** Although several guidance frameworks exist, such as the OECD Guidance on *Key considerations for the Identification and Selection of Safer Chemical Alternatives* (2021), there are no globally harmonized criteria for defining or verifying green and sustainable chemistry and safer chemical substitutes. This fragmentation creates uncertainty for investors seeking to identify credible safer chemistry solutions and compare alternatives across sectors and jurisdictions.

35. **Commercial uncertainty:** Many safer chemical alternatives emerge from early-stage green chemistry or materials innovation, which typically requires significant upfront investment in research, pilot testing, and industrial scale-up before commercial deployment. These technologies often face high technical and regulatory uncertainty, limited performance track records, and longer commercialization timelines compared with established chemical processes. Even when safer alternatives exist, adoption can be slow due to higher costs, performance uncertainties, and supply-chain adjustments. Regulatory incentives and market signals are often necessary to drive substitution toward safer chemicals, given the market barriers faced by new materials (Perrott, 2026), a

background paper prepared for the OECD June 2026 Workshop on Financing Sustainable Chemistry that does not represent OECD positions. These barriers can create a need for targeted incentives to reduce risk and support innovation, scale-up and market adoption. The 2026 report Incentivizing Sustainable Chemicals, developed by Change Chemistry and the Sustainable Chemistry Catalyst at the University of Massachusetts Lowell, highlights the role of government incentives in reducing investment risks and supporting the adoption of more sustainable chemicals (Change Chemistry & Sustainable Chemistry Catalyst, 2026).

Opportunities for financial institutions

36. Despite these challenges, financial institutions can play a pivotal role in accelerating the transition towards safer alternatives. The outcome of an assessment of safer alternatives can inform actions across multiple aspects of a financial institution's business model, from identifying priority sectors and integrating chemicals considerations into internal policies, to engaging clients, directing capital, measuring progress, and collaborating with external stakeholders.

I. **Impact identification and assessment:** Financial institutions can begin by identifying sectors, clients or investees, and value chains where hazardous chemicals present material risks, and where safer alternatives offer opportunities for positive impact. This can be supported through:
    a. Alternatives assessment frameworks to distinguish safer substitutes from regrettable substitutions, and to recognise that an alternative being technically available does not mean it can be adopted in the marketplace, which depends on cost, performance, supply and regulatory approval.
    b. Sustainable finance taxonomies can help identify technologies, products and process innovations that reduce hazardous substance use, promote safer substitutes, or support cleaner production methods. The EU Taxonomy includes pollution prevention and control as one of its six environmental objectives, but the activities listed as contributing substantially to it are a limited set of activities, for example handling and treating hazardous waste, and remediating contaminated sites and landfills (European Commission, 2023). Chemicals enter the taxonomy mainly through its “do no significant harm” criteria. Extending the substantial contribution criteria to safer chemistry, for example through activities covering substitution of substances of concern, could give clearer market signals and help align capital allocation with global chemicals management objectives.
    c. Verification and benchmarking tools can support screening, due diligence, and investment decision-making. Examples (non-exhaustive) include:

- USEtox, a scientific consensus model for characterising the human toxicity and ecotoxicity impacts of chemical emissions in life-cycle assessment (Rosenbaum, R.K. et al., 2008);
- GreenScreen for Safer Chemicals, a hazard assessment method that rates individual substances across 18 hazard endpoints and assigns a benchmark score (Clean Production Action, 2026);
- ChemFORWARD, a repository of third-party-verified chemical hazard assessments that companies and investors can draw on (ChemFORWARD, 2026);
- ChemScore, a ranking of major chemical producers on their management of hazardous chemicals and their progress towards safer alternatives (ChemSec, 2025).

II. **Governance and internal policies:** Once priority impacts have been identified, financial institutions can embed safer chemistry considerations into governance structures, risk management processes, and internal decision-making by:

a. integrating chemicals considerations into sector policies, sustainable finance frameworks, and risk assessments.
b. incorporating safer alternatives into environmental and social due diligence processes.
c. developing internal guidance for assessing transition opportunities related to safer chemistry and industrial process substitution.
d. using recognized methodologies and taxonomies to promote consistency across business lines.

Disclosure frameworks can further strengthen internal governance by improving data availability and comparability. Existing frameworks that require or encourage chemicals-related reporting include (non-exhaustive):

a) EU CSRD/ESRS: ESRS E2 (Pollution) includes disclosure on pollution-related policies, actions, targets and metrics and was recently updated. Disclosure Requirement E2-5 of ESRS E2, on substances of concern and substances of very high concern, is retained in the simplified ESRS adopted in July 2026, with a narrower scope. (European Commission, 2026). ESRS 2 SBM-3 addresses how material sustainability-related impacts, risks and opportunities interact with strategy and the business model, including current and anticipated financial effects;
b) ISSB Standards: IFRS S1 requires disclosure of material sustainability related risks and opportunities and directs entities to consider the industry-based SASB Standards. The SASB Chemicals Standard covers products containing GHS Category 1 and 2 hazardous substances and strategies to manage chemicals of concern and develop alternatives (IFRS Foundation, 2023). The ISSB published in October 2026 the exposure draft of IFRS

Sustainability Disclosure Practice Statement 1: Nature-related Disclosures (IFRS Foundation, 2026). Drawing on the TNFD recommendations, the proposed Practice Statement currently open to consultation intends to help companies apply IFRS S1 when disclosing material nature-related risks and opportunities, including those associated with pollution and other drivers of nature loss; and

c) GRI Standards: Relevant GRI standards include GRI 305 (Emissions), GRI 303 (Disclosures on water and effluents) and GRI 306 (Waste). GRI 13 (Agriculture, Aquaculture and Fishing Sectors 2022) includes Topic 13.6 on pesticide use (GRI, 2022). Alignment initiatives include the GRI–ESRS Interoperability Index (EFRAG & GRI, 2023) and the May 2024 GRI-IFRS Foundation alignment agreement (IFRS Foundation & GRI, 2024). Furthermore, pollution metrics are currently being reviewed and updated under the GRI Topic Standard Project for Pollution.
d) TNFD: The TNFD chemicals-sector guidance includes indicators associated with hazardous substances. It uses WHO acute-toxicity classes (Ia, Ib, II, III, U) directly aligned with FAO/WHO HHP classification (TNFD, 2024). The ISSB's proposed nature-related Practice Statement builds on the TNFD framework.

37. National and jurisdictional standards can translate global standards into domestic reporting frameworks or requirements. An example is the Sustainability Standards Board of Japan's inaugural sustainability disclosure standards (SSBJ Standards) issued in March 2025 with the objective of alignment with IFRS S1 and IFRS S2 and some jurisdiction-specific provisions (SSBJ, 2025). The general sustainability-disclosure architecture can support the reporting of material chemicals-related risks and opportunities.

38. As disclosure practices evolve, they can improve transparency around hazardous chemicals, substitution strategies and transition planning.

III. **Client and investee engagement:** Financial institutions can use stewardship, client or investee engagement and advisory support to encourage the transition toward safer chemistry and help companies manage chemicals-related risks and opportunities. For banks, a particularly important point of engagement is when a client is already seeking capital to finance a transition. At this stage, banks can draw on sector knowledge and market intelligence to help shape the financing approach and align relevant KPIs with broader chemicals and sustainability goals, while supporting the client's own transition objectives. Examples of client and investee engagement include:
    a. Encouraging disclosure of chemical impacts, risks and opportunities, including the use of relevant disclosure frameworks and reporting standards.

b. Promoting the adoption of alternatives assessment methodologies to identify genuinely safer substitutes and avoid regrettable substitution.
c. Supporting the development and implementation of transition strategies, including investments in safer alternatives, industrial process improvements, and innovation.
d. Engaging chemical producers and downstream companies to phase out hazardous substances and transition to verified safer alternatives, strengthen chemicals management practices and improve supply-chain transparency.
e. Using measures like shareholder engagement and sustainability-linked incentives to encourage companies to prioritize safer chemistry innovation.

IV. **Capital allocation and financing:** Financial institutions can accelerate the transition toward safer chemistry by directing capital towards technologies, businesses and projects that reduce hazardous chemical use and support safer alternatives. Examples include:

a. **Supporting green chemistry innovation:** financing startups and research institutions developing safer chemical formulations, biodegradable materials and non-toxic substitutes through venture capital, impact investment, and blended finance, particularly during early-stage research, pilot projects, and first-of-a-kind demonstration facilities.
b. **Scaling safer alternatives:** providing project finance, sustainability-linked loans and investment vehicles that support commercial-scale manufacturing, supply-chain development and product redesign for safer alternatives and circular economy solutions.
c. **Supporting industrial process substitution:** financing cleaner production technologies, green synthesis pathways and manufacturing process improvements that reduce or eliminate hazardous chemical inputs, improve resource efficiency, and strengthen regulatory compliance.
d. **Underwriting and claims:** insurers can include chemicals-management conditions in underwriting, reflect hazardous-chemicals liability in pricing and coverage terms, and specify safer materials when reinstating damaged property after a claim.

Portfolio-level allocation can therefore support both innovation and the wider market adoption of safer chemistry solutions.

BOX 3: Example of investors' engagement with consumer facing companies

The GFC Private Sector Financing and Investment workstream's report 'Financial Institutions' role in driving the transition to safe and sustainable chemicals maps current financial institutions' practice on chemical risk and the data and metric gaps that constrain it. This includes case examples that reference IEHN's safer chemical management guidance for investors on consumer facing companies. It points to a simple architecture connecting what investors ask companies to do with the metrics and key performance indicators used to assess corporate progress. This architecture makes each engagement ask both measurable and actionable. See pillars and high-level metrics below. The full guidance and key performance indicators are set out in Investor Environmental Health Network (2025).

IEHN Guidance	Investor-relevant metric	Verified destination a company can move to
Conduct a hazard inventory	Share of chemical inventory with full hazard characterization	ChemFORWARD verified hazard data, GreenScreen assessments by licensed profilers.
Adopt hazard-based chemicals policies	Revenue dependence on hazardous chemicals (declining)	ChemSec ChemScore and SIN List; authoritative hazard-based restricted-substance lists as aggregated in the GreenScreen List Translator and the Chemical Footprint Reference List
Invest in verified safer alternatives	Revenue from verified safer chemistries (rising)	ChemFORWARD SAFER, EPA Safer Choice, GreenScreen certified Gold

V. **Partnerships:** No single institution can accelerate the transition to safer chemistry alone, and collaboration across financial institutions, industry, governments, and standard-setting organizations can help. Financial institutions can:

a. participate in industry initiatives developing common methodologies and standards for safer chemistry.
b. support initiatives to harmonize chemical footprint approaches and alternatives assessment methodologies.
c. collaborate with policymakers to strengthen sustainable finance taxonomies and disclosure frameworks.
d. work with research organizations, verification bodies and data providers to improve the availability and quality of chemicals-related information;
e. contribute to market development by supporting pre-competitive initiatives that improve transparency and reduce information barriers.

39. Partnerships can also help clarify which actors finance which part of the transition. The preliminary modelling approach for estimating financial needs for the cotton textile value chain transition, developed as part of the work of the GFC Private Sector Financing and Investment workstream, separates redirected costs from additional costs (GFC, 2026c). In the modelling approach, redirected costs correspond to existing expenditure shifted to safer alternatives, such as integrated pest management and chemical substitution; only the incremental cost counts as a financing need to achieve GFC targets in the modelling approach, and it could be mobilised mainly through demand-side measures such as standards, procurement rules and import requirements. Additional costs are those requiring new expenditure. Within this split, public finance is expected to be important for policy and standards development, development and adoption of non-financial risk measures and early-stage research and development; additional costs may need concessional and blended finance from development finance institutions; and private finance is expected to lead on equipment upgrades and chemical substitution (GFC, 2026c). Partnerships between these different actors and sources of finance can reduce uncertainty, improve consistency across markets and help scale safer chemistry solutions.

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