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Workstream on Chemical Footprint approaches

Guidance for the application of Chemical Footprint approaches in Industry – Version 0

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About this document:

The *Guidance for the Application of Chemical Footprint approaches in Industry, Version 0*, is a voluntary, implementation-oriented resource for companies, governments and other stakeholders seeking to measure and reduce potential human-toxicity and ecotoxicity impacts associated with chemicals across product and organizational value chains. It translates chemical-footprint concepts into practical guidance for inventories, assessment, target-setting, reporting and corporate action.

Development and context
The guidance builds on the terminology and methodological principles developed through the **Global Framework on Chemicals (GFC) Chemical Footprint workstream** and on established life cycle assessment principles, particularly **ISO 14040, ISO 14044 and ISO 14026**. Its cross-sector industry commitments were developed through a **year-long stakeholder consultation** involving industry and other relevant actors. The document responds directly to the GFC's five strategic objectives and 28 targets, notably **Target D6**, which calls for major sectors to develop strategies using measures such as chemical footprint approaches by 2030. This is explicitly a **Version 0** intended for dissemination and practical testing during **2027**. Feedback and experience from pilots in sectors such as textiles, electronics, plastics, pharmaceuticals, healthcare and automotive are expected to inform a road-tested **Version 1 by 2028**, including clearer minimum requirements, data-quality rules, aggregation methods and sector-specific examples.

Key messages:

1. **Chemical footprinting follows a progressive pathway:** companies can start by measuring chemical usage, progress to emissions to air, water and soil, and ultimately assess potential toxicity impacts using fate, exposure and effect information. Only the complete impact-based result

should be called a **"Chemical Footprint"**; earlier stages should be described as chemical usage or chemical emission assessments.

2. **Start pragmatically and improve progressively.** Companies should define a limited initial scope, use existing procurement, safety-data-sheet, supplier and emissions-reporting systems, document missing information and expand coverage as capability improves. Unknown or unassessed chemicals must not be treated as having zero impact.
3. **Results must be interpreted according to their scope.** Reduced chemical mass does not automatically mean reduced hazard or impact; emissions do not by themselves represent toxicity impacts; and a Chemical Footprint is a potential-impact metric, not evidence of site-specific risk, regulatory compliance or observed harm.
4. **Credible action requires governance and measurable commitments.** The guidance proposes a six-step process: define scope; build the inventory; calculate indicators; interpret hotspots and uncertainty; set targets and KPIs; and integrate and scale the approach. It also provides 11 model commitments covering governance, inventories, usage, emissions, potential impacts, safer substitution, supplier engagement, finance, sector roadmaps, transparency and verification.

Added value for industry

The guidance gives companies a **common, scalable structure** for turning fragmented chemical data into decision-relevant information. It can help identify chemical, process and supply-chain hotspots; prioritize safer substitution while avoiding regrettable alternatives; inform procurement and product development; track performance through KPIs; and support credible sustainability and ESG disclosures. It also enables sector benchmarking where scopes and methods are aligned.

Importantly, it is designed as an **extension of existing EHS, procurement, reporting, LCA and R&D systems**, rather than a standalone exercise. Progressive implementation allows SMEs and less data-mature companies to begin with inventories and usage metrics, while more advanced businesses move toward value-chain emissions and impact assessment. This can strengthen regulatory preparedness, supplier transparency, investor confidence, market access and innovation, while potentially reducing material and operating costs. Public comparisons or marketing claims, however, require aligned methodologies and independent third-party review.

Chemical footprinting is a **complement** to, not a replacement for, chemical safety and risk assessment. It supports the evaluation and improvement of the overall life-cycle environmental performance of a system regarding potential human toxicity and ecotoxicity impacts.

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1 Introduction

1.1 Background

1. The Global Framework on Chemicals (GFC) establishes a comprehensive plan with 5 strategic objectives and 28 targets to protect human health and the environment from chemical harm. Beyond industry, these initiatives empower governments to implement national safety policies and provide consumers and producers alike with the transparency needed to make safer, informed decisions.

2. Chemical Footprint (ChF) approaches are useful for assessing the potential environmental impacts associated with human toxicity and/or ecotoxicity related to chemical usage and related chemical emissions (GFC, 2026)[1]. By evaluating the chemical constituents of products as well as the usage and related emissions of chemicals along the respective life cycles of products, organizations can gain insights into their environmental impacts and health implications. In an era characterized by increasing chemical pressure on the natural environment and on human health, regulatory scrutiny and consumer demand for transparency, the implementation of ChF approaches is not merely beneficial but essential for promoting sustainable practices across industries and regions[2].

3. A ChF is a metric that quantifies potential human toxicity and/or ecotoxicity impacts associated chemical usage and emissions (GFC, 2026).

4. ChF approaches are aligned with life cycle assessment (LCA)-based footprinting methodologies, consistent with the principles of ISO 14040 and ISO 14044, and structured in a manner comparable to other ISO-standardized footprint approaches such as carbon footprinting (ISO 14067) and water footprinting (ISO 14046). ChF approaches encompass a range of components, including those associated with quantifying chemical usage, those that translate usage into chemical emissions, and those that translate emissions or direct exposure into potential toxicity- and ecotoxicity-related impacts, all applied across defined system boundaries. Combining results from approaches addressing these three main elements yields the final ChF outputs. While distinct from substance-specific regulatory risk assessment frameworks, ChF approaches draw on many of the same underlying scientific data and concepts (e.g. hazard classifications, persistence, bioaccumulation and toxicity effect estimates). This guidance therefore focuses on footprint-based assessments of chemical usage and emissions and their translation into related potential environmental impacts associated with human toxicity and/or ecotoxicity, supporting action beyond regulatory compliance without replacing regulatory chemical assessment frameworks.

1.1.1 Global Context

5. The proliferation of chemicals remains a pressing global challenge, contributing substantially to climate change, loss of biodiversity, desertification, environmental pollution in air, soil and water, and human health burden. According to the United

[1] GFC (2026). Chemical Footprint - Terminology and Methodological Framework. Global Framework on Chemicals, UNEP. Available at https://iomcwebinars.org/chemical-footprint-approaches
[2] Chemical Footprint - An Overview. ScienceDirect, 2021.

Nations Environment Programme (UNEP, 2021), the global sound management of chemical substances is crucial to achieving the Sustainable Development Goals (SDGs), particularly those related to health, ecosystems, and sustainable production and consumption patterns.

6. The Seventh Edition of the Global Environmental Outlook (GEO-7), The Future We Choose (UNEP, 2025), emphasizes the need for harmonized protocols to collect and communicate information on chemicals and their impacts throughout all supply chains.

1.1.2 Overview of the need for ChF approaches

7. Growing demand for transparent, traceable and comparable information on chemicals requires approaches that connect chemical use and emissions with their potential impacts across product life cycles. This guidance supports stakeholders in selecting and applying proportionate ChF approaches, interpreting results and using them to inform action across sectors and value chains.

8. A structured guidance on ChF approaches is needed to: (i) establish consistent terminology and methods; (ii) generate transparent and comparable information for decision-making; and (iii) help organizations identify priorities for reducing chemical use, emissions and related potential impacts. ChF approaches can support corporate reporting and policy development, but do not replace regulatory compliance, chemical-safety assessment or risk assessment.

1.1.3 Importance of transparency, traceability, and comparability

9. Transparency in chemical management enhances corporate accountability and supports informed decision-making. Providing clear information about chemical usage, emissions and potential impacts fosters trust among consumers, stakeholders, and regulatory bodies.

10. Traceability ensures that organizations can identify sources of harmful substances and implement necessary changes to mitigate impacts. It requires comprehensive tracking of chemicals throughout the supply chain, from raw material extraction to product end of life management.

11. Common impact-level metric allows for meaningful comparisons between products, companies, and industries. This comparability drives informed substitution efforts, competition and innovation as organizations strive to reduce their ChF and improve their sustainability performance.

1.2 Objectives

12. Building on the need for harmonized terminology, transparent methodologies, and practical implementation support, the guidance aims to provide a structured and internationally relevant framework to assist governments, industry, and other stakeholders in applying ChF approaches across sectors and regions.

13. The guidance further focuses on translating the conceptual and methodological framework for chemical footprinting into practical application examples. Building on the terminology and methodological principles established by the GFC workstream on Chemical Footprint approaches (GFC, 2026), the goal of the guidance is to offer

overall practical, implementation-oriented information to support stakeholders in applying ChF approaches effectively within their sectors and contexts with the overall ambition of reducing harm from chemicals use. In particular, it aims to bridge the gap between methodological definition and operationalization by addressing key considerations such as data availability, system boundaries, selection of appropriate footprinting approaches, how to deal with missing information, appropriate levels of detail of results for effective decision support, and relevant aggregation and correct interpretation of results. It is designed to support stakeholders with varying levels of data availability and analytical maturity, enabling a pragmatic and scalable application of chemical footprinting approaches.

14. To achieve this goal, the guidance pursues the following objectives:

- To provide stakeholders with an overview of relevant data and methods that can be applied in the context of chemical footprint assessments,
- To support stakeholders in their practical application of chemical footprint approaches associated with chemical usage, chemical emissions and related human toxicity and ecotoxicity impacts,
- To propose criteria for consistently combining chemical footprint approaches, in support of calculating and interpreting overall chemical footprint results,
- To facilitate the use of chemical footprint approaches in support of measuring, disclosing, and reducing impacts from chemicals, including chemicals of concern, and promoting the adoption of safer alternatives,
- To enhance transparency, consistency and comparability of chemical footprint results across products, sectors and regions,
- To provide a set of requirements for using chemical footprint results effectively to support various types of stakeholder decisions.

15. In this context, the guidance contributes by supporting the application of ChF approaches within sector-specific implementation programmes of the GFC, enabling stakeholders to measure, disclose, and reduce impacts from the use of harmful chemicals in line with Global Framework on Chemicals (GFC) targets, and providing internationally relevant guidance on the relevant approaches to calculate and interpret Chemical Footprints across different sectors.

1.3 Intended Audience and Stakeholders

16. The intended audience and stakeholders for the guidance document are:

- Governments: regulatory bodies looking to enhance chemical management policies.
- Industry: companies and business associations aiming to implement safer chemical practices.
- Civil society: Non-governmental organizations (NGOs) and advocacy groups focused on public health and environmental protection.

- Academia: researchers and educational institutions involved in chemical management and sustainability studies and the development of underlying data and methods.

1.4 Concept and Scope of ChF

17. ChF approaches provide a structured way to understand, measure, and manage the usage, emissions and related potential toxicity-related impacts of chemicals across value chains and throughout the life cycle of products and processes. In this context, ChF approaches refer to the data and methods that provide relevant inputs to a ChF assessment for deriving an overall ChF or one or more of its elements, such as chemical usage, chemical emissions, and toxicity/ecotoxicity impact potentials.

1.4.1 Levels of assessment

18. ChF approaches may be applied at different levels of assessment depending on the objective of the study, the intended use of the results, data availability and the analytical maturity of the user. These levels can be understood as a progressive pathway from chemical usage, through chemical emissions and potential environmental impacts, towards the calculation of a ChF.

19. The progression can be summarized as follows:

Chemical Usage → Chemical Emissions → Potential Environmental Impacts → integration of all elements and aggregation into ChF

ChF definition (GFC, 2026):

Metric that quantifies the potential environmental impacts associated with human toxicity and ecotoxicity related to chemical usage and chemical emissions.

20. Each successive level increases methodological comprehensiveness, data requirements and representation of the source-to-impact pathway shown in Figure 1. Further detail on the different levels of assessment of the ChF approaches are provided in the ChF Terminology and Methodological Framework (GFC, 2026).

21. Across all levels, ChF approaches may draw on existing data, concepts and classifications from regulatory and scientific frameworks (e.g. hazard classifications, persistence, bioaccumulation and toxicity). However, these data are applied within an aggregated, system-level assessment and do not replace substance-specific risk assessment.

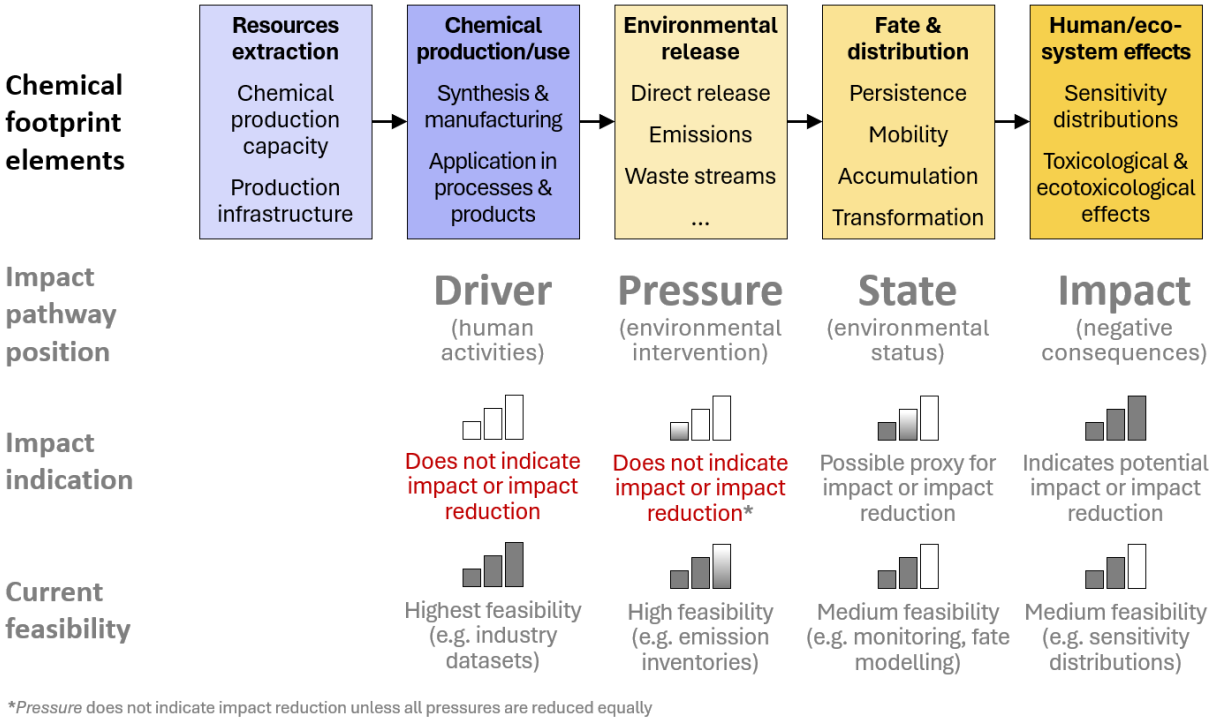


Figure 1: Chemical footprint elements along the human toxicity and ecotoxicity source-to-impact pathways, their impact indication and current feasibility (adapted from Smit et al. 2026). [3]

1.4.2 Approaches to ChF assessment

22. While different data sources and methodologies exist, distinct approaches may be relevant to chemical footprint assessments, including:

- Life cycle assessment (LCA)-based approaches, which quantify potential impacts across the full life cycle of products, incorporating usage, emissions, fate, exposure, and toxicity-related effect aspects. Such approaches are fully consistent with approaches used for other footprint assessment types, such as carbon footprint or water footprint, and are directly relevant for evaluating and combining different ChF elements.
- Score-based systems, which assign hazard or risk scores to chemicals based on predefined criteria to support prioritization and substitution decisions; ecotoxicity models, which evaluate the potential impacts of chemicals on ecosystems using experimental and modeled toxicity data. Such approaches may provide relevant chemical data and information required by approaches that translate chemical usage and emissions into potential human toxicity/ ecotoxicity impacts.
- Hybrid models, which combine elements from different approaches (e.g., hazard scoring and exposure assessment) to provide a more comprehensive

[3] Smit, M., Zare Jeddi, M., Tolls, J., Terry, C., Fantke, P., 2026. Challenges and initiatives to operationalize the planetary boundaries for novel entities. Environmental Science and Technology 60: 10359-10368. https://doi.org/10.1021/acs.est.5c14324

evaluation; chemical risk assessment models, which integrate hazard and exposure information to estimate potential risks to human health and the environment. Such approaches may provide relevant output that can be compared with ChF results in terms of aligned rankings and priorities when assessing chemicals based on different assumptions and with different frameworks.

23. Despite their methodological differences, all three types of approaches share the goal of generating structured results that support decision-making and contributing information relevant for the evaluation of impacts associated with chemical use to be measured, compared and reduced. While specific types of approaches (e.g. LCA-based approaches) directly provide results that can be combined into an overall ChF metric, other types of approaches (e.g. score-based systems and hybrid models) provide relevant data and information that can be either used as input for LCA-based ChF approaches or may be used to compare their results against those from ChF assessments in terms of ranking and prioritization.

1.5 Rationale for applying ChF Approaches

24. ChF approaches respond to growing demand from governments, industry, investors and the public for transparent and comparable information on chemical use, emissions and related potential impacts across value chains. Chapter 3 explains how these approaches support GFC objectives and respond to regulatory and market trends while applying a life-cycle perspective to reduce the risk of burden shifting.

2 Stakeholder Engagement

25. Effective implementation of ChF approaches depends on coordinated contributions from public authorities, industry, civil society, academia and financial institutions.

2.1 Critical Stakeholders for the implementation of Chemical Footprint

26. Implementation requires coordinated contributions from governments, companies, industry associations, civil society, academia and financial institutions. Their respective roles are outlined below.

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2.1.1 Government

28. Policymakers and regulators assume a leading role in the integration of the ChF into standard systems and also acts as advocates for its widespread application. The incorporation of the ChF into relevant management policies by governments has the potential to enhance chemical management, whilst concurrently encouraging industrial adoption and the implementation of relevant standards.

2.1.2 Industry

29. Industrial enterprises are the direct practitioners of the ChF, responsible for providing relevant data and practical methods, and integrating the ChF into the product life cycle. Several established frameworks and tools provide relevant reference points

for ChF measurement and management in the industrial sector, and a sample of this is described in Annex A.

2.1.3 Industry Associations

30. Industry association plays a bridging and coordinating role in promoting the application of ChF. They communicate with government departments regarding the latest regulatory requirements, organize workshops to exchange information, facilitate cooperation, and conduct training among companies within the industry, establish industry self-regulation standards, and engage in experience sharing with related industries.

2.1.4 Civil society

31. Civil society, encompassing environmental non-governmental organizations (NGOs) and the general public, adopts supervisory and promotional roles. Their activities include the oversight of ChF management practices from enterprises with a view to enhancing transparency, the conduct of science popularization activities with a view to raising public awareness of chemical environmental risks, and fostering a sound social environment for the promotion of ChF.

2.1.5 Academia

32. Academia, particularly research institutions, provides theoretical and technical support for the ChF, such as optimizing ChF assessment methods and models, and addressing technical problems like data collection and impact evaluation, filling data gaps and generating data and developing factors for chemicals and aspects not covered in current approaches and databases that are relevant for the application in the context of chemical footprint assessments. Additionally, academia can cultivate professionals in the ChF to support and provide scientific guidance for governments, enterprises, associations, and other entities.

2.1.6 Financial institutions

33. Financial institutions are the driving force behind capital supply, methodology implementation, risk management, data governance, and market transformation. They can convert ChF data together with other relevant information into a financial decision-making, thereby supporting the promotion and application of the ChF, directing capital toward green and sustainable chemical projects, and further encouraging green substitution practices in related fields.

2.2 Importance of collaboration in guiding the initiative forward

34. Promoting the ChF in the industrial sector requires in-depth collaboration among all stakeholders.

35. Firstly, jointly promote standard development and coordination. Governments, enterprises, associations, and academic institutions should work together to study the ChF and its alignment with existing standards (such as Product Environmental Footprint (PEF), ISO carbon emission standards, etc.), and also promote the implementation of technical documents.

36. Secondly, jointly address technical and data bottlenecks. Academic institutions provide technical support, enterprises share practical experience and data, and

associations coordinate resources, jointly enhancing the scientific rigor of ChF, which is conducive to improving the effectiveness of its implementation.

37. Thirdly, jointly promote industrial application. ChF application pilots might be conducted by enterprises, with the government defining the pilot scope and evaluation indicators, enterprises providing production scenarios and data support, the academic community offering evaluation methods and technical guidance, and associations coordinating resource connections. The economic feasibility and practicability of implementing the ChF will be assessed through these pilots, and potential issues can be identified in advance. Also, risks for subsequent large-scale promotions can be reduced.

3 Rationale for Chemical Footprint Approaches

3.1 Alignment with the Global Framework on Chemicals Objectives and Targets

38. The Fifth International Conference on Chemicals Management (ICCM5), held in September 2023 in Bonn, Germany, convened to negotiate a new “Global Framework on Chemicals” (GFC). The Framework decided on joint efforts towards a planet free from the harm of chemicals and waste, including through innovative solutions, strengthened legal framework, and through the life-cycle management of chemicals and waste. The Bonn meeting also adopted 5 objectives with 28 targets to measure the progress of the GFC. These objectives and targets, together with the high-level indicators, forms a measurability framework of the GFC that requires qualitative and quantitative assessment comprehensively.

39. Embedding ChF approaches into the structure and implementation of the GFC strengthens the ability to quantify chemical production, use and impacts across value chains. These approaches directly support the achievement of several GFC strategic objectives and targets. Objective D through its targeted D1 to D4 calls for safer alternatives and innovative and sustainable solutions in product value chains are in place so that benefits to human health and the environment are maximized and risks are prevented or, where prevention is not feasible, minimized. Target D6 requires that “by 2030, sustainable chemical and waste management strategies have been developed and implemented for major economic and industry sectors that identify priority chemicals of concern and standards and measures, such as the chemical footprint approach, to reduce their impact and, where feasible, their input along the value chain”. These targets highlight the need for sectors to not only design such strategies but also to operationalize them, including through the adoption of robust ChF methodologies that consider both the usage of chemicals along product life cycles as well as how such usage translates into related emissions and potential, toxicity-related impacts on human health and then environment, thereby acknowledging large differences in emission potential, persistence, exposure, and effect potencies across chemicals. Well-established, broadly accepted ChF approaches are therefore essential to enable consistent application across sectors and to support the effective achievement of these targets.

40. Similarly, many other targets of the GFC can also directly or indirectly benefit from information disclosure fostered through ChF approaches. For example, Target A3

requires that “by 2030, companies implement measures identified to prevent or, where prevention is not feasible, minimize adverse effects from chemicals throughout their life cycle”. Target A7 requires that by 2035, stakeholders have taken effective measures to phase out highly hazardous pesticides in agriculture where the risks have not been managed and where safer and affordable alternatives are available, and to promote transition to and make available those alternatives. Under Objective B, which aims to ensure that “comprehensive and sufficient knowledge, data and information are generated, available and accessible to all to enable informed decisions and actions”, Target B1 requires that “by 2035, comprehensive data and information on the properties of chemicals are generated and made available and accessible”, Target B2 calls for stakeholders, by 2030, to make available, to the extent possible, reliable information on chemicals in materials and products throughout the value chain. Target B3 further requires that, by 2035, stakeholders generate data on the production of chemicals, including the use of chemicals in materials and products, in addition to data on emissions and releases of chemicals and waste to the environment, making these data available and publicly accessible. Together, these targets emphasize the need for standardized data collection, information disclosure, and improved traceability throughout the life cycle of chemicals and waste. ChF approaches capture these elements and are therefore expected to contribute to measuring progress towards these targets. The clear timelines established under the GFC further highlight the urgency of adopting standardized methodologies and scaling up the application of ChF approaches to support timely and effective implementation.

41. Moreover, ChF approaches can support the development and measurement of GFC high-level indicators by providing structured, quantifiable data on the presence of chemicals of concern across value chains. By standardizing the way chemical information is collected and disclosed, ChF approaches strengthen transparency and traceability and help operationalize the GFC’s measurability framework. Enabling consistent tracking of progress over time, ChF approaches contribute to converting complex life-cycle data into aggregated indicators that reflect improvements in sustainable chemicals management and reductions in chemical impacts.

3.1.1 Other Voluntary Frameworks and Global Commitments

42. The contribution of GFC Strategic Objective B and its related data targets is described in section 3.1. Similarly, the Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution (ISP-CWP) is expected to strengthen the science-policy interface by providing assessments and recommendations that rely on robust, comparable and internationally harmonized data. Together, these initiatives reinforce the need for improved chemical information systems and greater consistency in data collection and reporting practices worldwide.

3.2 Market and Regulatory Trends

43. The demand for standardized, high-quality data on chemicals is increasing as governments, industries, investors and other stakeholders seek more reliable information on the production, use, emissions and impacts of chemicals across value chains. This trend is driven by a combination of voluntary global policy frameworks and legally binding regulatory instruments, both of which require improved transparency, traceability and comparability of chemical information.

3.2.1 Legally Binding Instruments and Mandatory Requirements

44. In parallel, legally binding international and regional instruments establish mandatory obligations for monitoring, reporting and managing chemicals.

45. At the global level, Multilateral Environmental Agreements (MEAs), including the Basel, Rotterdam, Stockholm and Minamata Conventions, as well as the Montreal Protocol, require Parties to monitor chemical production and use, report emissions and releases, phase out or restrict hazardous substances, and strengthen traceability throughout supply chains. These obligations create a strong demand for comprehensive and reliable chemical data.

46. At the regional and national levels, regulatory frameworks such as the European Union's REACH Regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals) and the CLP Regulation (Classification, Labelling and Packaging) further reinforce these requirements by establishing legally enforceable obligations for chemical registration, hazard communication and risk management.

47. Together, these developments reflect a global transition toward more coherent and integrated chemical information systems, where voluntary frameworks provide strategic direction and international cooperation, while mandatory regulations ensure compliance and implementation. This evolving landscape is increasing the demand for standardized approaches to collecting, interpreting and communicating chemical information, thereby supporting transparency, regulatory compliance and the sound management of chemicals and waste.

48. Annex B provides an overview of the links between regulatory frameworks and Chemical Footprint approaches.

3.2.2 Need for design, manufacture and use of green and sustainable chemicals

49. The Global Chemicals Outlook-II recognizes that innovations in chemistry can work towards achieving the SDGs, and presents a number of trends that cause concern from a human health, environmental and sustainability perspective (UNEP 2019). A number of hazardous chemicals and other pollutants continue to be released to indoor and outdoor environments including as waste in large quantities. The World Health Organization (WHO) estimated the burden of disease associated with exposure to selected chemicals at 1.6 million lives lost and 44.8 million disability-adjusted life years (DALYs) in 2016 (WHO 2018). Workers, women, and children are particularly at risk (UNEP 2019). The GCO-II concludes that more ambitious and urgent worldwide action by all stakeholders is required to achieve the global goal to minimize adverse impacts of chemicals and waste, and through accelerating greener and more sustainable chemistry innovations including scaling up innovation programmes, developing sustainable value chains that cover the entire life cycle and commercializing chemicals and products that are sustainable (UNEP 2019).

50. The concepts of green and sustainable chemistry have gained significant attention around the world, given their potential to innovate and advance chemistry to help achieve global sustainable development goals and targets (UNEP, 2020). Resolution 8 of the fourth United Nations Environment Assembly (UNEP/EA.4/RES.8)

highlights the importance of green and sustainable chemistry within broader chemicals and waste governance, calling for analysis of best practices. UNEA Resolution 5/7 welcomed UNEP's Green and Sustainable Chemistry: Framework Manual, including its road maps that encourages stakeholders to build a coherent plan for action.

4 Guidance for application of Chemical Footprint approaches in Industry

51. The GFC description of the terminology and methodological framework on Chemical Footprint (GFC, 2026) clearly describe the different components of ChF assessments. This section provides practical considerations for the application of ChF approaches in industry.

52. Initially, one should identify the overall goal and scope of the assessment, considering the object (product; company; factory) and system boundaries relevant for a given management decision context (see Figure 2). Section 4.1 provides an overview of the possible ChF elements, objects of analysis, and levels of scope that can be considered when applying ChF approaches. The assessment can thus be structured along a progressive pathway from **chemical usage, to emissions (pressure), and ultimately to potential toxicity-related impacts**. This progression reflects increasing levels of data requirements, methodological complexity and environmental relevance, consistent with the source-to-impact logic applied in LCA. All levels of assessment can in principle be applied to different systems, **including products, processes or organizations' activities,** depending on the intended purpose and scope of the assessment. Section 4.1 guides the reader on the main characteristics and steps and data sources required by each assessment level, as well as on the possible interpretation and support to decision-making, drawing mainly from GFC (2026).

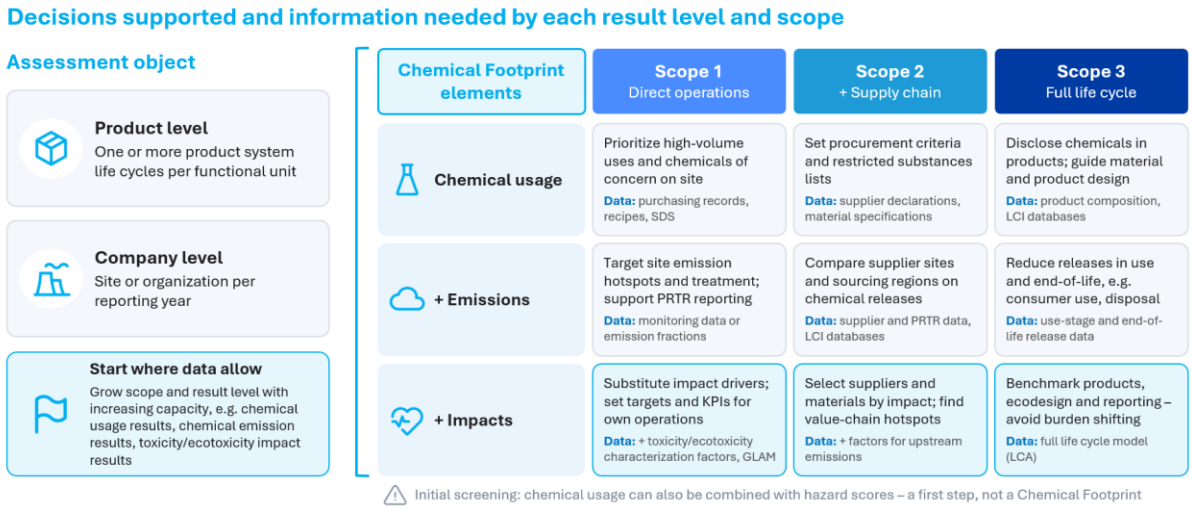


Figure 2: Progressive pathway to implement Chemical Footprint approaches in industry. NOTE: SDS = Safety Data Sheet; PRTR = Pollutant Release and Transfer Register; LCI = Life Cycle Inventory; KPI = Key Performance Indicator; LCA = Life Cycle Assessment; GLAM = Global Guidance for Life Cycle Impact Assessment Indicators and Methods (UNEP Life Cycle Initiative).

53. Section 4.2 then reflects some of the key challenges currently related to the assessment of Chemical Footprint, Section 4.3 recalls important considerations regarding the use of qualifiers when using different ChF approaches (from GFC, 2026) and Section 4.4 notes critical elements related to data sources for their application. The main purpose of this industry guidance is to encourage and promote action towards the reduction harm from chemicals use, and this is the focus of section 4.5.

4.1 Types of approaches: pathway from use and emissions to impact

54. The use of a **progressive framework** enables stakeholders to apply ChF approaches according to data availability, analytical maturity and assessment objectives. While impact-based metrics provide the most direct representation of potential environmental, toxicity-related impacts, their application is still often constrained by **limited data on substance-specific hazard, fate, and life-cycle emissions.**

55. The assessment levels described below should not be confused with methodological approaches such as hazard-based, risk-based or impact-based methods. Assessment levels describe what is being quantified, while methodological approaches describe how information is evaluated and interpreted.

4.1.1 Usage-based assessment

56. Quantifies the amount and type of chemicals used within a defined system. This assessment type covers the first element of a Chemical Footprint assessment, namely providing an overview of chemical usage within products and along entire product life cycles.

57. Assesses:

- Quantities of chemicals used
- Can be extended towards structured classification of chemicals used based on hazard or other regulatory criteria/classifications (e.g. substances of very high concern (SVHC), Carcinogenic, Mutagenic and Reprotoxic (CMR) substances, endocrine disruptors, PFAS, hazard statements)
- Does not assess emissions, exposure or potential impacts, overall chemical footprint

58. Use cases:

- Screening and prioritization (e.g. of reducing high-usage chemicals)
- Identification of chemicals of concern (only when usage information is combined with information on hazard)
- Regulatory or voluntary reporting
- Supply chain transparency

Assessment steps, characteristics and data sources:

59. This assessment type directly builds upon the first phase of a chemical footprint assessment, namely the goal and scope definition, where the product system and its

boundaries is defined, where the decision context is clarified, and where the scope of all assessment elements is provided. For the defined system, usage of chemicals is then assessed.

60. Minimum steps are to: (1) define the decision objective, object of assessment, system boundary, reporting period and chemical scope; (2) compile quantities of chemicals used from procurement records, production systems, safety data sheets and supplier information; (3) identify substances consistently and, where relevant, classify them using stated hazard or regulatory criteria; (4) normalize results to the selected functional unit or organizational reference; and (5) document coverage, exclusions, assumptions, data sources and data quality. Usage results may support inventory improvement and prioritization, but should not be interpreted as evidence of reduced emissions, exposure or potential impacts.

61. Methodological priorities for strengthening usage-based assessment are consolidated in section 5.1.1.

4.1.2 Emission-based assessment (pressure)

62. Quantifies the release of chemicals to environmental compartments within defined system boundaries. This assessment type covers the first two elements of a Chemical Footprint assessment, namely providing an overview of chemical usage in products and along entire product life cycles, and translating chemical usage to chemical emissions reaching the environment (e.g. emissions to air, water and soil) and direct exposure of humans (e.g. direct contact with chemicals in products during product use).

63. Assesses:

- Emissions to air, water and soil, covering elements of chemical usage and emission rates from usage to environmental compartments
- Can be extended towards structured classification of emitted substances based on hazard or regulatory criteria (e.g. SVHC, CMR, PFAS, hazard classes)
- **Does not assess** downstream exposure resulting from environmental releases or potential toxicity-related impacts; however, direct human exposure during product use may be estimated where applicable

64. Use cases:

- Identification of emission hotspots
- Environmental performance tracking related to emissions
- Regulatory and voluntary reporting (e.g. CSRD)
- Supply chain and life cycle transparency

65. **Interpretation:** reflects environmental pressure, but does not reflect potential environmental exposure or impact

Assessment steps, characteristics and data sources:

66. This assessment type includes all aspects that are already included in the usage-based assessment. Furthermore, this assessment step includes additional assessment components related to translating chemical usage into chemical emissions into the environment and into direct chemical exposure of consumers to chemicals in products. This can be done based on available emission factors.

67. Building on the usage inventory, users should identify relevant release pathways and estimate emissions to air, water and soil, and direct exposure where applicable, using measured data, mass balances, process-specific emission factors or documented models. Results should distinguish substances, life-cycle stages and receiving compartments and should record whether data are measured, supplier-reported, modelled or estimated. Emission-based results indicate environmental pressure and can support hotspot analysis and performance tracking, but should not be interpreted as toxicity impacts without characterization of fate, exposure and effects.

68. Methodological priorities for strengthening emission-based assessment are consolidated in section 5.1.1.

4.1.3 Impact-based assessment = Chemical Footprint (ChF)

69. An impact-based assessment translates chemical emissions and direct exposure into potential human-toxicity and ecotoxicity impacts by applying characterization factors that represent fate, exposure and effects. Therefore, this assessment type covers all elements of a Chemical Footprint assessment. Where the assessment consistently integrates chemical use, related emissions and impact characterization within defined system boundaries, and reports or aggregates the resulting impact indicators in accordance with the stated goal and scope, **the result may be described as a Chemical Footprint**. Human-toxicity and ecotoxicity results should remain separately traceable even where an aggregated result is presented. A ChF represents potential impacts, not site-specific risk, regulatory compliance or observed harm.

70. Assesses:

- Potential impacts (i.e. human toxicity, ecotoxicity) using characterization models, whose output (i.e. characterization factors) is combined with emission estimates that combine usage and emission rates)
- Aggregation of impacts across multiple substances and life cycle stages, where appropriate depending on the decision context
- Integration of fate, exposure and toxicity-related effect information
- **Does not assess** Site-specific risk or regulatory compliance, or actual measured impacts or real-world exposure conditions over a given life cycle

71. Use cases:

- Identification of impact hotspots and predominantly exposed populations
- Product comparison and benchmarking
- Strategic decision-making and portfolio optimization

- Sustainability reporting and ESG disclosures
- Identification of impact hotspots across value chains
- Sector benchmarking;
- Assessing substitutions between chemicals and/or suppliers;
- Tracking progress towards chemical management goals;
- Supporting sector programmes under the GFC.

72. **Interpretation:** a ChF should be understood as an impact-based metric derived from chemical usage and emission information, combined with information on characterization factors for human toxicity and ecotoxicity that includes aspects on environmental fate, exposure and effects. It provides disaggregated and aggregated results of potential toxicity-related impacts, enabling comparison across products or systems; results are dependent on model assumptions, data availability and system boundaries, and should be interpreted with consideration of associated uncertainties.

Assessment steps, characteristics and data sources:

73. This assessment type includes all aspects that are already included in the usage-based and emission-based assessments. Furthermore, this assessment step includes additional assessment components related to translating chemical emissions into the environment and direct chemical exposure of consumers to chemicals in products into potential human toxicity and potential ecotoxicity impacts. This can be done based on available impact characterization factors. This assessment step finally includes information on how to aggregate results into an overall footprint metric.

74. The main aspects and factors involved in translating emissions and direct exposure into potential toxicity and ecotoxicity impacts are outlined in Figure 3 below. Translating emissions and direct exposure is done by using characterization models from life cycle impact assessment (LCIA), and covers source-to-impact pathways that include aspects related to environmental fate of chemicals (i.e. persistence), human and ecological exposure, human toxicity and ecotoxicity effects, and effect severity translating physical effects into damage on human health (i.e. population lifetime loss) and ecosystem health (i.e. species-years lost).

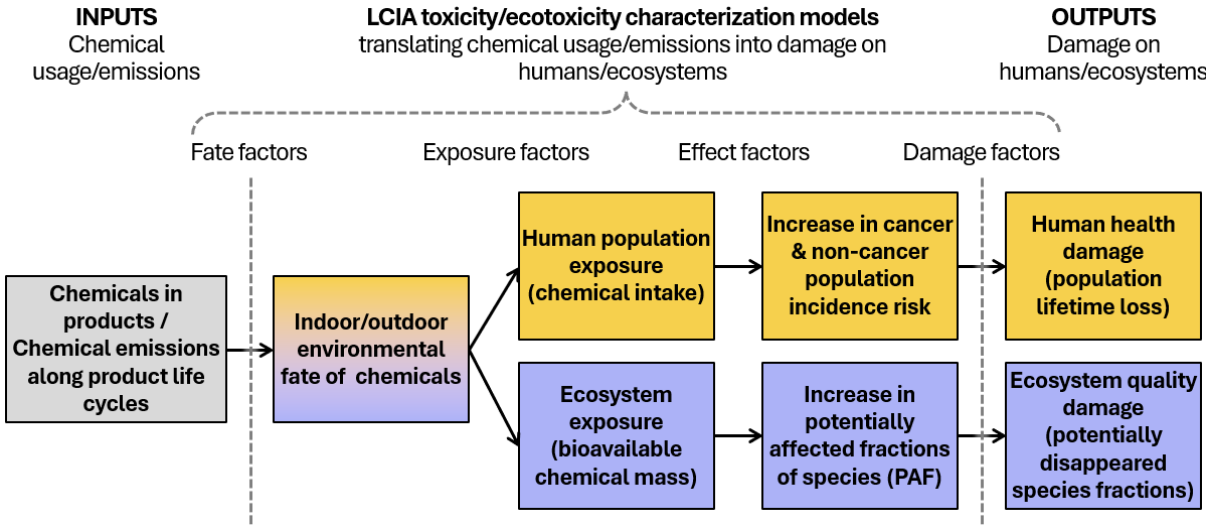


Figure 3. Source-to-impact pathways considered by life cycle impact assessment (LCIA) models to translate chemical usage and emissions to potential toxicity-related impacts on humans and ecosystems. Adapted from the impact pathways considered in the USEtox4 characterization model as implemented in e.g. the LCIA method GLAM.[5]

75. Assessing human toxicity concerning the area of protection of human health and assessing ecotoxicity concerning the area of protection of ecosystem quality are covered in the life cycle impact assessment (LCIA) characterization relevant within the context of chemical footprint assessments.

76. Chemicals can be emitted into the environment (air, water, soil, etc.) during all life cycle stages of products, services and systems, and expose consumers during product use. Emission inventories of different products may contain hundreds of chemicals, of which many will have the potential to cause toxicity-related impacts on human beings and/or ecosystems. Hence, identifying and quantifying human health and ecosystem impacts associated with emissions of toxic chemicals are an important aspect for developing more sustainable products and technologies. The related impact pathway is covering the environmental fate of emitted or directly exposing chemicals, human and ecosystem exposure to increased environmental concentrations of these chemicals, the associated toxicity-related effects due to chemical exposure in different environmental compartments, and finally the translation of these effects into damages on human health and ecosystem quality (see Figure 3).

77. The impact pathways for both human toxicity and ecotoxicity are consistently built from a set of multiplicative factors including (a) a fate factor accounting for the distribution and transformation of chemicals in the environment, (b) an exposure factor relating environmental concentrations of chemicals to human and ecosystem exposures, (c) an effect factor associating potential human toxicity and ecotoxicity effects per unit of chemical exposure, and (d) a damage factor relating toxicity effects

[4] Rosenbaum, R.K., Bachmann, T.M., Gold, L.S., et al., 2008. USEtox - The UNEP-SETAC toxicity model: Recommended characterisation factors for human toxicity and freshwater ecotoxicity in life cycle impact assessment. Int J LCA 13, 532-546, https://doi.org/10.1007/s11367-008-0038-4

[5] UNEP, 2019. Global Guidance on Environmental Life Cycle Impact Assessment Indicators: Volume 2. https://lifecycleinitiative.org/training-resources/global-guidance-for-life-cycle-impact-assessment-indicators-volume-2/

to damage on human health and ecosystem quality. Chemicals thereby refer to organic chemical substances and metallic elements that exist in various chemical forms.

78. Users should combine the emission inventory and any relevant direct-exposure flows with characterization factors from an appropriate LCIA method, ensuring consistency in substance identity, emission compartment, geographic and temporal scope, units and system boundaries. Human-toxicity and ecotoxicity results should first be reported separately, with significant contributing substances, processes and life-cycle stages identified. Any subsequent aggregation should be transparent, justified for the decision context and accompanied by data-quality and uncertainty information. Gaps in emission data or characterization factors should be reported as unassessed flows rather than treated as zero impact.

79. Methodological priorities for strengthening impact-based assessment and aggregation are consolidated in section 5.1.1.

80. Table 1 summarizes how the three assessment levels differ in scope, metrics, data requirements, decision uses and limitations.

Table 1. Possible system boundaries and levels of application in different Chemical Footprint approaches.

Approach →	Usage-based	Emission-based	Impact-based
Level of application	Product, process, organization	Product, process, organization	Product, process, organization
System boundaries	Gate-to-gate, cradle-to-gate	Gate-to-gate, cradle-to-gate, cradle-to-grave	Gate-to-gate, cradle-to-gate, cradle-to-grave
What is assessed	Quantities of chemicals used; + optionally chemical hazard classes (e.g. SVHC, PFAS)	Emissions to air, water and soil + hazard classification of emitted substances	Potential impacts (e.g. human toxicity, ecotoxicity); aggregation across substances and life cycle stages
Resulting metrics (examples)	kg chemicals used; kg substances of concern; both assessed per functional unit or per organization	kg emissions per compartment and chemical; kg emissions of substances of concern per chemical	Impact indicators (e.g. impact scores expressed as comparative toxic units per functional unit, separately for human toxicity and ecotoxicity impacts)
Typical use cases	Screening, usage prioritization, supply chain transparency	Emission hotspot analysis, environmental performance tracking, reporting, supply chain transparency	Product comparison, impact hotspot analysis, decision-making, ESG reporting, chemical **footprinting**
Data sources	Procurement data, SAP, SDS, internal inventories, supplier disclosures	Emission monitoring data, PRTR, models, mass balances, LCI databases	LCA characterization models (e.g. USEtox), LCA databases, combined with emission inventories
Target audience	EHS teams, procurement, supply chain, product stewardship	EHS teams, sustainability, operations, environmental reporting	Sustainability, strategy, reporting, R&D, product development
Decision relevance	Screening / operational	Operational / performance tracking	Strategic / external reporting
Key limitations	No link to emissions or impacts; incomplete inventories; classification challenges	Limited monitoring data; reliance on models; high uncertainty for supply chain and use-stage emissions	Data gaps, model uncertainty, high complexity, limited substance coverage

4.2 Key challenges across ChF approaches

81. The application of ChF approaches across all levels is subject to several key challenges:

- **Data availability and completeness**: Comprehensive data on chemical use, emissions and life cycle flows are often incomplete, particularly across complex and global supply chains.
- **Chemical identification and classification**: The classification of chemicals according to hazard or regulatory categories (e.g. SVHC, CMR, PFAS, endocrine disruptors) can be challenging due to evolving definitions, inconsistent datasets and limited substance-level information.

- **Hazard and toxicity data gaps:** Robust data on persistence, bioaccumulation, toxicity and other hazard properties are not available for all substances, limiting consistent classification and impact assessment beyond chemicals where such information is available already.
- **Emission data limitations:** Emissions are not systematically monitored for all substances or processes. Assessments often rely on estimation approaches (e.g. mass balances, emission factors, models), which introduce uncertainty.
- **Supply chain and use-stage uncertainty:** Data on upstream and downstream processes, including product use and end-of-life stages, are often limited and require assumptions or generic data.
- **Methodological complexity and resource requirements:** The effort, expertise and data requirements increase significantly from use-based to impact-based approaches, which may limit applicability for some users.
- **Uncertainty and interpretation:** Results are subject to uncertainty and should be interpreted in light of assumptions, data gaps, system boundaries and methodological choices.

4.3 Use of qualifiers in ChF approaches

82. ChF approaches may operate at different levels of methodological maturity and data availability. Where assessments quantify potential toxicity impacts through characterization methods combined with usage and emission information, the resulting metric can be referred to as a "Chemical Footprint". However, where assessments are limited to chemical usage data or chemical emission estimates and do not quantify potential impacts, the use of a qualifier is needed to clearly communicate the scope of the assessment.

Examples include:

- Chemical Usage assessment: based on the quantity of chemicals used.
- Chemical Emission assessment: based on the quantity of chemicals emitted or released.
- Chemical Footprint: based on the quantification of potential toxicity impacts associated with chemical usage and emissions.

83. The use of qualifiers improves transparency, comparability and interpretation of results, particularly when comparing approaches with different levels of methodological comprehensiveness, while restricting the use of the term “chemical footprint” to reflect **impact-level results** that include a consistent combination of all relevant components from chemical usage of chemicals in products and along product life cycles, translation of usage into emissions into the various indoor and outdoor environments, translation of emissions and direct exposures into potential human toxicity and ecotoxicity impacts across exposure pathways and effects, and appropriately aggregating results across life cycle stages, impact pathways and chemicals, depending on the defined scope of an assessment.

4.4 Data considerations

84. Relevant data and metrics should be selected according to the goal and scope of the assessment, the selected level of assessment, and the availability and quality of data. Users should, where appropriate, build on existing data sources and management systems before establishing new data collection processes.

85. Relevant data may include:

- Chemical inventories and substance identification information;
- Procurement records, production data and information on chemical use;
- Safety data sheets (SDS), supplier declarations and product composition information;
- PRTR or other emissions reporting data, monitoring data and mass-balance estimates; and
- Toxicity, ecotoxicity, fate and exposure-related data, for impact-based assessment.

86. Unknown or unassessed chemicals should not automatically be treated as having no potential impacts. Where chemical identity, hazard classification or usage information is incomplete, users should document such data gaps and, where relevant, track them as a separate category for further information gathering and improvement.

87. ChF results should be accompanied by information on data quality and data maturity, distinguishing where appropriate between primary data, supplier-reported data, secondary data, estimated data and unknown or unassessed data. This can support appropriate interpretation of results and progressive improvement.

88. Where ChF approaches are applied at organizational level, quantitative use-, emission- and impact-based metrics may be complemented by information on relevant management practices, such as inventory coverage, substance identification rates, supplier information coverage, assessment coverage, progress in substitution or risk education, internal review processes and follow-up actions.

89. To support standardization of data collection and reporting practices, as well as transparency and comparability, users should document the scope, coverage, assumptions, data sources, reporting period, units and limitations of the data and metrics used. Data collection and reporting practices should, where possible, use consistent definitions, units and formats, and should be aligned with existing reporting systems to avoid unnecessary duplication.

4.5 Structuring Industry Action around Chemical Footprint commitments

90. This part of the document sets out a framework for promoting voluntary, business-led action to reduce the harm from chemicals generated by industry through chemical footprint approaches. It translates a set of cross-sector commitments developed during a year-long stakeholder consultation for the chemicals value chain into a short, practical case for action, and sets out the conditions needed for the private sector, of every size and whether acting as manufacturers, upstream suppliers or

downstream users of chemicals, to adopt them with confidence. It draws on, and should be read alongside, related work under the GFC, including on finance and on reporting standards and frameworks.

4.5.1 Why business commitments matter

91. Chemical emissions and toxicity arise from the activities of both businesses and governments, and the industrial sector plays a significant role. As with other high-impact sectors, the scale of the challenge means regulation alone is not enough to deliver the pace of change required to fulfill the Global Framework on Chemicals objectives and targets. In this area, progress depends on manufacturers and other upstream and downstream users choosing to act ahead of, and alongside, government mandates, rather than waiting for them.

92. There can be a business case for industry involvement as well as an environmental one. Companies that reduce their use of toxic chemicals have reported lower operating and raw-material costs (Massey, 2011; TURI, 2026). From a strategic perspective, switching to safer alternatives can lead to economic benefits due to increased reputation and access to more demanding markets, as demand for safer chemistry grows faster than the conventional chemicals market (Trucost, 2015; UNEP, 2019). Investors are also asking chemical companies to disclose and reduce hazardous chemicals, so progress can strengthen investor trust and access to finance (ChemSec, 2026). These benefits vary case by case: substituting one substance with another can be expensive and time-consuming (OECD, 2023), and payback needs to be confirmed over time. When the private sector has as a core strategy the goal to achieve a chemical footprint reduction, rather than a mere regulatory compliance exercise, it is best placed to capture these benefits and to meet rising expectations from the communities in which they operate.

93. Nevertheless, as ambition alone is not enough, the private sector needs a realistic, actionable framework and a shared understanding of what a credible commitment looks like. That is the purpose of this section.

4.5.2 Key pillars for action

94. **Governance and leadership.** Chemical footprint commitments require robust governance to be effective. Ideally, the board (or senior management) should review its chemicals-management strategy and progress at least annually, informed by internal organizational functions (environment, health and safety, sustainability, procurement and research and development). When chemical footprint performance is embedded in this way, it signals that it is part of the private sector's core strategy, not a peripheral initiative.

95. **Data and standards as enablers.** Using recognized standards associated with the concept of footprints (e.g. ISO 14040:2006 and ISO 14044:2006 for life cycle assessment, and ISO 14026:2017 for footprint communication) and generating reliable science-based data are two critical components for measuring chemical footprint progress, as they are for other sustainability goals. The availability and accessibility of scientifically substantiated data on the properties of chemical substances, particularly characterization factors, is a key factor in the implementability of the chemical footprint in industry. The private sector needs a consistent approach

to conduct chemical inventories and define system boundaries to make credible claims to regulatory bodies and external stakeholders, and to apply internationally recognized or equivalent reporting standards to disclosures of chemical usage, chemical emissions and chemical footprint (GFC Target D3), drawing on the work of the GFC reporting standards and frameworks workstream. Further, independent standards for verification of chemical footprint data build the confidence that markets, regulators and civil society need to trust the numbers. Internationally harmonized guidance on data accuracy, practical information exchange and verification in relation to the chemical footprint approach should be developed, particularly in consideration of SMEs and companies in developing countries.

96. **Supply chain engagement.** In calculating chemical usage, chemical emissions and chemical footprint, the private sector engages different actors along the value chain. Large organizations typically have more mature systems for defining what they expect from suppliers, including chemical and component manufacturers, than smaller firms further down the chain. Beginning with Tier 1 suppliers and extending progressively to priority Tier 2 suppliers, the private sector should engage with and progressively request composition and hazard data from suppliers and support suppliers, through training proportionate to their size and capacity, to build their own chemical footprint reporting capability. Where a private sector entity is itself a downstream user of chemicals supplied by others, the same expectations apply in reverse: it passes equivalent composition, hazard and usage information down the value chain to its own customers. Shared training resources, delivered by industry associations or common chemical management training programmes, avoid duplicating effort and extend capability faster than any single private sector entity, manufacturer or user could alone.

97. **Transparency and verification.** Reporting progress in implementing the chemical footprint approach, covering approach, scope, data sources and results, is the foundation of trust. Reporting is inextricably linked with independent verification and should consider the private sector entity's size and sector. It helps turn a public commitment into a credible one. In cases where full disclosure of a chemical footprint compromises confidential business information, a viable alternative is to present it as aggregated chemical footprint reports per industrial sector. Where results are used to support public comparative or marketing claims, independent (third-party) review is required, by analogy with ISO 14044 requirements for comparative assertions disclosed to the public and with environmental product declaration (EPD) schemes.

98. **Financing and collaboration.** Chemical footprint performance is beginning to be considered in the investment decision-making process. Reporting chemical footprint, chemical usage and emissions results using corporate sustainability reporting frameworks that already apply to the private sector gives investors and lenders a consistent basis for comparison and can help green financing reward verifiable progress rather than good intentions.

99. In addition, engaging in sector-wide collaboration in developing harmonized technical methodologies for reporting specific data spreads the cost of getting sound data and gives smaller companies a credible starting point for calculating chemical

usage, emissions and chemical footprint that they could not build alone. In this case, progress at systemic level comes from sharing infrastructure, costs and accountability.

100. **Scalability for business.** Guidance for setting commitments on chemical footprinting that only works for the largest parts of the private sector will not deliver systemic change. Commitments should be voluntary and applied in a proportionate manner according to each entity's scale, capacity and maturity, considering as well whether the entity is a manufacturer, an upstream supplier or a downstream user of chemicals. A simple maturity reference, set out in Figure 4 below, gives every business, whatever its starting point, a clear next step.

101. A private sector entity's progress may be referenced against the maturity levels shown in Figure 4, corresponding broadly to the progression from chemical usage, through chemical emissions, to potential chemical footprint impact assessment. Entities progress through these levels at a pace proportionate to their size, capacity and role in the value chain; smaller entities may remain at earlier levels for longer.

Introduction	Foundation	Expansion	Integration	Advanced
Entity-level policy	Product-level chemical inventory and usage tracking (baseline set)	Entity-wide chemical usage targets for priority chemicals of concern	Value-chain usage, emissions and impact	Value-chain-wide targets, framework-reported, evidenced by safer and sustainable chemistry progress

Figure 4. Company maturity levels in the context of Chemical Footprint assessments.

4.5.3 Six-Step process to define commitments

102. The following six-step process translates these pillars into implementable commitments. The model commitments in Annex C provide optional wording for organizations and sectors.

103. Step 1. Define goal and scope (Start with the “why”)

What to do

- Define the **objective** of the assessment (e.g. internal prioritization, ESG reporting, product comparison)
- Identify the **target audience** (e.g. EHS, management, external reporting)
- Select the **assessment components** (usage assessment, emissions assessment, assessment of potential impacts)
- Define the **system boundary** (e.g. site, product, supply chain; gate-to-gate or cradle-to-grave)
- Select **chemical scope** (e.g. all chemicals, chemicals of concern, specific categories such as SVHC, PFAS)

104. Key questions

- What decision should this assessment inform?
- What level of detail is required?
- What data are available today?

105. **Practical tip**: Start with a **limited scope (e.g. one site, product or chemical category)** and expand over time. Table 1 provides a reminder of the different Chemical Footprint approaches and levels of application.

106. Step 2. Build the chemical inventory (Get the data)

107. What to do

- Compile **chemical usage data** (e.g. procurement, SAP, SDS, internal inventories)
- Identify and classify chemicals (e.g. SVHC, CMR, hazard classes)
- Collect or estimate **emissions data** (e.g. monitoring data, PRTR, models, mass balances)

108. Key questions

- Where are chemical data stored internally?
- Are inventories complete and consistent across sites?
- Which chemicals can be classified using available data?

109. **Practical tip**: Leverage **existing systems (EHS, procurement, ERA data)** rather than creating new data streams, while documenting data gaps, assumptions and limitations.

110. Step 3. Quantify and calculate indicators (Apply the method)

111. What to do

- Calculate selected metrics depending on the approach:
- Usage-based: e.g. kg chemicals or kg substances of concern per functional unit
- Emission-based: e.g. kg emissions per compartment
- Impact-based: apply characterization models
- Apply proxies or estimation methods where data gaps exist

112. Key questions

- Which metrics are most relevant to the objective?
- Where are data gaps and how can they be addressed pragmatically?

113. Practical tip: Do not wait for perfect data - screening-level estimates are sufficient to start.

114. Step 4. Interpret results (Turn data into insight)

115. What to do

- Identify **hotspots** (chemicals, processes, sites)
- Compare results across products, sites or time (if applicable)
- Assess data quality and uncertainty

116. Key questions

- Which chemicals or processes drive the footprint?
- What actions can be prioritized based on results?
- What are the key uncertainties?

117. **Practical tip**: Interpret results **in line with the level of assessment** (e.g. usage-based = usage prioritization, not impact).

118. Step 5. Define actions, targets and Key Performance Indicator (KPIs) (Act on results)

119. What to do

- Define reduction targets (e.g. reduction of usage, emissions and/or impacts of the overall chemical footprint along one or more product life cycle, or reduction of impacts of specific substances of concern or specific effects, such as cancer effects)
- Establish KPIs aligned with the chosen metrics
- Integrate ChF into:
- EHS management
- procurement criteria
- product development

120. Key questions

- What is a meaningful and achievable target?
- How will progress be tracked over time?
- Who is accountable within the organization?
- Do the selected indicators appropriately reflect the areas the organisation wishes to improve?

121. Examples of KPIs

- % reduction in Substances of Very High Concern (SVHC) use
- kg emissions per unit product
- reduction in impact indicator over time

122. Step 6. Integrate and scale (Move from pilot to system)

123. What to do

- Expand scope from pilot (site/product) to broader portfolio
- Integrate into **existing business processes** (reporting, procurement, R&D)
- Align with **external reporting requirements** (e.g. ESG, Corporate Sustainability Reporting Directive-CSRD)

124. Key questions

- How can this be embedded into existing workflows?
- What level of standardization is needed across sites or regions?

125. **Practical tip:** Position ChF as an **extension of existing systems**, not a standalone exercise.

4.5.4 Guiding Principles for Chemical Footprint Commitments

- Industry commitments should aim to translate broad chemical footprint ambitions into measurable, time-bound corporate actions, following key principles such as:
- **Clear scope:** precise definition of the area of application.
- **Measurable and time-bound:** establishment of specific metrics and timelines.
- **Ambitious:** seeking significant improvements beyond minimum compliance.
- **Alignment with the GFC:** coherence with the GFC's strategic objectives and targets.
- **Governance:** clear management structures.
- **Supplier education:** promoting awareness and best practices within the supply chain.
- **Transparency:** open communication regarding progress and challenges.
- **Constructive accountability:** encouraging peer benchmarking to create accountability and accelerate convergence toward common standards, as linked to GFC Target D6.

4.5.5 Aligning ChF commitments with GFC targets

126. Private-sector commitments on ChF derive their credibility and systemic impact from explicit alignment with the GFC. Firms should map every commitment -whether

covering governance, chemical usage, emissions quantification, or toxicity impact assessment- directly to the relevant GFC targets, in particular Target A3 (minimizing adverse effects across the life cycle), Target B3 (generating and publicizing data on the production of chemicals), Target D4 (substitution of chemicals of concern with safer alternatives), and Target D6 (sector-level strategies).

127. This alignment requires that the scope, metrics, and timelines embedded in corporate commitments reflect the GFC's underlying principles: ambition beyond compliance, transparency, life-cycle thinking, and the progressive integration of science-based methodologies. Commitments should explicitly link reduction targets - expressed in terms of chemical usage, emissions, and potential toxicity impact- to the GFC's overarching vision of **"a planet free of harm from chemicals and waste."**

128. Key success factors for Chemical Footprint commitments

- Start simple and build progressively
- Use existing data and systems
- Ensure clear ownership and accountability
- Align with business objectives and reporting needs
- Be transparent about data gaps and limitations

129. Positive change can be measured at every level — substance used, substance in product, substance released in use, substance emitted across the life cycle. Each level offers a different, complementary view; the right level depends on the question asked, and the transition being tracked. Taken together, they produce a chemical footprint comparable across products, processes and reporting cycles.

5 Roadmap for Action

130. This initial (“Version 0”) Guidance for the application of Chemical Footprint approaches in Industry is provided to foster the implementation of ChF in industry in support of the objectives and targets of the GFC. In the near term (2027-2028), the priority should be to apply the Guidance and collect written comments and edits from industry and stakeholders towards delivering a “road-tested guidance” (Version 1) by 2028.

131. In addition to the necessary dissemination, pilot-testing and improvement of the guidance, additional important action in the coming years include promotion of sectoral commitments (e.g. in the context of the GFC Implementation Programmes), as well as the standardisation of ChF assessments and their integration into other sustainable management instruments.

5.1 Dissemination, Pilot-testing and Evaluation

132. Initial efforts following the publication of this Guidance should include wide dissemination of Chemical Footprint approaches to explain the concepts, invite

feedback and identify initial pilot applications. See e.g. the initial webinars posted in the IOMC webpage on Chemical Footprint approaches.[6]

133. Pilot applications should be used to assess feasibility, data requirements, methodological issues and capacity-building needs. They may also generate practical examples, case studies, assessment templates and mappings to existing initiatives or frameworks. Lessons learned may inform future revisions of the guidance and, where relevant, methodological alignment and standardization discussions, including relevant ISO processes.

134. Evaluation should assess the practicality, clarity and usefulness of the guidance for different sectors and users. This includes examining whether the proposed approaches can be applied with available data, capacities and resources, and whether the results can support chemical management, risk reduction, reporting and continuous improvement.

135. Stakeholder feedback may help identify issues requiring further consideration, including data availability, data quality, methodological choices, resource needs, interpretation of results, reporting issues and capacity-building needs. Where possible, feedback can be collected through existing processes, pilot reports, webinars, surveys or stakeholder consultations, rather than through new reporting requirements.

136. Findings from pilot-testing and evaluation should inform future revisions of the guidance, as appropriate. In reviewing the guidance, consideration may also be given to relevant scientific and methodological developments, including improvements in toxicity and ecotoxicity data, characterization factors, modelling approaches, exposure-related information and internationally recognized assessment methods. Monitoring and evaluation should contribute to the progressive improvement of the guidance, while avoiding unnecessary reporting burdens for participating organizations.

137. Pilot-testing this Guidance on industries with a high ChF is essential for translating it into actionable strategies. These pilot projects could focus on sectors such as textiles, electronics, plastics, pharmaceuticals and healthcare, automotive, among others, which are known for their significant chemical usage and potential environmental impacts. By creating these demonstrative initiatives, organizations can showcase effective practices in chemical management and provide valuable insights for broader adoption across various industries.

138. The significance of these pilot projects extends beyond merely highlighting best practices; they can also be integrated into larger frameworks and funding mechanisms, such as the Special Program on the Management of Chemicals and Waste. These initiatives offer critical support and resources that can facilitate the scaling of successful pilot projects. Additionally, funding from the Global Environment Facility (GEF) and alignment with the GFC can provide the necessary financial backing and strategic direction to enhance the effectiveness of these initiatives.

[6] https://iomcwebinars.org/chemical-footprint-approaches/

139. Each pilot program must be designed with a clear and specific scope, focusing on key aspects of the ChF, such as usage, emissions, and potential impacts. By initially targeting the chemical usage aspect, these programs can create accessible entry points for companies to engage with the methodology, gradually progressing towards a more comprehensive evaluation of their overall chemical impacts.

140. Moreover, the integration of the guiding principles for industry commitments (section 4.5) into these pilot projects is vital. These principles emphasize the importance of ambitious commitments, transparency, and robust governance, ensuring that pilot programs not only demonstrate effective practices but also foster accountability and continuous improvement. Establishing SMART (Specific, Measurable, Achievable, Relevant, Time-bound) objectives within each pilot will allow for precise tracking of progress and outcomes, facilitating adjustments and enhancements as needed.

141. Developing sector-specific roadmaps with measurable reduction targets for chemical usage, emissions, and potential toxicity impacts in the near-term (e.g. 2-4 years) is another critical component of these pilot projects (see 5.2). Collaboration with industry associations will be essential in creating relevant and harmonized methodologies, reporting templates, and best practices, thereby promoting widespread adoption of chemical footprint metrics across sectors.

142. Engaging in the Implementation Programmes of the GFC and collaborative efforts focused on chemicals and waste management can further strengthen the impact of these pilot projects/programs. Such collaborations can foster shared learning and innovation, enabling industries to benefit from each other's experiences and successes in prevention or minimizing their ChF. By working together through these partnerships, companies can leverage collective expertise and resources to address common challenges and drive progress towards sustainability.

143. Ultimately, by demonstrating effective chemical management strategies and aligning with global initiatives, these pilots can provide valuable insights and frameworks that can be adopted by a wider range of industries. This proactive approach not only enhances the credibility of private-sector commitments but also contributes to the overarching goals of the GFC, ensuring a more sustainable future for chemical management on a global scale.

5.1.1 Priorities for Version 1 of the Industry Guidance on Chemical Footprint

144. Pilot-testing and stakeholder feedback during 2027-2028 should be used to resolve the methodological gaps identified in Version 0 and to support preparation of a road-tested Version 1 by 2028. Priority development work should address at least the following areas:

- **Goal and scope definition.** Define minimum requirements for decision objectives, objects of assessment, organizational and product-system boundaries, reporting periods, functional units, chemical scope, cut-off criteria, allocation procedures and documentation of exclusions.
- **Chemical usage inventories.** Develop practical procedures and templates for compiling chemical quantities from procurement records, production

systems, safety data sheets and supplier information; identifying substances consistently; applying hazard or regulatory classifications where relevant; normalizing results; and documenting inventory coverage and data quality.

- **Translation of chemical use into emissions and direct exposure.** Provide guidance on selecting and applying measured data, mass balances, process-specific emission factors and documented models to estimate releases to air, water and soil and direct exposure where applicable. Guidance should distinguish substances, life-cycle stages and receiving compartments and record whether data are measured, supplier-reported, modelled or estimated.
- **Impact characterization and method selection.** Identify appropriate life cycle impact assessment methods, data sources and characterization factors for translating emissions and direct-exposure flows into potential human-toxicity and ecotoxicity impacts, with consistent treatment of substance identity, emission compartment, geographic and temporal scope, units and system boundaries.
- **Treatment of data gaps and uncertainty.** Establish transparent procedures for missing chemical identities, emission data and characterization factors. Unknown or unassessed flows should be reported separately rather than treated as zero impact. Version 1 should define proportionate data-quality indicators, uncertainty reporting and minimum coverage expectations for different decision contexts.
- **Aggregation and interpretation.** Clarify when and how results may be aggregated across substances, life-cycle stages and impact pathways; how human-toxicity and ecotoxicity results should remain separately traceable; and under what conditions an impact-based result may be described as a Chemical Footprint. Aggregation choices should be justified by the decision context and should not obscure significant contributors or unassessed flows.
- **Decision use, comparability and communication.** Define the decisions that usage-, emission- and impact-based results can appropriately support, including hotspot identification, target setting, substitution, product comparison and reporting. Requirements for comparative claims, benchmarking, confidentiality, verification and communication should be aligned with relevant LCA and footprint standards, including ISO 14040, ISO 14044 and ISO 14026.
- **Interoperability and practical implementation.** Improve interoperability with Life Cycle Assessment, Product Environmental Footprint, USEtox, ProScale, Safe and Sustainable by Design and relevant chemicals-management and reporting systems. Pilot applications should produce reusable templates, worked examples and sector-specific recommendations, while testing feasibility for SMEs and organizations with different levels of data maturity.

145. Progress against these priorities should be reviewed through a transparent process that records methodological decisions, evidence from pilots, unresolved issues and proposed changes. Version 1 should distinguish minimum requirements from recommended good practice and should remain proportionate to the intended use of results, organizational capacity and data maturity.

5.2 Promotion of sectoral commitments and roadmaps in ChF

146. Translating broad ChF ambitions into sector-specific action requires deliberate, coordinated strategies that reflect the operational realities and data maturity of each industry. Industry associations play a central role in this process. They should convene member firms to develop harmonized, sector-level chemical footprint methodologies, establish shared reporting templates aligned with the GFC ChF definitions (GFC, 2026), and engage in public policy advocacy to shape sector-wide standards for best practices. These actions can strengthen consistency within sectors and support international coordination in chemical-footprint practice.

147. The design and content of sector-specific roadmaps are set out below under 'Sectoral roadmaps and implementation'.

148. Incentive structures are also vital to encourage companies to adopt these metrics. Formal recognition programs for firms that demonstrate leadership in their chemical footprint initiatives -such as the ZDHC initiative in textiles and the RBA CMLP in electronics- can significantly reinforce the uptake of chemical footprint metrics. Such recognition not only motivates individual companies but also sets benchmarks for others to follow, fostering a culture of accountability and continuous improvement within industries.

149. Furthermore, private-sector commitments gain credibility when they explicitly align with the GFC targets. This alignment is particularly important for Targets D3, which focuses on measurement and reporting, and D6, which addresses sector-level strategies. By mapping their commitments to these targets, companies can ensure that their efforts contribute to broader environmental goals and demonstrate their commitment to sustainable practices.

150. It is crucial for the industry to provide reports at appropriate intervals, which may vary depending on the specific sector and the extent of their ChF, such as annually, biennially, or every three years. This approach aligns with the objectives and targets outlined in the GFC, ensuring that companies can effectively measure and communicate their progress toward reducing chemical impacts while remaining responsive to evolving standards and practices within their sectors. It is important to recognize that alignment with the GFC is not a one-time effort; rather, it is a dynamic obligation. Companies must engage in continuous review processes, provide progress reports, and recalibrate their commitments as global standards evolve. This proactive approach not only enhances the effectiveness of their initiatives but also ensures that they remain relevant and responsive to emerging challenges and opportunities in the field of chemical management.

151. Sector-specific roadmaps should designate clear milestone years, e.g. aligned with future International Conferences of the GFC, with measurable reduction targets

expressed across the three ChF elements: chemical usage, chemical emissions, and potential toxicity impact. Commitments should align with each sector's current tools and data availability.

152. The practical takeaway messages for the GFC Implementation Programme 2 include:

- **Establish clear roadmaps:** define measurable reduction targets for chemical usage, emissions, and toxicity impact, with specific milestones for 2028 and 2030.
- **Align with GFC objectives:** ensure all private sector commitments are directly linked to relevant Global Framework on Chemicals (GFC) targets, especially D3 and D6.
- **Promote harmonized standards:** industry associations along with international organizations should lead the development of harmonized ChF methodologies and reporting templates, e.g. in the context of the ISO process.
- **Recognize leadership:** document and formally recognize companies demonstrating leadership in adopting ChF metrics to encourage replication and continuous improvement.
- **Implement continuous review:** establish a structured review process to update commitments as methodologies and data availability evolve, ensuring dynamic alignment with global standards.

5.3 Future Outlook of application of ChF

153. **Standardization and regulatory integration:** It is anticipated that a growing number of countries and regions will establish ChF assessment standards and technical specifications, including via ISO, thereby promoting international harmonization of ChF evaluation methodologies and supporting future integration into regulatory and policy frameworks. Also, this will support alignment with regulatory and policy frameworks while maintaining its role as a voluntary approach.

154. **Decision-making, risk prioritization and substitution**: ChF approaches are expected to increasingly support decision-making within organizations by enabling the identification and prioritization of chemicals, processes or products contributing most significantly to potential impacts. This can inform risk management strategies, guide the substitution of chemicals of concern, and support the development and adoption of safer and more sustainable alternatives. In this context, ChF can complement existing regulatory and scientific assessment frameworks by providing a system-level perspective across products and value chains.

155. **Integration into sustainability reporting and Environmental, Social and Governance (ESG) frameworks:** Chemical footprinting is likely to become an important component of sustainability reporting and disclosure frameworks (e.g. Corporate Sustainability Reporting Directive-CSRD), supporting transparency on chemical use, emissions and associated impacts. Standardized ChF metrics may

enable companies to track performance over time, benchmark against peers, and communicate progress toward reducing chemical-related environmental and health impacts. This will require continued efforts to harmonize methodologies and ensure data comparability and robustness.

156. **Sustainable procurement and supply chain transparency:** ChF approaches can support more informed procurement decisions by enabling the evaluation of chemical-related impacts across supply chains. This may drive increased transparency, traceability and engagement with suppliers, particularly in identifying and reducing the use and emission of chemicals of concern.

157. **Collaboration:** Methodological interoperability and collaboration: Future work should improve the interoperability of ChF approaches with LCA and environmental-footprint standards and with relevant chemicals-management and safe-and-sustainable-design frameworks. This should focus on consistent system boundaries, data exchange, impact characterization and communication requirements, while avoiding double counting. Examples of relevant methods, standards and initiatives are summarized in Annex A.

158. **Digitalization:** By leveraging technologies such as the Internet of Things and blockchain, enterprises will establish intelligent ChF management platforms to enable the monitoring and traceability of the production, use, and emission of chemicals, including chemicals of concern.

159. **Cross-sector application and continuous improvement:** Through pilot project experiences across multiple industries, ChF approaches will be continuously improved to enhance their applicability.

Annex A: Existing Initiatives that may provide relevant reference points for ChF measurement and management

Initiative	(a) Usage quantification	(b) Emission quantification	(c) Impact quantification	(d) Full integration into ChF metrics	Sectors covered	Factors / parameters	Chemicals covered	Links — websites & reports	Data status	Industry relevance
Cradle to Cradle Certified ®	—	—	Material safety is assessed as one of five certification categories.	Circular product design and material safety across 5 categories.	Broad product sectors.	Material health; circularity and other certification criteria.	Chemicals/materials evaluated under the certification's Material Health framework.	C2CPII	Certification assessment data.	C2CPII
Chemical Footprint Project (CFP)	Measures chemical use in products and operations.	—	Addresses chemicals of concern through chemical management assessment.	Measurement and disclosure of chemicals of concern in products and operations.	Cross-industry; used by companies, brands and investors.	Chemicals of concern; chemical management practices; substitution/ progress indicators.	Chemicals of concern.	Clean Production Action	Self-assessment / company-reported data.	Clean Production Action
Safer Chemistry Profile	Uses chemical usage information within a defined scope.	—	Quantifies the distribution of chemical hazards (high, low, and unknown).	Standardized metric for reporting progress toward safer chemistry.	Beauty & Personal Care; Apparel; Electronics; and other sectors.	Chemical hazard classifications; high/low/unknown hazard distribution; chemical usage information.	Chemicals assessed through hazard classifications.	ChemFORWARD	Aggregated data from multiple brands used for industry insights.	ChemFORWARD
UNEP/SETAC USEtox®	Quantifies chemical emissions in the near-field	Characterizes impacts associated with	Toxicity characterization factors for human toxicity	Used within LCA, PEF, chemical substitution,	Broad; applicable in LCA and environme	Toxicity characterization factors; human	Substances for which characterizatio	https://usetox.org	Model/database data; recommended/used in multiple	

Initiative	(a) Usage quantification	(b) Emission quantification	(c) Impact quantification	(d) Full integration into ChF metrics	Sectors covered	Factors / parameters	Chemicals covered	Links — websites & reports	Data status	Industry relevance
	environment from product applications.	environmental emissions into indoor and outdoor environments and with chemicals in more than 500 product applications.	and ecotoxicity, separated by exposed populations.	SSbD and chemical prioritization assessments.	ntal footprint studies.	toxicity; ecotoxicity.	n factors are available.		assessment frameworks.	UNEP / SETAC; endorsed by the UNEP Life Cycle Initiative, applied by various companies around the world for LCA, environmental footprinting and chemical footprinting, chemical substitution and risk screening, and by governments for chemical prioritization.
ProScale	Quantifies chemical usage through LCI	Focuses on direct (near-field) exposure to workers,	Combines a Hazard Factor	Designed to complement	Chemical manufacturing (BASF case	Hazard Factor (HF) from CLP hazard	Any chemical with REACH/CLP classification	proscale.org Method document (v2b)	Hazard data: Public (REACH/CLP	Complements LCA-based toxicity assessment by

Initiative	(a) Usage quantification	(b) Emission quantification	(c) Impact quantification	(d) Full integration into ChF metrics	Sectors covered	Factors / parameters	Chemicals covered	Links — websites & reports	Data status	Industry relevance
	data per unit process. Chemical inputs linked to a functional unit and allocated across life cycle stages. A Person-Hours Factor (PHF) captures the number of persons exposed and duration of exposure.	professionals and consumers rather than far-field environmental emissions. Exposure modelled through REACH use scenario categories. ProScaleE (in development) will address aggregated ecotoxicity from environmental releases.	(HF) from REACH/CLP hazard classifications (H-statements) assigned to hazard bands with an exposure factor to produce a dimensionless ProScale Score (PSS) per substance and unit process. Scores aggregated across the life cycle. ProScale-H operational; ProScaleE under development.	LCA toxicity indicators (e.g. USEtox) by adding near-field exposure that standard LCIA often underrepresents. When combined with USEtox, contributes to a more complete chemical footprint assessment (CFA). ProScaleE will enable fuller integration into aggregated ChF metrics.	studies); utility poles / electricity infrastructure (wood, concrete, steel, composite); building materials; indoor wall paint; polymer and resin systems. Applicable to any product system with an LCA framework.	bands; exposure factor from REACH use descriptors + Person-Hours Factor (PHF); functional unit; life cycle stage allocation; aggregation across unit processes.	(H-statements). Includes preservatives (creosote, copper-based), coatings, binders, corrosion inhibitors, resins, monomers, solvents. In silico screening for unclassified substances (in development).	Case study: Utility poles Case study: BASF / Mistra SafeChem Cefic case study	classifications from ECHA). Methodology & web tool: Public (freely distributed; web tool for consortium members). Company-specific formulations: Often confidential (trade secrets); ProScale works with aggregated/banded data. In silico hazard screening: Work in progress (Mistra SafeChem).	capturing near-field exposure; supports more complete chemical footprint assessment when combined with USEtox.
QSAR Toolbox	—	—	Predicts chemical properties and toxicity using structure-	Supports hazard assessment where	Broad chemical/product sectors.	Chemical structure; predicted properties and toxicity.	Chemicals amenable to QSAR/read-across assessment.	ECHA / OECD	Model-based predictions; useful where empirical data are unavailable.	ECHA / OECD

Initiative	(a) Usage quantification	(b) Emission quantification	(c) Impact quantification	(d) Full integration into ChF metrics	Sectors covered	Factors / parameters	Chemicals covered	Links — websites & reports	Data status	Industry relevance
			activity relationships.	empirical toxicity data are unavailable.						
eChemPortal	—	—	Provides access to chemical hazard information from linked databases.	Reference data source supporting chemical hazard assessment and prioritization.	Broad chemical sectors.	Hazard properties and classifications from linked databases.	Chemicals covered by participating databases.	OECD + partners	Global portal linking 35+ national chemical hazard databases.	OECD + partners
ZDHC (Zero Discharge of Hazardous Chemicals)	Tracks chemical use and chemical management in relevant supply chains.	Focuses on eliminating hazardous chemical releases/discharges.	Addresses hazardous chemicals through chemical management requirements.	Supply-chain chemical management framework for hazardous chemical elimination.	Textile, apparel, leather and footwear supply chains.	Hazardous chemicals; chemical inputs; supply-chain compliance and traceability.	Hazardous chemicals covered by ZDHC requirements.	ZDHC	Supply-chain/company data and compliance information.	Multi-stakeholder alliance
WBCSD's Portfolio Sustainability Assessm	Assesses product sustainability performance using quantitative	Includes environmental performance considerations within the	Includes chemical risks among the Signal Categories.	Measurement of product sustainability performance according to	Broad product applications.	8 Signal Categories, including chemical risks, regulatory	Chemical risks within the product sustainability assessment.	WBCSD	Quantitative and qualitative; signal-based framework	WBCSD

Initiative	(a) Usage quantification	(b) Emission quantification	(c) Impact quantification	(d) Full integration into ChF metrics	Sectors covered	Factors / parameters	Chemicals covered	Links — websites & reports	Data status	Industry relevance
ent (PSA)	and qualitative information.	assessment framework.		8 Signal Categories to support strategic and operational decisions.		and social performance .			grounded in LCA.	

Annex B: Chemical Footprint approaches in regulatory frameworks and Multilateral Environmental Agreements (MEAs)

160. Over the past decade, MEAs have progressively shifted toward life-cycle oriented strategies, creating a structural demand for standardized ChF methodologies that support coherence across agreements. Key conventions - covering hazardous waste, persistent pollutants, mercury, ozone-depleting substances, and chemical trade - share common principles of transparency, substitution, and life-cycle control that directly reinforce ChF approaches. Regional frameworks and national regulatory systems, such as the EU's REACH and CLP regulations and Pollutant Release and Transfer Registers (PRTR) protocols, further contribute by generating the harmonized datasets that ChF methodologies require.

Framework	Scope	Relevance for ChF approaches	Key limitations for footprint use
Basel Convention	Hazardous waste transboundary movements and disposal	Waste stream data as input for footprint inventories; life cycle and circularity alignment	Data reported by Parties varies in quality and completeness; limited upstream coverage
Stockholm Convention	Persistent Organic Pollutants (POPs)	Monitoring datasets and listing mechanisms for POP-related footprint calculations	Restricted to listed POPs; emerging chemicals with similar profiles may not yet be covered
Rotterdam Convention	Prior Informed Consent for hazardous chemicals in trade	Trade flow data to enhance accuracy of footprint calculations	Covers only chemicals subject to PIC procedure; informal trade flows not captured
BRS Synergies Process	Coordination across Basel, Rotterdam and Stockholm	Harmonized data infrastructure supporting comparable footprint datasets	Coordination is ongoing; full data harmonization not yet achieved across the three conventions
Minamata Convention	Mercury life cycle management	National mercury inventories as direct inputs for footprint calculations	Scope limited to mercury; artisanal and small-scale mining sector data remains incomplete
Montreal Protocol / Vienna Convention	Ozone-depleting substances and HFCs	Production and consumption data; substitution and life-cycle tracking	Illegal trade and leakage points not fully captured in official reporting

Framework	Scope	Relevance for ChF approaches	Key limitations for footprint use
ISP-CWP	Global science-policy interface on chemicals, waste and pollution	System-wide assessments supporting standardized footprint methodologies	Recently established (2025); methodologies and outputs still under development
Regional Seas Conventions	Marine pollution (Mediterranean, Baltic, North-East Atlantic)	Hazardous substance reduction targets relevant to discharge footprints	Geographic scope limited; data comparability across conventions is uneven
Kyiv Protocol (PRTRs)	Pollutant release and transfer registers	Annual quantitative emissions data for manufacturing and waste sectors	Coverage varies by country; reporting thresholds may exclude smaller emission sources
EU REACH & CLP	Chemical registration, authorization, restriction and labelling	Large datasets on hazardous chemicals and product composition for footprint inputs	Primarily applicable to EU market; SMEs face reporting gaps; data confidentiality limits access

161. The relationship between MEAs and chemical footprint approaches is one of mutual reinforcement: MEAs generate the data and regulatory incentives that drive the adoption of chemical footprint approaches, while chemical footprint approaches provide the consistent methodology that makes compliance with MEAs measurable, comparable and verifiable. This mutual reinforcement rests on four concrete linkages:

- 1. MEAs generate essential data inputs for chemical footprint approaches
- Multilateral Environmental Agreements (MEAs) addressing hazardous waste, persistent organic pollutants, mercury, ozone-depleting substances and international chemical trade may provide relevant complementary information and data to support Chemical Footprint assessments, depending on their scope, availability and applicability. These agreements also contribute to broader efforts to strengthen transparency, traceability and the environmentally sound management of chemicals and waste throughout their life cycles.
- 2. MEAs create regulatory demand for measurement and verification tools
- MEAs create demand for complementary measurement and reporting tools. MEAs establish obligations to control, restrict or phase out specified chemicals and to report relevant production, trade, release or waste information. ChF approaches may complement compliance reporting and policy evaluation by organizing chemical-use, emission and potential-impact information across product life cycles. They do not determine legal compliance and should be applied alongside the agreement-specific monitoring, reporting and verification requirements.

- 3. MEA principles and chemical footprint principles converge on three shared axes
- Both MEAs and chemical footprint approaches are built on the same principles: transparency and traceability of chemical substances, safer substitution of hazardous chemicals, and life cycle management of chemicals and waste. Chemical footprint approaches are the operational instrument that translates these normative principles into measurable results - making visible what substances are present (transparency), enabling comparison between alternatives (substitution), and assessing impacts from production to end-of-life (life-cycle management). This convergence is not coincidental; it reflects a shared policy objective expressed through different instruments.
- 4. MEAs act as catalysts for large-scale chemical substitution - the Montreal Protocol's transition from CFCs to HCFCs and low-GWP alternatives, the Stockholm Convention's phase-out of POPs, the Minamata Convention's pressure on mercury-intensive sectors. Chemical footprint approaches support this evolution by allowing stakeholders to assess the the potential environmental impact of a substance and its proposed substitute before a decision is made, and to verify that the substitution effectively reduces impact across the life cycle, preventing burden-shifting whereby one hazardous substance is replaced by another that generates impacts elsewhere in the value chain.

Annex C: Steps and Examples for Cross-Sector Industry Commitments

Integrating ChF into corporate portfolio and R&D assessment processes and investor analyses

162. This section sets out model cross-sector industry commitments, developed through the year-long stakeholder consultation described in section 4.5. They translate the guidance in section 4 into voluntary actions that an individual private sector entity may take, within the context of its sector, to manage and reduce its chemical footprint. They support GFC Target D6, which calls for sector strategies that identify priority chemicals of concern and use measures such as the chemical footprint approach, and Target D3 on private-sector strategies and reporting, and they build on the roadmap and pilot programmes described in section 5.

163. The commitments describe voluntary actions. Each entity decides whether to declare a commitment to implement some or all of them, and at what pace. The section closes with sector-level roadmaps and a practical takeaway that summarizes overall recommendations.

Rationale for action.

164. There is currently no generally applicable requirement to calculate and disclose a complete impact-based Chemical Footprint as defined in this guidance, although companies may be subject to chemical, emissions and sustainability disclosure requirements. Voluntary company and sector commitments can therefore help test and refine complete ChF approaches in practice and support their integration into portfolio management, research and development and investment analysis.

165. This guidance is provided for information as a voluntary technical resource and has not been negotiated or adopted by the International Conference.

Model commitments

166.

Note 1: These commitments are voluntary and are intended to be applied progressively and proportionately by the private sector, including manufacturers, upstream and downstream users of chemicals, and small and medium-sized enterprises, taking into account their scale, sector, geographic scope, role in the value chain, operational capacity, data availability and methodological maturity, with phased implementation where appropriate.

Note 2: Individual commitments are not intended to create a legal obligation, mandatory certification requirement or condition of market access.

Note 3: The commitments below are cross-sector commitments. Sector-specific commitments elaborate them for sector-specific conditions, supplier tiers and programmes and are to remain consistent with, and cross-referenced to, the commitments below.

Note 4: A chemical footprint approach does not replace regulatory compliance, product-safety assessment, or exposure-based risk assessment.

Note 5: The term “chemical footprint” is reserved for a metric representing potential environmental impacts associated with human toxicity and/or ecotoxicity, obtained by combining chemical usage, chemical emissions and characterization factors. Where a commitment or disclosure addresses chemical usage or chemical emissions only, the corresponding qualifier is used (“chemical usage assessment”; “chemical emission assessment”).

Note 6: “Chemicals of concern” is used, throughout, as a provisional qualifier pending the definition to be developed by the dedicated Cross-Thematic Group on Chemicals of Concern; commitments referencing this term will be updated once that work concludes and the glossary is finalized.

Note 7: Disclosure commitments below may be satisfied through aggregated reporting where full disclosure of primary data would compromise confidential business information, formulation confidentiality, or supplier contractual obligations. This guidance does not require disclosure of confidential formulations, proprietary supplier information or commercially sensitive data beyond applicable legal and contractual requirements.

Commitment 1 — Governance

167. A private sector entity establishes a governance structure for its chemicals management and chemical footprint approach, in which responsible technical functions compile, monitor and report the results of Commitments 4 through 6 below. Senior management or the board undertakes a documented review of strategy and progress not less than once per year, informed by a summary prepared by these technical functions, supplemented, where appropriate, by quarterly progress updates.

GFC alignment: Targets D3, D6.

Commitment 2 — Scope and System Boundaries

168. For each of the commitments below, a private sector entity defines and discloses (a) the organizational boundary considered, i.e. whether own operations and/or the value chain are covered, specifying the relevant supplier tiers and, where applicable, whether the entity is acting as manufacturer, upstream user or downstream user of the chemicals or products concerned; (b) for commitments applied at product level, the system boundary (e.g. cradle-to-gate, cradle-to-grave), functional unit, cut-off criteria and allocation procedures applied; and (c) the chemical scope considered, together with the rationale for any exclusions.

Note 1: System boundary, functional unit, cut-off and allocation procedures are applied consistently with ISO 14040:2006 and ISO 14044:2006.

Note 2: Entities report a common minimum set of parameters — boundaries, functional units, cut-off criteria, allocation procedures, exclusions and data quality — with transparent documentation. Comparisons and benchmarking between entities or products are made only where scope and methodology are sufficiently aligned.

GFC alignment: Objective A.

Commitment 3 — Chemical Inventory and Disclosure

169. A private sector entity develops and maintains an inventory of chemicals intentionally used in its products and processes. It may start with an initial inventory based on available data and defined priorities, such as selected product categories, material processes or areas with the greatest potential impact, with documented and justified exclusions, and progressively expands coverage towards its full product range according to data availability, technical and financial resources and organizational maturity. The entity discloses the scope, exclusions, reasons for exclusions and information on priority chemicals of concern, annually for large entities and, for SMEs, at a stated interval appropriate to their size, sector, materiality and data maturity. Disclosure of confidential formulation information, proprietary supplier information or other information protected by applicable law or contract may take an aggregated form.

GFC alignment: Targets A3, B1–B3, D3.

Commitment 4 — Chemical Usage

170. A private sector entity establishes a baseline chemical usage metric quantifying the chemical mass used along the life cycle of its products or activities and processes, considering scope, functional unit and data quality.

171. Note 1: Results reported under this commitment are qualified as a “chemical usage assessment” and are not described as a “chemical footprint” unless combined with chemical emissions and impact data as set out in Commitment 6.

172. Note 2: The chemical usage metric should not be interpreted as a direct proxy for hazard, exposure, risk or potential environmental impact unless supported by relevant additional data.

GFC alignment: Targets B1, B3, D6.

Commitment 5 — Chemical Emissions

173. A private sector entity progressively assesses emissions of priority chemicals of concern to air, water and soil associated with relevant life-cycle stages (i.e. the chemical mass emitted to the environment), and reports results annually for large entities and, for SMEs, at a stated interval appropriate to their size, sector, materiality of emissions and data maturity.

174. Note 1: Results reported under this commitment are qualified as a “chemical emission assessment” and are not described as a “chemical footprint” unless combined with impact data as set out in Commitment 6.

GFC alignment: Targets A3, B3, D3.

Commitment 6 — Chemical Footprint (Potential Impact) Assessment

175. Where characterization factors are available, a private sector entity applies life cycle impact assessment-based methods to quantify potential environmental impacts associated with human toxicity and/or ecotoxicity, and publishes chemical footprint results together with the underlying chemical usage and chemical emissions data needed to maintain traceability to significant contributing chemicals, processes or life cycle stages, consistent with the interpretation requirements for chemical footprint

assessment. Underlying data may be disclosed at an appropriate level of aggregation, subject to applicable confidentiality, contractual and legal requirements.

Note 1: Life cycle impact assessment methods applied under this commitment are consistent with ISO 14040:2006 and ISO 14044:2006.

Note 2: Chemical footprint results are screening-level or decision-support information where characterization factors, emissions data or interpretation guidance are incomplete. Results should not be used as a standalone basis for ranking entities, products or suppliers, assigning liability, or making regulatory determinations.

Note 3: Entities may report chemical usage assessments and chemical emission assessments separately and identify chemical footprint results as provisional where appropriate.

GFC alignment: Targets D1, D3, D6.

Commitment 7 — Safer Alternatives and Substitution

176. A private sector entity considers, where appropriate, substituting priority chemicals of concern with safer and more sustainable alternatives, with the aim of reducing their impact and, where feasible, their input, when it is technically feasible, legally permissible, economically viable and consistent with product safety and performance requirements. Where substitution is not currently feasible, the entity documents the reasons, applies appropriate risk-management measures and reviews the opportunity periodically. The entity applies documented criteria to avoid regrettable substitution.

177. Note 1: Chemical footprint results should be used together with other considerations to support decision-making in the context of substitution; substitution decisions weigh chemical footprint results for human toxicity and ecotoxicity alongside complementary factors — intrinsic hazard characteristics, data availability, technical performance, regulatory considerations and exposure context — rather than footprint results alone.

GFC alignment: Targets D4, D6.

Commitment 8 — Value-Chain Engagement

178. A private sector entity engages with and progressively requests suppliers, including chemical and component manufacturers, beginning with Tier 1 suppliers and extending progressively to priority Tier 2 suppliers, to report their chemical usage, chemical emissions, and chemical footprint progressively and proportionately, taking into account supplier size, role, geographic location, technical capacity, data availability and the complexity of the relevant supply chain, and supports suppliers, through training and shared resources proportionate to their size and capacity, to build reporting capability.

Note 1: Where primary data are not available, suppliers may use recognized estimates, screening-level data or sector-average data, provided that the data type and limitations are clearly identified.

Note 2: Supplier information is handled in accordance with applicable confidentiality obligations, competition law and contractual arrangements.

Note 3: Aggregated or independently managed data-collection mechanisms may be used where direct disclosure would create confidentiality concerns.

GFC alignment: Targets B2, D4.

Commitment 9 — Financing and Investment

179. A private sector entity may use chemical footprint information, together with other relevant chemicals-management information, to inform its corporate finance and investment decisions and, where appropriate, report such information through recognized sustainability and financial-disclosure frameworks applicable to the reporting entity (e.g. GRI, CSRD/ESRS or equivalent national or regional frameworks), reflecting the current scope and disclosure requirements of each framework at the time of reporting.

180. Note 1: This commitment does not require an entity to disclose information beyond applicable legal, regulatory, accounting, contractual or confidentiality requirements.

GFC alignment: Targets D3, E3.

Commitment 10 — Sector-Level Roadmaps

181. A private sector entity participates in sector initiatives to develop harmonized chemical footprint methodologies and reporting templates covering chemical usage, chemical emissions and chemical footprint.

Note 1: Sector-specific commitments elaborate these cross-sector commitments for sector-specific conditions, supplier tiers and programmes, and remain consistent with, and cross-referenced to, the commitments in this document.

GFC alignment: Target D6.

Commitment 11 — Transparency and Verification

182. A private sector entity publishes progress reports (annually for large entities; at a stated interval for SMEs) covering the methodology, scope, data sources and results of its chemical footprint approach, and seeks independent verification proportionate to the size, sector, complexity and maturity of the assessment, with transparent disclosure of methods, data sources, material assumptions and uncertainty.

Note 1: Third-party certification and labelling schemes referenced in sector-specific commitments are voluntary; participation in such schemes is not a mandatory condition of this commitment.

Note 2: Footprint communication under this commitment follows ISO 14026:2017.

Note 3: Verification may be conducted on a reasonable sampling basis, with limited assurance and, where possible, reasonable assurance.

Note 4: Publication of chemical footprint results in progress reports or under Commitment 6 is subject to the proportionate verification described above. Where results are used to support public comparative or marketing claims (e.g. that a

product or entity has a lower chemical footprint than another), independent (third-party) review is required, by analogy with ISO 14044 requirements for comparative assertions disclosed to the public.

GFC alignment: Targets B2, D3.

Practical takeaway

183. In order for the private sector to sustain investment and continue the ChF approach, all stakeholders, including governments, the private sector and NGOs, should work to foster a market in which safety and sustainability are recognized as values that go beyond low cost, so that corporate efforts are rewarded (GFC Targets D2 and D4).

184. The cross-sector recommendations supporting these commitments are summarized in section 5.2. This annex should be read together with that roadmap and the implementation priorities set out there.

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