

ANALYTICAL REPORT

EXPERT ROUNDTABLE

GLOBAL GOVERNANCE ON ENDOCRINE DISRUPTORS: FROM SCIENCE TO POLICY

**1 SEPTEMBER 2025
INTERNATIONAL ENVIRONMENT HOUSE, GENEVA**

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THE UNEP GLOBAL FRAMEWORK ON CHEMICALS,
THE FOOD PACKAGING FORUM AND PIRSE.

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The views expressed herein reflect conference discussions and do not necessarily represent the official positions of the co-organizing institutions. While accuracy has been prioritized, this report captures the state of discussions at the time of the event and does not claim to be exhaustive.

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ABOUT THIS REPORT

This report provides a structured analytical synthesis of the expert roundtable Global Governance on Endocrine Disruptors: From Science to Policy, held on 1 September 2025 at the International Environment House, Geneva. Drawing on interventions from leading specialists across scientific, policy, and institutional perspectives, it highlights key scientific findings, governance gaps, and emerging pathways for action – expanding on the event summary published on the Geneva Environment Network website.

It is intended for scientists, policymakers, negotiators, and practitioners operating at the science-policy interface who require comprehensive reference material beyond event summaries.

EXECUTIVE SUMMARY: KEY POLICY MESSAGES

SCIENTIFIC FOUNDATION AND EVIDENCE SUFFICIENCY

There is sufficient science to act on EDCs

The scientific consensus on endocrine-disrupting chemicals (EDCs) is unambiguous and sufficient for immediate policy action. Key findings demonstrate that:

- Endocrine-disrupting chemicals contribute significantly to non-communicable diseases globally, with evidence that was already robust over a decade ago warranting immediate protective measures.
- EDC testing must fundamentally respect endocrinological principles concerning dose-response relationships, critical exposure windows, and system complexity—requirements that differ dramatically from traditional toxicological approaches.
- Despite sufficient scientific evidence, regulatory inaction persists due to insufficient historical testing, inconsistent governmental interpretations, and the systematic challenge of 'chemical whack-a-mole' where regulated substances are replaced by untested alternatives.
- Effective communication about EDCs requires translating complex science into actionable narratives that emphasize protection during vulnerable life stages, moving beyond technical granularity to policy-relevant synthesis.

Detailed analysis: Sections 1-2

SCIENCE-POLICY INTERFACE AND COMMUNICATION FAILURES

Improving connections between evidence and decision-makers

Structural barriers in science-policy communication perpetuate the evidence-action gap despite robust scientific foundations:

- Current institutional frameworks lack genuine science-policy interfaces, relying instead on an overloaded 'science-regulators interface' that fails to connect evidence with political decision-makers who set fundamental policy directions.
- The emerging Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution faces significant organizational challenges and is not yet operational for supporting effective policy work.
- Scientists must adopt solution-oriented communication strategies that provide concise, actionable messages while emphasizing that absence of complete data does not equal absence of risk.

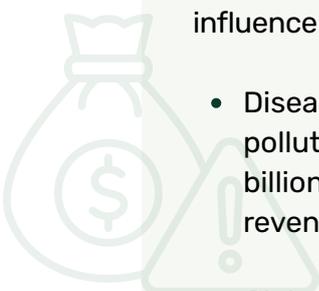
- Successful national implementation requires rapid translation of scientific findings into low-cost, 'surgical' policy adjustments using plain-language briefs that include implementation details, costs, and regulatory options within existing legal frameworks.
- Regulatory paralysis results from fragmented governmental mandates, lack of context-specific national data, and conflicting conclusions driven by industry-funded research that creates false scientific controversy.

Detailed analysis: Sections 3-4

ECONOMIC BURDEN AND SYSTEMIC INDUSTRY INFLUENCE

Disease burden assessment and regulatory frameworks

Economic quantification reveals massive societal costs while systematic industry influence undermines protective regulation:

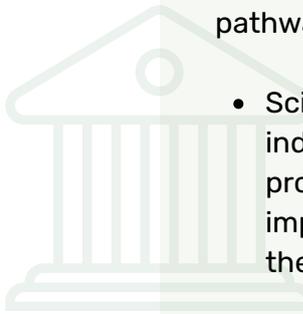
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- Disease burden and social costs from EDC exposure exceed the revenue of polluting industries—phthalate-related mortality alone costs between 510 billion and 3.74 trillion USD, surpassing the entire global plastics industry revenue of approximately 500 billion USD annually.
 - Global action requires immediate investment in biomonitoring infrastructure, particularly in low- and middle-income countries, coupled with strategic focus on specific sources (plastics, pesticides) rather than abstract 'EDC' terminology.
 - Precautionary action is scientifically justified and must prioritize children's unique developmental vulnerability while holding industry accountable for chemical safety throughout product lifecycles.
 - Current national regulatory systems remain anchored in obsolete 16th-century toxicological principles fundamentally incompatible with endocrine disruption science, incapable of protecting vulnerable populations from complex, multi-chemical exposures.
 - Industry capture of regulatory systems operates through delegation of toxicity assessment to manufacturers, sophisticated disinformation campaigns, and systematic generation of scientific uncertainty designed to maintain regulatory status quo.
 - The global crisis demands immediate cessation of denial and full enforcement of protective principles that address pollution at source rather than managing consequences.

Detailed analysis: Sections 5-6

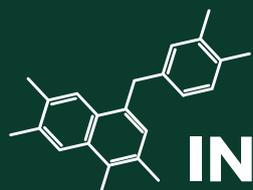
EMERGING GOVERNANCE MECHANISMS AND IMPLEMENTATION PATHWAYS

New frameworks offer pathways for action

New institutional frameworks and proven implementation strategies offer pathways for transforming EDC governance:

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- Scientific documentation can motivate significant national action independent of formal regulatory mandates, as demonstrated by proactive adopters who use accessible scientific information to implement protective measures before international agreements require them.
 - International agreements that incorporate precautionary approaches—such as the Stockholm Convention’s explicit provision allowing decisions to proceed in the presence of scientific uncertainty—provide legal frameworks for protective measures while recognizing that absolute scientific certainty is rarely achievable.
 - Effective governance requires addressing alternatives assessment alongside hazard identification, ensuring viable substitutes that maintain economic functionality while protecting human health and environment.
 - The Global Framework on Chemicals (GFC) represents major institutional evolution through 28 measurable political targets, multi-sectoral engagement including finance sector involvement, and focus on urgent, transformational implementation across entire value chains.
 - The GFC's voluntary nature requires strategic evaluation of which issues benefit from multi-stakeholder collaboration versus regulatory enforcement, recognizing that different governance challenges demand different institutional approaches.
 - Critical dependence on external scientific bodies, particularly the emerging partnership with the Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution, will determine the framework’s capacity to provide independent, policy-relevant guidance.

Detailed analysis: Sections 7-8



INTRODUCTION

THE EDC GOVERNANCE PARADOX

Endocrine-disrupting chemicals (EDCs) represent a critical challenge for contemporary international environmental governance. Present in everyday consumer products from plastics to pesticides, these substances interfere with hormone systems in both humans and wildlife, causing harm at remarkably low concentrations through mechanisms that fundamentally challenge established regulatory approaches. Since Theo Colborn's foundational work at Wingspread in 1991, scientific evidence has accumulated demonstrating correlations between EDC exposure and serious health consequences including developmental disorders, reproductive complications, and multiple cancer types.

The core challenge concerns a persistent disconnect between substantial scientific evidence and effective policy implementation. Despite decades of research demonstrating EDC risks, transformation of knowledge into concrete regulatory measures remains fragmented—a paradox reflecting deeper structural limitations within international governance systems' capacity to address multifaceted, cross-sectoral challenges. This science-policy gap involves scientific complexity requiring understanding of endocrinological principles that differ from classical toxicology, global chemical production patterns necessitating coordination across multiple international frameworks, and substantial economic interests systematically influencing both scientific discourse and policy development.

RECENT INSTITUTIONAL DEVELOPMENTS

International scientific assessments have progressively documented EDC risks. The World Health Organization (WHO) and United Nations Environment Programme (UNEP) published foundational reports in 2002 and 2012.

On the governance level, there is no dedicated legally binding policy response on EDCs at the global level. However, several initiatives exist:

- The Strategic Approach to International Chemicals Management (SAICM) formally recognized EDCs as an emerging policy issue in 2012.
- The 2023 Global Framework on Chemicals (GFC) represents substantial evolution from SAICM, establishing 28 political targets under five strategic objectives while emphasizing multi-sectoral approaches.
- Concurrently, the Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution (ISPP) offers potential for independent, policy-relevant scientific guidance, though organizational challenges remain significant.

PURPOSE OF THIS ANALYTICAL REPORT

The Geneva roundtable of 1 September 2025 brought together eight international experts representing distinct but complementary dimensions of the EDC governance challenge. The scientific panel comprised specialists addressing core evidentiary and methodological questions, while the policy panel addressed governance challenges and institutional solutions. Discussions were facilitated by Jane Muncke (Managing Director, Food Packaging Forum) and Mickaël Repellin (Interdisciplinary Institute for Environmental Health Research and Information, University of Lausanne), whose expertise in chemical safety and environmental health policy ensured productive dialogue between scientific evidence and governance perspectives.

This document provides comprehensive synthesis of the roundtable discussions, structured as reference material for scientists, practitioners, negotiators, and researchers operating at the science-policy interface.

DOCUMENT ROADMAP

The analysis follows a logical progression addressing challenges facing the international community:

Opening remarks and political context

Part I - Scientific Foundations for Regulatory Action (Sections 1-2).

Part II - Implementation Barriers and Systemic Challenges (Sections 3-4).

Part III - Economic Dimensions and Industry Dynamics (Sections 5-6).

Part IV - Emerging Governance Solutions (Sections 7-8).

Synthesis and strategic perspectives





OPENING REMARKS AND POLITICAL CONTEXT

Jana Urh Lesjak

Deputy Permanent Representative of Slovenia to the UN Office and other international organizations in Geneva

“For my country Slovenia, protecting humanity from these chemicals is not just scientific or environmental necessity. It's a moral obligation rooted in human rights”

0.1 KEY TAKEAWAYS

- EDC protection constitutes a moral obligation rooted in human rights, requiring genuine multilateral cooperation where all countries commit to eliminating harmful chemicals.
- Existing agreements including the Basel Convention provide immediate cooperation pathways, while the Global Framework on Chemicals offers unprecedented opportunities for reducing harmful exposures through full implementation of its 28 targets.
- The International Court of Justice affirmed that the right to a healthy environment is inherent and essential, providing legal foundation for precautionary action despite scientific uncertainty.

0.2 MULTILATERAL URGENCY

The plastics treaty impasse and chemical governance pathways

This event occurred just two weeks after realizing much more effort is needed to secure an ambitious, legally binding agreement to end plastic pollution across its full life cycle. Yet plastics represent only one example of consumer products carrying hidden threats: endocrine-disrupting chemicals that interfere with human hormones, damage ecosystems,

and undermine public health at every product lifecycle stage—from extraction and production to use and disposal. These chemicals compromise fundamental rights: the right to health and the right to a clean, healthy, and sustainable environment. Health consequences mount, affecting millions of lives. These cross-border harms operate silently—they must be made visible and addressed through genuine multilateral cooperation where all countries, not just a majority, commit to eliminating harmful chemicals.

0.3 HUMAN RIGHTS FOUNDATIONS AND LEGAL FRAMEWORKS

The International Court of Justice precedent as governance anchor

The International Court of Justice (ICJ) recently affirmed this reality, recognizing that the right to a healthy environment is inherent and essential for the enjoyment of all human rights.

This recognition elevates EDC governance from technical regulation to fundamental rights obligation, reversing burden of proof from those advocating protection to those resisting action.

Environmental rights recognized as "inherent and essential" provide legal foundation for protective measures despite scientific uncertainty. This aligns with the Stockholm Convention's explicit provision allowing action despite incomplete scientific certainty—establishing that precautionary governance remains justified even when knowledge gaps persist.

From invisibility to actionable governance

EDC harms cross borders silently, operating at concentrations below human sensory detection while health effects manifest years after exposure. This multi-dimensional invisibility—molecular, temporal, and political—creates fundamental governance challenges. Making these harms visible requires more than communication: it demands monitoring systems, biomonitoring infrastructure, and transparency mechanisms that render long-term, low-concentration exposures politically actionable.

0.4 EXISTING FRAMEWORKS AND FUTURE PATHWAYS

Leveraging established agreements
While the path toward a new plastics treaty remains uncertain, momentum must not be lost.

Existing agreements already offer pathways for cooperation. The Basel Convention provides established notification procedures and enforcement mechanisms relevant for EDC governance. The Stockholm Convention already lists several substances with endocrine-disrupting properties, establishing precedent for regulation under existing international law.

The Global Framework on Chemicals as turning point

For a planet free of harm from chemicals and waste marks a turning point, committing the international community to safeguarding health, protecting ecosystems, and advancing sustainable development. Full implementation of its 28 measurable political targets under five strategic objectives offers a unique opportunity to reduce harmful exposures, including to endocrine-disrupting chemicals. The Framework's multi-stakeholder agreement brings together diverse sectors to address the pollution crisis through comprehensive lifecycle approaches. However, its voluntary nature requires sustained commitment and coordination. Working with UNEP as the leading global environmental authority to strengthen international governance remains essential for ensuring the right to a clean, healthy, and sustainable environment for all.

Acknowledging scientific contributions

The scientific community deserves recognition for tireless research on endocrine-disrupting chemicals, providing the evidence needed to act, reduce risks, and design effective solutions. For Slovenia, protecting humanity from these chemicals is not just a scientific or environmental necessity, but a moral obligation rooted in human rights.

PART I

SCIENTIFIC FOUNDATIONS FOR REGULATORY ACTION: THERE IS SUFFICIENT SCIENCE TO ACT ON EDCS

The governance of endocrine-disrupting chemicals depends fundamentally on the robustness and adequacy of scientific evidence. This part examines whether current scientific knowledge provides sufficient grounds for immediate regulatory intervention. Section 1 establishes the strength of scientific consensus linking EDC exposure to non-communicable diseases and explores effective strategies for translating complex scientific findings into actionable policy messages. Section 2 addresses the methodological requirements for proper EDC assessment, demonstrating how endocrinological principles differ fundamentally from traditional toxicological frameworks and why these distinctions matter for regulatory decision-making.



SECTION 1 - SCIENTIFIC CONSENSUS AND CAUSALITY FRAMEWORK

Thomas Zoeller - Professor Emeritus,
University of Massachusetts Amherst

"Looking at the body of scientific evidence overall, it is clear that we can say that chemicals that interfere with hormone systems in humans and wildlife are contributing to a large proportion of non-communicable diseases worldwide."

1.1 KEY TAKEAWAYS

- The scientific evidence confirms that endocrine-disrupting chemicals contribute to non-communicable diseases globally, necessitating immediate action.
- Effective communication about EDCs must translate complex, granular science into simple, relevant narratives, emphasizing the importance of protection during vulnerable life stages.
- A primary barrier to implementing necessary policy changes is the resistance of policymakers to engage with and act upon scientific findings.

1.2 THE EVIDENCE BASE: FROM GRANULARITY TO POLICY SYNTHESIS

The paradox of methodological specificity

The evidence base for endocrine disruption presents a paradox that complicates regulatory decision-making. While epidemiological studies necessarily focus on specific chemical-disease pairs—such as perfluorooctanoic acid (PFOA) and thyroid cancer—this methodological specificity creates barriers to policy synthesis. Indeed, each chemical-disease relationship involves unique exposure pathways, biological mechanisms, and health outcomes

that resist simple generalization across chemical classes. This granularity strengthens scientific rigor but fragments the narrative needed for coherent regulatory frameworks, leaving policymakers struggling to extract unified principles from necessarily discrete findings.

1.3 BRIDGING SCIENCE AND POLICY: COMMUNICATION STRATEGIES

Institutional receptivity vs. communication techniques

The success of scientific communication depends heavily on institutional receptivity rather than solely on communication techniques.

When regulatory consultations are structured to emphasize controversy rather than evaluate evidence—as experienced during a 2015 European Commission consultation—they create performative rather than substantive science-policy interfaces. However, when genuine interest exists, effective communication requires a multi-layered approach that moves from evidence synthesis to practical relevance.

From evidence to actionable guidance

This begins with clear, non-technical explanations of chemical effects, connects these findings to health outcomes that matter to decision-makers (e.g. explaining why reduced thyroid hormone levels threaten fetal development), and extends to practical guidance that makes scientific knowledge actionable for families and communities.

1.4 SYSTEMIC CONSTRAINTS IN POLICY IMPLEMENTATION

The persistent challenge in translating scientific evidence into policy action reflects structural constraints within governance systems that extend beyond communication failures.

The observation that most successful policy changes require regulatory pressure rather than scientific evidence alone points to systemic issues where economic interests often have greater immediate political influence than research findings.

This reality suggests that effective EDC governance requires not just improved science communication, but complementary strategies including legal pressure, public advocacy, and international coordination to create political conditions where scientific evidence can meaningfully drive policy decisions.



RECONCEPTUALIZING CAUSALITY FOR REGULATORY FRAMEWORKS

Traditional causality models prove inadequate for understanding EDC impacts, where simple cause-effect relationships give way to complex contribution patterns. Modern disease outcomes reflect multiple interacting factors—genetic predispositions, lifestyle influences, and chemical exposures operating simultaneously.

The "contribution" model addresses this complexity by acknowledging that EDCs operate as significant contributors to disease burden rather than exclusive causative agents. This reconceptualization has profound implications for regulatory frameworks that traditionally require clear causal demonstration before action.



SECTION 2 - METHODOLOGICAL FRAMEWORK FOR EDC ASSESSMENT

Laura Vandenberg - Associate Vice Chancellor
University of Massachusetts Amherst

"Do we know enough to act? I think that the answer is very clearly yes. The case for EDCs being involved in human health outcomes and wildlife outcomes is very clear. Frankly it was clear 12 years ago when the last state of science document came out."

2.1 KEY TAKEAWAYS

- EDC testing must fundamentally respect the unique principles of endocrinology, particularly concerning dose, timing, and complexity.
- Despite sufficient scientific evidence, regulatory inaction persists, fueled by insufficient historical testing and inconsistent governmental interpretations.
- The "chemical whack-a-mole" approach is a significant regulatory challenge, necessitating resolute scientific guidelines to prevent continuous substitution with untested chemicals.

2.2 ENDOCRINOLOGICAL PRINCIPLES FOR CHEMICAL TESTING

The paradigm shift from toxicology to endocrinology

The fundamental challenge in EDC evaluation lies in applying appropriate biological frameworks to chemical assessment. Traditional toxicological approaches, designed for identifying overt toxicity through high-dose exposures, prove inadequate for substances that operate through hormonal mechanisms. The five endocrinological principles create a testing paradigm that acknowledges how hormones function in biological systems.

Receptor binding assays must evaluate both direct chemical-receptor interactions and interference with natural hormone-receptor binding. Life-stage considerations recognize that hormonal vulnerability varies dramatically across development, with fetal, neonatal, and pubertal periods presenting heightened susceptibility.

System complexity acknowledgment prepares researchers for unexpected effects when hormonal networks are perturbed, recognizing that endocrine systems' interconnected nature can produce effects that appear unrelated to initial exposure points.

NON-MONOTONIC DOSE-RESPONSE RELATIONSHIPS IN EDC ASSESSMENT

Non-monotonic dose-response curves (NMDRCs) are mathematically defined as relationships where the slope changes sign within the range of doses tested. For EDCs, this means that low-dose effects cannot be predicted by effects observed at high doses, fundamentally challenging the traditional toxicological principle that "the dose makes the poison."

Hormones naturally operate at part-per-billion concentrations during critical developmental windows, and EDCs can produce entirely different effects at environmental versus high-dose exposures. This biological reality renders conventional high-to-low dose extrapolations inappropriate for risk assessment.

2.3 EVIDENCE SUFFICIENCY AND HISTORICAL CONTEXT

Decades of inadequate testing approaches

The current situation reflects decades of testing approaches that prioritized general toxicity over endocrine-specific effects, resulting in widespread human and wildlife exposures to substances later identified as hormonally active. However, the accumulated evidence base now provides clear support for regulatory action.

The robustness of current evidence

The scientific case for EDC involvement in adverse health outcomes has been robust for over a decade, with continuing research strengthening rather than undermining these conclusions.

2.4 REGULATORY CHALLENGES AND SYSTEMATIC FAILURES

Geographic inconsistencies in regulation

The divergence between European Union (EU) and United States (US) approaches to Bisphenol A (BPA) regulation illustrates how identical scientific evidence can yield opposite regulatory outcomes.

This inconsistency reflects not scientific uncertainty but institutional, economic, and political factors that influence regulatory interpretation.

The "chemical whack-a-mole" phenomenon

The "chemical whack-a-mole" phenomenon compounds these challenges, as phase-outs of well-studied chemicals like BPA lead to replacement with lesser-known substances that may pose similar or greater risks.

Industry influence on scientific literature

Industry influence on scientific literature through funded research creates additional complexity in distinguishing genuine scientific debate from strategic uncertainty generation. These systematic challenges suggest that effective EDC governance requires not just better science, but regulatory frameworks capable of acting decisively on available evidence while preventing regrettable substitutions.

PART II

IMPLEMENTATION BARRIERS AND SYSTEMIC CHALLENGES: IMPROVING CONNECTIONS BETWEEN EVIDENCE AND DECISION-MAKERS

Despite robust scientific foundations, evidence consistently fails to translate into effective policy interventions. This part investigates the structural obstacles preventing regulatory action. Section 3 analyzes deficiencies in science-policy interfaces, revealing how institutional frameworks systematically disconnect scientific evidence from political decision-makers and exploring the communication strategies necessary to bridge this gap. Section 4 examines regulatory paralysis resulting from fragmented governmental mandates, the challenge of generating context-specific national data, and the ways industry-funded research creates false scientific uncertainty that undermines protective action.



SECTION 3 - SCIENCE-POLICY INTERFACE FAILURES

Martin Scheringer
Masaryk University, ETH Zurich

"What I have learned in my media experiences over the last weeks and months is that we should really say the most important thing first and then stop, which is not easy because normally scientists do the opposite... We should really stick to the content but make it brief."

3.1 KEY TAKEAWAYS

- The emerging Intergovernmental Science Policy Panel on Chemicals, Waste and Pollution is currently incapacitated and not yet ready to effectively support policy work.
- The current system lacks a true "science-policy interface," relying instead on an overloaded, indirect "science-regulators interface."
- Scientists must fundamentally change how they communicate by providing concise, solution-oriented messages and emphasizing that lack of data does not equal absence of risk.

3.2 THE INSTITUTIONAL VOID BETWEEN SCIENCE AND POLITICAL DECISION-MAKING

Structural barriers to political engagement

The fundamental challenge in EDC governance lies not in the quality of scientific evidence but in the absence of genuine science-policy interfaces within current institutional frameworks. While scientists regularly engage with regulatory agencies through established channels that prove effective and collaborative, direct access to political decision-makers—parliamentarians and ministers—remains exceptionally rare.

Political overload and time constraints

The single experience with a German parliamentarian revealed the systemic nature of this challenge: politicians operate under such extensive workloads and time constraints that meaningful scientific engagement becomes practically impossible. This overload is not a personal failing but reflects structural constraints within political systems that prioritize immediate demands over long-term evidence assessment. The resulting gap means that scientific insights struggle to reach the level where fundamental policy directions are determined, leaving regulatory agencies to interpret scientific evidence within political frameworks they did not help establish.

3.3 MEDIA AS ALTERNATIVE PATHWAY FOR SCIENCE-POLICY COMMUNICATION

Strategic use of media attention

Given the limited direct access to political decision-makers, media engagement emerges as a strategic alternative for scientists seeking policy influence. The principle that "what's in the media matters to politicians" reflects the reality that political attention operates through public and media pressure rather than direct scientific briefing.

Challenges of media communication

This approach requires scientists to develop new communication skills and accept different success metrics—measuring impact through media coverage and public engagement rather than direct policy adoption. However, this pathway introduces additional challenges, as media communication demands message simplification that may not capture scientific nuance while competing with other information sources for political attention.



SOLUTION-ORIENTED ASSESSMENTS AS BRIDGE-BUILDING MECHANISMS

Solution-oriented assessments, emerging within frameworks like the Intergovernmental Panel on Climate Change (IPCC), represent a methodological innovation that addresses the gap between scientific analysis and policy application. Rather than simply documenting problems or evaluating evidence,

these assessments explore practical options and responses to identified challenges, essentially asking "what if we did this or what if we did that?" This approach acknowledges that effective science-policy interfaces require more than problem identification—they need actionable alternatives that policymakers can evaluate and implement.



SECTION 4 - NATIONAL IMPLEMENTATION INNOVATION: THE PERUVIAN CASE STUDY

Vanessa Aliaga
Permanent Mission of Peru in Geneva

"Plain language policy briefs that are one page that say: this is our problem, this is why it's a public health issue or environmental issue, what we know, your options in your legal context, and then how much it would cost, who should implement it—so just quite clearly a very clear proposal for decision-makers"

4.1 KEY TAKEAWAYS

- Scientific findings must be rapidly translated into actionable, low-cost, and "surgical" policy adjustments, avoiding the slow process of passing new laws.
- Regulatory paralysis is frequently caused by fragmented governmental mandates, lack of national data tailored to local situations, and conflicting conclusions driven by industry-funded science.
- To be useful to policymakers, scientific information must be packaged into clear, plain-language briefs that include specific implementation details and costs.

STRATEGIC INSTITUTIONAL COORDINATION FOR RAPID POLICY IMPLEMENTATION

The Peruvian model demonstrates how inter-sectoral coordination can overcome traditional silos that impede environmental health policy implementation. The collaboration between health, environment, and agriculture ministries created comprehensive regulatory coverage while university partnerships provided scientific credibility

and Pan American Health Organization funding ensured international standards compliance. Rather than producing abstract recommendations, the research team developed concrete policy packages for each finding, creating procurement checklists for schools and incorporating EDC considerations into existing administrative frameworks without requiring new legislation.

4.2 SYSTEMIC BARRIERS AND CONTEXTUAL CHALLENGES IN DEVELOPING COUNTRIES

Institutional fragmentation and capacity constraints

The Peruvian experience illuminates broader challenges facing developing countries in EDC governance that extend beyond scientific uncertainty to structural and economic constraints. Institutional fragmentation creates coordination failures where multiple sectors hold relevant mandates but no single entity provides leadership. Capacity limitations manifest through insufficient biomonitoring infrastructure, sluggish product surveillance systems, and minimal local toxicology assessment capabilities.

Economic context and exposure complexity

The country's predominantly informal economy, stark rural-urban exposure differences, and dependence on imported goods create complex exposure patterns that resist one-size-fits-all policy approaches developed for different economic contexts.

4.3 COMMUNICATION BARRIERS AND INDUSTRY INFLUENCE IN POLICY FORMATION

Technical complexity and linguistic diversity

The challenge of transforming scientific evidence into effective policy extends beyond institutional coordination to fundamental communication failures that affect both regulators and public engagement.

Technical briefs designed for regulatory audiences often prove too complex for effective policy translation, while public awareness campaigns rarely accommodate linguistic diversity—being conducted primarily in Spanish with virtually no indigenous language materials.

Industry-funded research as impediment

Industry-funded research compounds these challenges by creating competing scientific narratives that allow decision-makers to maintain higher evidence thresholds, perpetuating status quo situations when consensus appears lacking. These communication failures suggest that effective EDC governance requires not just better science, but dedicated communication strategies that acknowledge linguistic, educational, and cultural contexts within national implementation frameworks.

Suggested solutions

To overcome these systemic barriers, three strategic interventions emerge as essential for accelerating science-to-policy translation:

- Appoint a dedicated public policy leader for EDCs.
- Integrate EDC policy into broader health strategies, such as non-communicable diseases (NCDs) frameworks.
- Produce plain-language, one-page policy briefs that clearly outline: the problem, public health/environmental relevance, evidence, legal context, implementation costs, and specific agency responsibilities..

PART III

ECONOMIC DIMENSIONS AND INDUSTRY DYNAMICS: EDC COSTS EXCEED POLLUTING INDUSTRY REVENUES

Understanding the EDC challenge requires quantifying its economic magnitude and analyzing how industrial interests shape regulatory discourse. This part establishes the problem's scale through economic assessment and examines the structural factors that influence regulatory decision-making. Section 5 presents economic evidence on disease burden and social costs associated with EDC exposure, discussing the need for biomonitoring infrastructure and approaches to risk assessment in the context of vulnerable populations. Section 6 analyzes regulatory frameworks from a historical and institutional perspective, examining how the evolution of chemical testing systems has created tensions between traditional toxicological approaches and endocrine disruption science, and exploring the role of different stakeholders in shaping scientific evidence and regulatory outcomes.



SECTION 5 - GLOBAL ECONOMIC QUANTIFICATION OF EDC IMPACTS

Leonardo Trasande
NYU Grossman School of Medicine, Endocrine Society
Representative.

"The economic costs of phthalates mortality are more than the revenue of the plastics industry—510 billion to 3.74 trillion in social costs... Mind you the plastics industry revenue is in the range of 500 billion dollars a year. So already just based on one endpoint we're talking about disease burden greater than the revenue of the industry"

5.1 KEY TAKEAWAYS

- The disease burden and social costs associated with EDC exposure, even from a single source like phthalates, are astronomically high and often exceed the entire revenue of the polluting industry.
- Global action is urgently needed, requiring immediate investment in biomonitoring infrastructure, especially in low- and middle-income countries, and a shift in focus from "EDCs" to specific "sources" like plastics and pesticides.
- The existing science is sufficient to necessitate urgent regulatory and multisectoral action (Precautionary Principle), which must prioritize the unique susceptibility of children and hold industry accountable.

GLOBAL EXPOSURE MAPPING AND ECONOMIC BURDEN QUANTIFICATION

The development of global exposure maps represents a methodological breakthrough that addresses historical bias toward developed country data while revealing the true scope of EDC impacts worldwide. Economic quantification reveals a fundamental misalignment between industrial profits and societal costs: mortality costs from phthalate exposure alone ranging from 510 billion to 3.74

trillion USD in social costs—exceed the entire global plastics industry revenue of approximately 500 billion USD annually. When expanded to include 15 previously mapped conditions, potential global costs reach tens of trillions of dollars in lost economic productivity.

5.2 DEVELOPMENTAL VULNERABILITY AND LIFE-STAGE SPECIFIC IMPACTS

Heightened susceptibility in children

The recognition that children face disproportionate EDC susceptibility reflects fundamental biological realities that demand age-specific policy approaches rather than population-averaged risk assessments. Children's pound-for-pound higher air intake and food consumption, combined with developing organ systems, create heightened vulnerability windows that persist throughout the lifespan.

Life-course vulnerability patterns

However, adult vulnerability patterns vary by life stage, with different systems becoming susceptible depending on biological and hormonal states. This understanding suggests that effective EDC governance requires life-course approaches that acknowledge varying vulnerability patterns rather than treating populations as uniformly susceptible to chemical exposures.

5.3 INFRASTRUCTURE REQUIREMENTS FOR GLOBAL BIOMONITORING AND CHEMICAL TRACKING

Current limitations and data gaps

The current analysis represents only "the tip of the iceberg" due to limited global biomonitoring infrastructure, particularly in low- and middle-income countries where exposures may be highest. As science-policy frameworks develop and international agreements like plastic treaties advance, establishing biomonitoring capabilities becomes essential for both quantifying disease burden and measuring chemical exposures that remain poorly characterized even in developed countries.

The chemical substitution challenge

The "chemical whack-a-mole" problem compounds these challenges—as older chemicals like BPA are phased out, replacement chemicals appear without adequate exposure assessment or health impact evaluation. Effective global governance requires parallel development of biomonitoring infrastructure and chemical tracking systems that can identify and assess new chemicals as they enter commercial use, preventing the repetition of historical patterns where harmful exposures become apparent only after widespread population exposure has occurred.



SECTION 6 - SYSTEMIC OBSTACLES AND INDUSTRY INFLUENCE

Valentine Python
Environmental Science Expert, Former National Council
Member, Switzerland

"The aim of the misinformation about EDCs is to sow doubt, to create the false impression that existing regulatory frameworks are sufficient to protect public health. This framing is misleading. It serves to maintain a status quo that prioritizes private economic interests."

6.1 KEY TAKEAWAYS

- Current national regulatory frameworks, anchored in outdated toxicological principles, are structurally ill-equipped to address the complexity of EDC exposure – particularly for vulnerable populations. Reform, not deregulation, is the necessary response.
- Regulatory gaps persist due to structural over-reliance on industry-generated data and insufficient independent verification, compounded by deliberate corporate interference in scientific discourse.
- The global crisis requires regulatory modernization and rigorous enforcement of the precautionary principle.

6.2 OBSOLESCENCE OF FOUNDATIONAL REGULATORY PRINCIPLES

The Paracelsian paradigm and its limitations

National regulatory systems remain anchored in 16th-century toxicological principles fundamentally incompatible with endocrine disruption science. The Acceptable Daily Intake (ADI) approach, rooted in Paracelsus's principle that "the dose makes the poison," relies on methods developed in the 1930s and revised in the 1960s for synthetic pesticides and food additives.

Temporal mismatch between regulation and science

While European adoption of EDC criteria in 2018 and assessment obligations for newly authorized substances since 2023 represent progress, these reforms remain incomplete. They perpetuate a substance-by-substance assessment logic structurally unable to address the combinatorial complexity of EDC exposure. Switzerland's projected timeline – requiring until 2080 to reassess approximately 300 synthetic pesticides at current rates – illustrates a structural temporal mismatch between existing regulatory capacity and scientific urgency. Accelerated prioritization processes are needed.

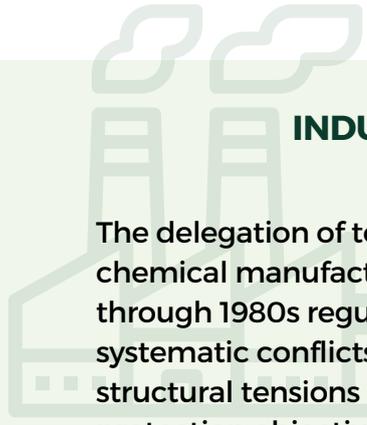
6.3 INADEQUACY OF CURRENT FRAMEWORKS FOR EDC-SPECIFIC VULNERABILITIES

Misalignment with EDC biological realities

The regulatory paradigm's core limitation lies in assumptions of standard vulnerability and linear dose-response relationships not designed to capture EDC biological realities. For endocrine disruptors, timing of exposure, recurrence patterns, and multi-chemical interactions matter as much as absolute quantities – a complexity that existing risk assessment frameworks were not built to accommodate, leaving pregnant women, young children, and adolescents insufficiently protected.

Absence of EDC-specific prevention policies

National regulations based on ADI principles were not designed to accommodate chronic, multiple exposures to substances operating through hormonal mechanisms. Existing chronic disease prevention strategies – as illustrated by their current scope in the Swiss federal framework – have yet to systematically integrate EDC-specific considerations, representing an urgent extension that current frameworks both require and can accommodate.



INDUSTRY CAPTURE OF REGULATORY SYSTEMS

The delegation of toxicity assessment to chemical manufacturers, established through 1980s regulatory reforms, creates systematic conflicts of interest that create structural tensions with public health protection objectives. Government agencies primarily verify administrative compliance rather than scientific validity of industry-submitted studies,

which often remain confidential until problems emerge decades later through independent research. Industrial influence operates through sophisticated disinformation campaigns designed to maintain regulatory status quo by creating false equivalencies between synthetic chemicals and natural substances, while deploying rhetorical devices that exploit public misunderstanding of low-dose effects.

PART IV

EMERGING GOVERNANCE SOLUTIONS: NEW FRAMEWORKS OFFER PATHWAYS FOR ACTION

New institutional frameworks and proven implementation strategies offer pathways for overcoming identified barriers to effective EDC governance. This part examines innovative approaches demonstrating potential for transformation. Section 7 explores how scientific documentation motivates national action independent of formal regulatory mandates, analyzing successful implementation by proactive adopters and examining the role of alternatives assessment in ensuring viable substitutes. Section 8 evaluates the Global Framework on Chemicals as institutional evolution, assessing its measurable political targets, multi-sectoral engagement mechanisms, and strategic dependence on the emerging Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution.



SECTION 7 - INTERNATIONAL LEGAL MECHANISMS AND PRECAUTIONARY IMPLEMENTATION

Kei Ohno Woodall - Senior Coordination Officer, Basel, Rotterdam and Stockholm Conventions

“The Stockholm Convention has very important passage in Article 8. It says lack of full scientific certainty should not prevent the proposal from proceeding... the COP should take decision including scientific uncertainty in a precautionary manner whether the chemical should be listed in the Stockholm Convention”

7.1 KEY TAKEAWAYS

- Scientific findings can motivate significant national action even before international or national regulations are established.
- Scientific information, particularly concerning adverse effects like endocrine disruption, is essential for decision-making within international conventions like the Stockholm Convention.
- International agreements must adhere to the precautionary principle, meaning lack of full certainty should not halt action, and addressing alternatives is key to successful implementation.

7.2 PROACTIVE IMPLEMENTATION THROUGH SCIENTIFIC INFORMATION

Scientific evidence as catalyst for early action

A case from a national authority in Kenya demonstrates how scientific documentation can drive early policy action. Based on the risk profile on perfluorooctane sulfonates (PFOS) developed by the Persistent Organic Pollutants Review Committee under the Stockholm Convention following the proposal for listing submitted in 2005,

the Kenya Airports Authority began procuring fluorine-free firefighting foam alternatives ahead of both international requirements and national regulatory measures. This proactive decision illustrates how timely and accessible scientific information can enable authorities to take protective action based on evidence, rather than waiting for formal policy directives.

7.3 SCIENTIFIC SUBSIDIARY BODIES AS INFORMATION BRIDGES

Structured interface between science and policy

The POPs Review Committee within the Stockholm Convention illustrates how scientific subsidiary bodies within international environmental governance frameworks translate technical evidence into policy-relevant assessments. The Committee's consideration of scientific information from academia, industry, and governments creates a structured interface between diverse knowledge sources and regulatory decision-making processes. The upcoming consideration of polybrominated dibenzo-p-dioxins and dibenzofurans demonstrates how these mechanisms address complex chemical exposures, including unintentionally released substances formed during thermal processes involving materials containing bromine or chlorine, such as plastics treated with flame retardants.

7.4 ECONOMIC-ENVIRONMENTAL BALANCE IN CHEMICAL GOVERNANCE

The Stockholm Convention's effectiveness depends not only on prohibiting harmful POPs but also on ensuring the availability of viable alternatives that maintain economic functionality while protecting human health and environment. This dual requirement reflects the understanding that sustainable chemical governance must address both hazard elimination and economic continuity, particularly in developing countries with varying technical capacities and economic constraints. The emphasis on alternatives assessment builds on lessons learned from earlier environmental policies where prohibitions introduced without feasible substitution options created implementation challenges. Collaboration with initiatives like the Global Framework on Chemicals extends this approach beyond legally binding substances to related chemicals that influence decision-making, helping to avoid regrettable substitutions and support more comprehensive governance strategies.

PRECAUTIONARY PRINCIPLE IN MULTILATERAL ENVIRONMENTAL LAW

Article 8 of the Stockholm Convention explicitly provides a framework for precautionary decision-making in the presence of scientific uncertainty. It requires the Conference of the Parties, taking due account of the recommendations of the Persistent Organic Pollutants Review Committee, including any scientific uncertainty,

to decide in a precautionary manner whether to list a chemical in Annexes A, B and/or C. This reflects the recognition that lack of full scientific certainty should not delay protective action, particularly given the risks posed by persistent organic pollutants that accumulate in environmental and biological systems and may result in continued harmful exposures if action is postponed.



SECTION 8 - NEW INSTITUTIONAL MECHANISMS: THE GLOBAL FRAMEWORK ON CHEMICALS

Kay Williams

Head, Global Framework on Chemicals

“The Global Framework on Chemicals is multisectoral, it is multistakeholder. It doesn't have that regulatory stick, but it has lots of carrots and many people around the table that can work together in that voluntary fashion, and that has tremendous value”.

8.1 KEY TAKEAWAYS

- The Global Framework on Chemicals (GFC) represents a major institutional evolution focused on urgent, measurable implementation across the entire value chain, engaging new actors like the finance sector.
- The broad and multisectoral nature of the GFC allows for the private sector and civil society to be at the table so that decisions and actions are inclusive and effective for issues such as EDCs.
- The framework is highly dependent on external scientific bodies and seeks to establish a close partnership with the new Intergovernmental Science Policy Panel.

8.2 MULTI-STAKEHOLDER GOVERNANCE ARCHITECTURE

Departure from traditional diplomatic frameworks

The Global Framework on Chemicals For a planet free of harm from chemicals and waste represents a fundamental departure from traditional government-to-government diplomacy by establishing 28 measurable political targets and engaging businesses, financial institutions, and civil society as essential actors for transformational change.

Building upon the analysis of existing legal mechanisms that can enable precautionary action, this framework examines new institutional approaches specifically designed to bridge the science-policy gap and accelerate implementation across multiple sectors.



SCIENTIFIC DEPENDENCE AND INSTITUTIONAL COORDINATION

Unlike legally binding conventions, academics have an equal voice in the negotiations. The emerging partnership with the Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution, however, represents a critical relationship for providing independent scientific guidance while maintaining institutional autonomy.

This architecture enables rapid response to emerging chemical concerns while avoiding the bureaucratic constraints that can delay action in more traditional regulatory frameworks.

8.3 GLOBAL IMPLEMENTATION PROGRAMS

Sectoral coordination mechanisms

The framework operationalizes its implementation focus through two distinct global implementation programs designed with common components but sufficient flexibility to address diverse stakeholder needs. One focuses on strengthening national chemicals management systems and the second focuses on economic and industry sectors. The institutional structures and regulation program coordinates with legally binding conventions like the Stockholm Convention to address EDCs through existing regulatory frameworks. The sectoral programs sit under the second global program and target chemically intensive industries— textiles, electronics, healthcare, and buildings and construction— representing a novel approach to coherent industry-specific governance. Financial sector engagement, potentially as a cross-cutting theme, involves partnerships with banks and organizations like UNEP Finance Initiative to leverage investment decisions as governance tools. Additional mechanisms include the potential Global Alliance on

Highly Hazardous Pesticides, which would specifically target pesticides with endocrine-disrupting properties, complementing the framework's sectoral implementation programs.

8.4 STRATEGIC POSITIONING OF VOLUNTARY GOVERNANCE

The GFC's nature creates both opportunities and constraints that distinguish it from regulatory frameworks while offering unique value propositions for international chemical governance. The absence of regulatory authority means the framework operates through leadership and incentives rather than enforcement, requiring careful strategic positioning to identify issues where multisectoral and multistakeholder approaches can add meaningful value. The multi-stakeholder platform enables collaboration among diverse actors who might not engage through traditional regulatory channels, creating potential for innovative solutions and broad-based commitment. However, this voluntary structure necessitates clear criteria for selecting issues where the framework's approach proves most effective, particularly for complex challenges like EDCs where regulatory gaps persist.



SYNTHESIS AND STRATEGIC PERSPECTIVES



Jane Muncke - Food
Packaging Forum



Mickaël Repellin - PIRSE-IEHRI and
University of Lausanne

SCIENTIFIC CONSENSUS AND REGULATORY TRANSFORMATION NEEDS

The scientific foundation for action reached unambiguous clarity through the roundtable discussions. "The science is undeniable"—a conclusion that synthesizes the evidence presented across all expert interventions. This consensus extends beyond simple hazard identification to encompass the methodological frameworks needed for appropriate EDC evaluation, the economic quantification of global impacts, and successful examples of science-to-policy translation. However, this scientific clarity contrasts sharply with regulatory frameworks that remain anchored in obsolete principles.

The need for "a 21st-century overhaul" of chemical regulations becomes particularly urgent when considering that 16,325 plastic chemicals have been identified, making traditional chemical-by-chemical approaches practically impossible and methodologically inappropriate for substances operating through endocrine mechanisms.

CAPACITY BUILDING AS CROSS- SECTORAL IMPERATIVE

Effective EDC governance requires capacity building that extends far beyond traditional scientific or regulatory communities.

Regulators need enhanced understanding of endocrinological principles that differ fundamentally from classical toxicology. Politicians require accessible information that connects scientific evidence to policy options without technical complexity that obscures essential messages. Citizens need communication strategies that make chemical science fascinating and comprehensible rather than intimidating. Most critically, the finance sector emerges as a crucial leverage point, since "money makes the world go round" and long-term investors who understand the health and economic consequences of their investments can drive market transformation more rapidly than regulatory processes alone.

INSTITUTIONAL INNOVATION AND GOVERNANCE COORDINATION

The emergence of unprecedented institutional frameworks—the Global Framework on Chemicals and the Intergovernmental Science-Policy Panel on Chemicals, Waste and Pollution—creates opportunities for stronger coordination between scientific assessment and policy implementation. These institutions offer potential to "draw strong lines" connecting scientific evidence to regulatory action, but their effectiveness depends on overcoming current organizational challenges and establishing clear collaborative relationships. The economic evidence supporting this institutional development proves compelling: EDC exposure costs exceed plastics industry revenues, demonstrating that current governance approaches create massive economic inefficiencies alongside public health harms.

NATIONAL IMPLEMENTATION ACCELERATION THROUGH INTERNATIONAL COORDINATION

Effective EDC governance requires international frameworks that accelerate national-level policy development rather than replacing it.

The Peruvian case study illustrated how strategic institutional coordination can enable rapid translation from research findings to policy implementation within single budget cycles. However, this success depends on having "clear information to trigger action from policymakers"—information that connects scientific evidence to practical policy options, cost assessments, and implementation strategies. International coordination becomes essential not just for addressing the global nature of chemical production and trade, but for providing national governments with tested approaches, technical assistance, and political support for taking precautionary action while acknowledging scientific uncertainty.

INTEGRATION IMPERATIVES AND MULTI-SECTORAL ENGAGEMENT

EDC governance cannot succeed through environmental policy alone but requires integration across health, labor, finance, and economic sectors. This integration reflects both the multi-system impacts of endocrine disruption and the multi-sectoral nature of effective solutions. The science-policy interface must evolve beyond traditional academic-regulatory channels to include media engagement, corporate accountability mechanisms, financial sector involvement, and legal pressure where necessary. The path forward demands recognition that EDC governance represents a governance transformation challenge rather than simply a chemical management problem.

There is a clear recognition that sufficient scientific evidence exists to justify immediate action through transformed governance approaches that align institutional capacity with the scale and complexity of EDC exposure and impact.

