



Briefing for Soils for Europe

S Y S T E M I Q

Our journey into hazardous chemicals

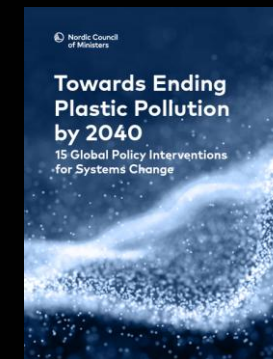
OUR PURPOSE

Systemiq's purpose is to accelerate systemic change for a **prosperous, net-zero world**

From turning the tide of ocean plastics, to creating businesses that safeguard the world's tropical forests, Systemiq focuses on reshaping the connections between economic and natural systems. We deliver on our purpose by applying this expertise in areas that will make the biggest impact in combating climate change, safeguarding our natural world and building human prosperity.



Breaking the Plastic Wave
(2020)



Plastic Treaty Scenarios
(2023, 2024)

ABOUT THE REPORT



The report provides a comprehensive global assessment of harms of four chemical groups widely used in the food system and solutions to reduce them

Moving from diagnosis to action:

The report offers clear, evidence-based recommendations to drastically reduce chemical exposures and move towards a safer chemical economy.

Groups of chemicals in scope:

- **Phthalates** – Large group of chemicals generally used to soften materials (plasticizer), most notably PVC
- **Bisphenols** – Class of chemicals, best known being BPA, among the world's most widely-manufactured chemicals
- **Pesticides** – Diverse range of chemicals designed to kill living organisms (e.g., pests) but often strike beyond their targets
- **PFAS** – ~15,000 chemicals used across the economy known as “forever chemicals” due to their persistence

Note: While micro- and nano-plastics (MNPs) are of concern, the evidence on their human health impacts is less advanced

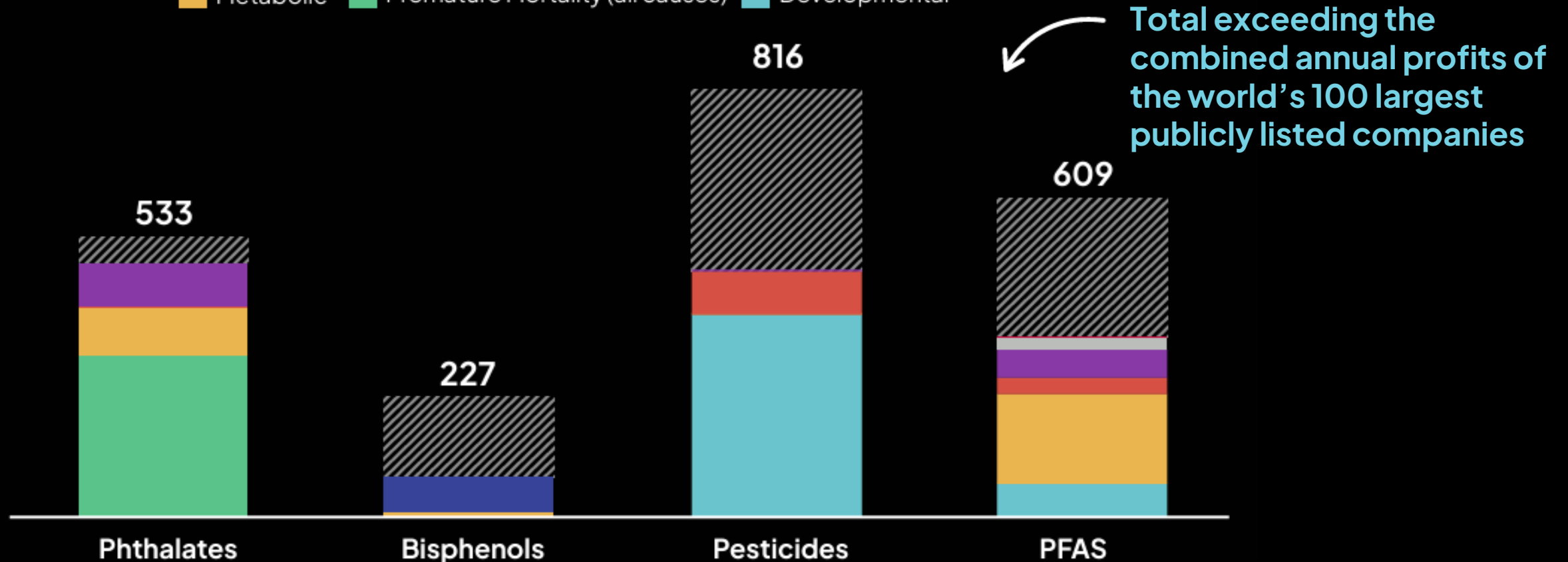
Harms in scope:

- **Human health**
- **Fertility**
- **Ecosystems (partial)**

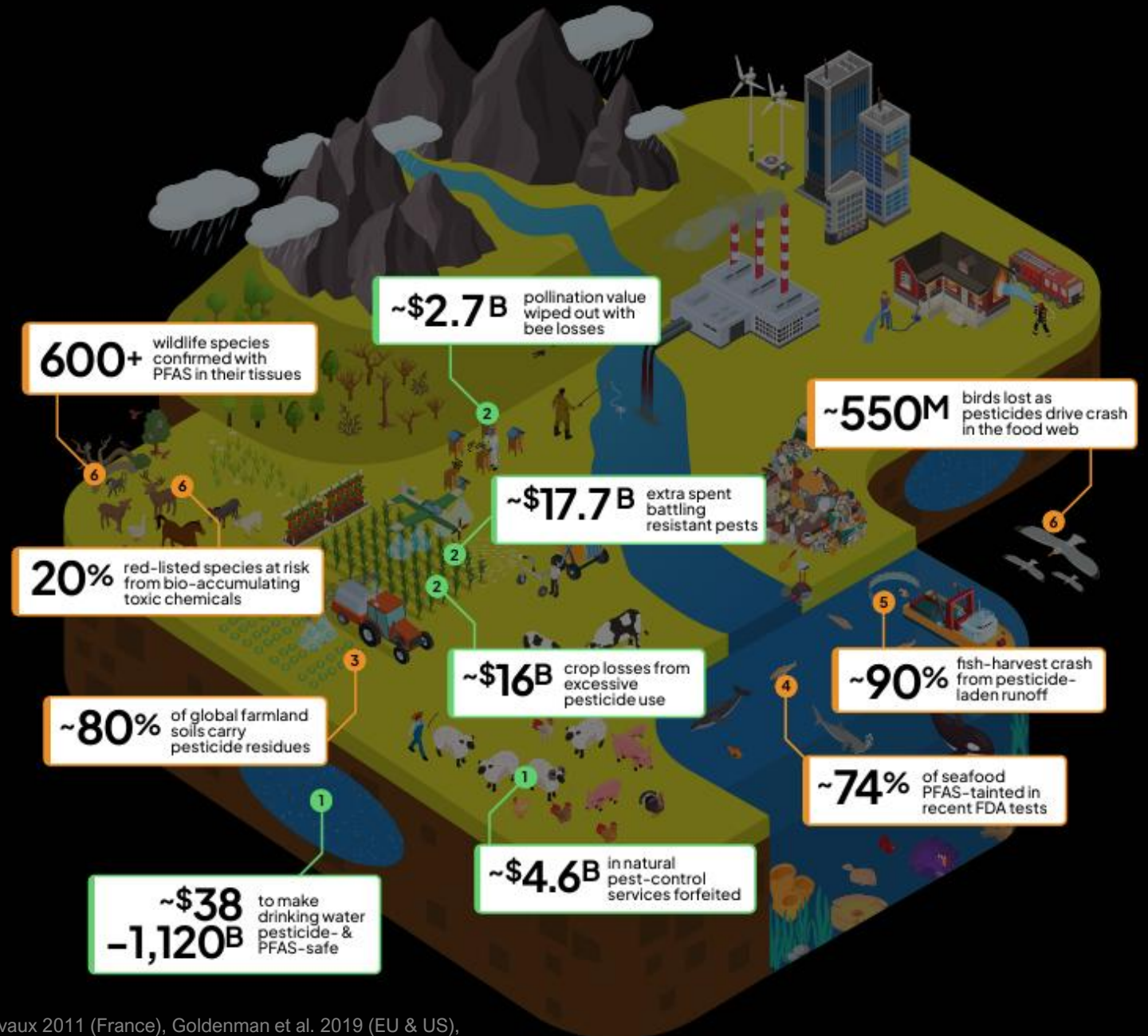
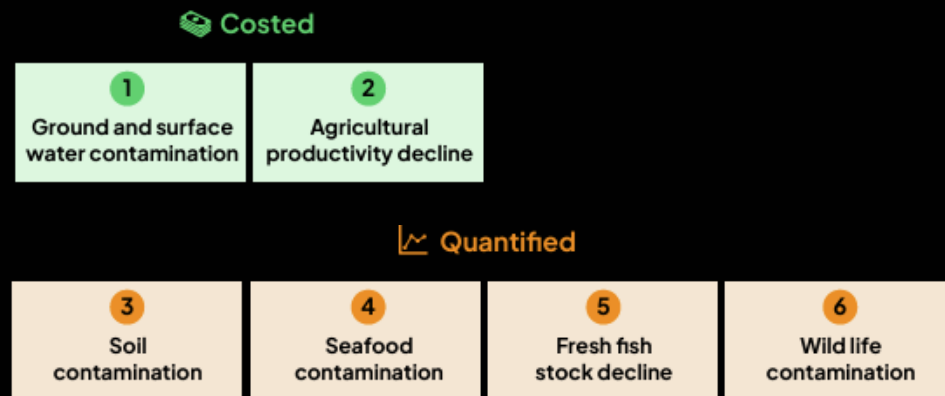
Human health costs of four toxic chemicals in the food system is conservatively estimated at **\$1.4–2.2 trillion** per year (2–3% of global GDP)

Billion USD, 2023

▨ All extrapolated health impacts Respiratory Circulatory Cancer Reproductive Endocrine
Metabolic Premature Mortality (all causes) Developmental



Annual ecological harms amount to at least \$640B but capture the ‘**tip of the iceberg**’ as most ecosystem impacts remain unpriced

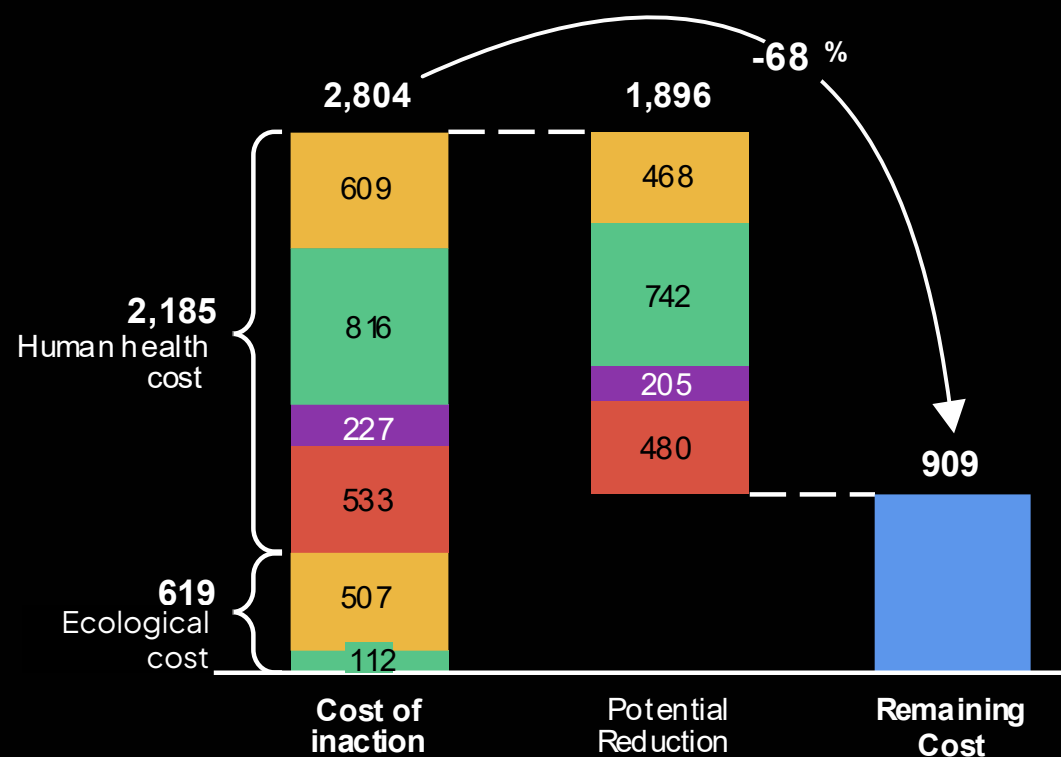


Sources: Adapted from Wee & Aris (2023). Ecological impact sources: 1. Bommelaer & Devaux 2011 (France), Goldenman et al. 2019 (EU & US), 2: Pimentel (2005), 3: FAO (2021), 4: FDA (2022), 5. Yamamuro, M. et al. (2019), 6: Rigal, S. et al. (2023), 6: ChemSec; Andrews, D.Q. et al. (2023)

Reductions could cut global human health and ecological costs by ~\$1.9 trillion annually, or roughly 3% of global GDP

Total costs and potential reduction
Billion USD, 2023

Phthalates Bisphenols Pesticides PFAS



Assumed reduction:

- ↓90% Phthalates (based on observed EU reduction)
- ↓90% Bisphenols (assumes similar reduction as phthalates)
- ↓80% Pesticides (toxicity and volume adjusted)
- ↓42% PFAS (currently feasible volumes only)



Pesticides

Diverse range of chemicals designed to kill living organisms (e.g., pests) but often strike beyond their targets

● Strong evidence of hazard for subset of group, or entire group ● Evidence of hazard for subset of group, or suspected widely



Toxic to reproduction



Endocrine disrupting



Carcinogenic



Mutagenic



Skin sensitizing



Respiratory sensitizing



Persistent, bioaccumulative, toxic (PBT/vPvB)



Persistent Organic Pollutant (POP)

Food system uses:



Crop protection: herbicides, insecticides, fungicides



Seed treatments



Post-harvest treatments



Water/soil fumigation

Other uses:



Vector control (mosquitoes, public health)



Non-agricultural pest/weed control (gardens, forestry)

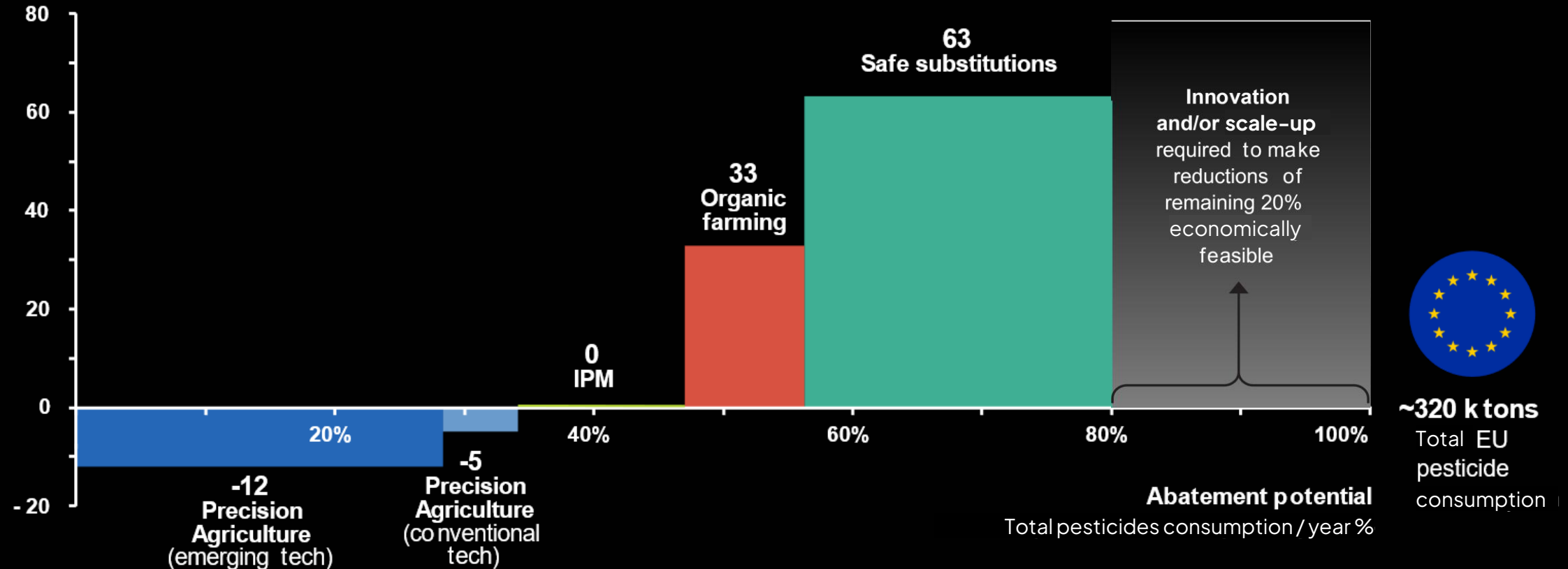


Biocides, disinfectants

In the EU, an 80% reduction in pesticide use can be achieved at ~\$5 billion annual costs

(\$1000/year, based on 2023 pesticide usage, illustrating direct, current costs only)

Costs of pesticides use reduction
\$ thousand / tonnes



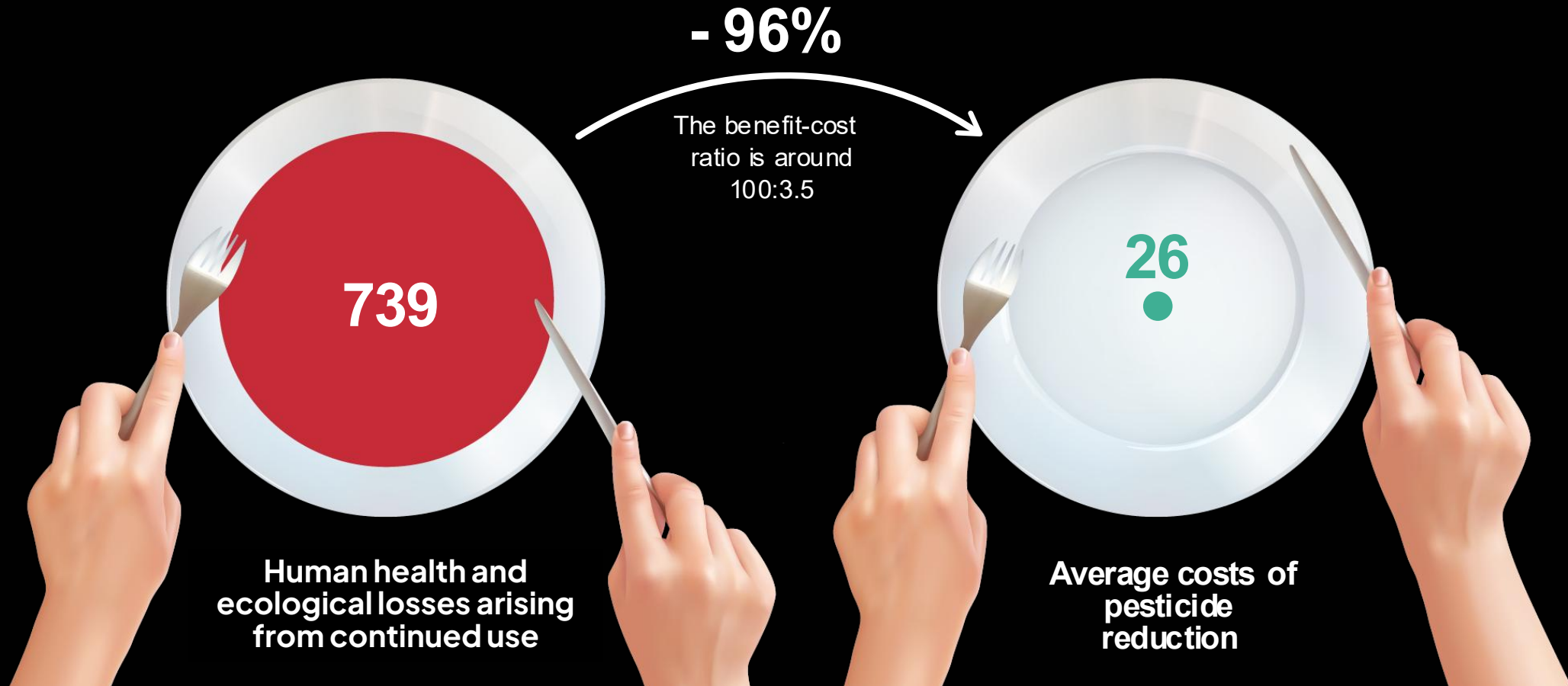
Source: Systemiq analysis

Note: IPM costs are set to zero to ensure the analysis remains generalisable across diverse farming contexts. In practice, IPM performance is highly context-dependent (crop type, regional conditions, specific measures used, implementation quality), yet evidence shows that holistic IPM programmes often become cost-neutral or cost-saving over time.

S Y S T E M I Q

Reducing harmful pesticide use is ~30× more cost-effective than business as usual

Comparisons of harms from inaction and pesticide reduction costs in the EU



EU's Food and Feed Safety Omnibus

– one step forward, **two steps back**

Biologics Fast Track

EU biocontrol approval currently takes 10-15 years – 3-5x longer than in Brazil or the US.

Omnibus offers a **partial fix**.

- Tacit agreement **mutual recognition for low-risk products** between EU member states
- **Provisional authorisations** - faster market entry while review continues
- Parliament biocontrol resolution: **90.8% support** across party lines
- ⊗ **Fails to address lack of dedicated EFSA capacity**
- ⊗ **Removes record keeping** necessary to track impact
- ⊗ **Definition incl. problematic synthetic compounds**

Conventional pesticide deregulation

"The Omnibus proposal moves the EU in the wrong direction - increasing risks to human health and the environment, reducing incentives for safer alternatives."

- Scientists from 27 EU research institutions, Science (2026)

Omnibus proposes:

- **Unlimited approval** instead of 10-15-year review cycle
- **Grace period extended** from 6-18 months to 3 years
- Member States **no longer able to revise authorizations based on latest evidence**

Achieving this transition demands combined action from regulators, industry, and investors, as well as civil society

Above all, clear, binding phaseout timelines are needed, affording certainty to industry, expediting cost declines through scale, and stimulating innovation.

Overview of policy recommendations



STOP using toxic chemicals we already know are harmful

- ✗ Ban and phase out highly hazardous chemical groups with clear deadlines
- ✗ Strengthen enforcement through biomonitoring, food & water testing, and supply chain transparency
- ✗ Prohibit production and exports of chemicals restricted domestically
- ✗ Strengthen liability frameworks so producers are incentivized to identify and phase out hazards



PREVENT toxic chemicals reaching people and ecosystems

- ⚠️ Adopt precautionary, hazard-based regulation
- ⚠️ Require pre-market proof of safety based on independent scientific assessment ("no data, no market")
- ⚠️ Monitor unforeseen harms through post-market surveillance
- ⚠️ Apply systematic review methods to weigh all scientific evidence transparently



REALIGN incentives and redesign systems

- ✓ Reform fiscal and regulatory incentives to reward lower toxicity.
- ✓ Fund time-bound innovation missions to accelerate solutions in hard-to-replace uses or critical exposure pathways
- ✓ Drive product & system redesign to eliminate unnecessary chemical use
- ✓ Embed hazard literacy and safe-by-design principles in STEM education and industry training

Thank you!

EXPLORE THE FULL REPORT

Invisible ingredients

Tackling toxic chemicals
in the food system

Reach out: felix.cornehl@systemiq.earth
www.systemiq.earth/invisible-ingredients

