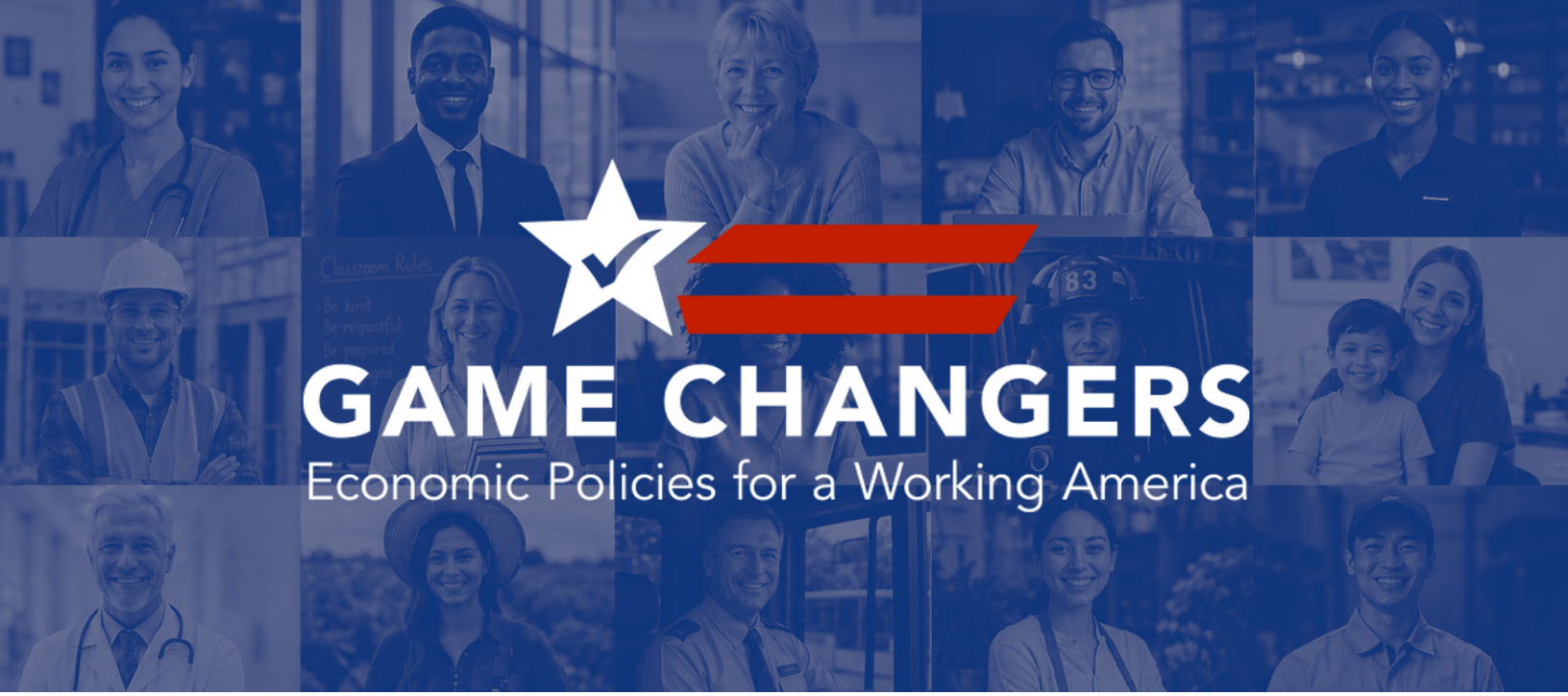

BACKGROUND PAPER / JULY 2026

Chemicals Without Harm Act

BY JOEL A. TICKNER

POLITICAL ECONOMY RESEARCH INSTITUTE
PERI
University of Massachusetts Amherst

Chemicals Without Harm Act

By Joel A. Tickner

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Executive Summary

The U.S. chemical industry underpins nearly all manufactured goods and has delivered significant economic and sustainability benefits to society. Yet its fossil-fuel-dependent growth has produced profound and ongoing harms to human health, ecosystems, and the climate. Chemical pollution, toxic legacy sites, plastic waste, and disproportionate impacts on low-income and marginalized communities reflect decades of externalized costs that are not captured in market prices. Our current fragmented chemicals policy—anchored in the outdated Toxic Substances Control Act and its 2016 Lautenberg Amendments—has proven reactive, slow, and ineffective, regulating only a small fraction of chemicals in commerce while failing to incentivize innovation in safer chemistry. As a result, hazardous chemicals remain pervasive across value chains, and the chemical industry and sectors that depend on them have little incentive or motivation for change. This situation locks in the industry's current molecules and processes, along with their environmental and health impacts, while obstructing its path towards sustainability, ultimately imposing on society hundreds of billions of dollars annually in avoidable health and remediation costs.

The Chemicals Without Harm Act proposes a comprehensive, prevention-oriented transformation of U.S. chemicals policy and the chemicals economy itself. It represents a bold omnibus policy and long-term industrial strategy that coordinates government activities to achieve a clear goal: A safe, sustainable and vibrant chemicals sector that creates good jobs and brings societal benefits. It builds from lessons of inadequate policies and takes elements of the most innovative policies globally.

The Act has five pillars:

1. **A *National Chemicals Agency*** to coordinate and strengthen chemicals assessment and policy across the federal government, modeled after efforts in Europe.

2. ***A Comprehensive Chemicals Policy*** that increases information on chemical hazards; rapidly prioritizes chemicals for action, including restrictions on the most toxic chemicals and materials; and incentivizes the development and adoption of safer alternatives.

3. **A *Chemical Industry Roadmap*** that establishes a national industrial policy for transitioning the industry towards innovation, resilience, safety, and sustainability.

4. **A *National Remediation Fund*** to clean up legacy pollution while supporting real community engagement and redevelopment, paid for by the corporations and government agencies responsible for the impacts.

5. **A *National Transition Fund*** for the development and deployment of safer and more sustainable chemicals and manufacturing processes and for the transition of workers and communities.

Funded by the companies and government entities that created past and current industry impacts, internalizing costs, the Act aims not only to clean up the legacy of past harms, but to reposition the U.S. chemical industry as a modern, resilient, and innovative sector that delivers health, environmental protection, good jobs, and long-term economic value.

Introduction

"What we can learn from the environmental impact of the petrochemical industry is that the industry needs to be redesigned to fulfill the needs of society, rather than its own internal economic logic; and to accord with the imperatives of the ecosphere and of the enhancement of human welfare."

– Barry Commoner, 1973[1]

Chemistry and products of the chemical industry are inextricably intertwined in our daily lives. The chemicals and materials that are embedded in more than 96% of manufactured goods have significantly contributed to economic development and job creation. But this has come at a cost. The chemical industry – whose exponential growth was dependent on abundant and cheap fossil fuels - is the largest industrial energy user and greenhouse gas emitter and a significant contributor to the chemical pollution and plastics waste crises that threaten human and ecosystem health. The industry's important contributions to society have been offset by its legacy of contamination, community impacts, and disease.[2]

What was once an engine of innovation and invention has today become a dinosaur focused primarily on new market creation and financial returns. This has resulted in an unimaginative and rigid industry that locks in impacts, is vulnerable to disruption, and is unable to pivot towards new manufacturing processes, chemicals, materials and products that meet societal needs yet are safer and more sustainable.[3] The supply chains that depend on the industry and the investors that benefit from the industry's artificially cheap fossil-based production have reinforced this situation. Workers, communities, and ultimately taxpayers meanwhile pay for the externalized costs of damage to public and planetary health.

Public policy in the United States has largely reinforced this dysfunctional status quo. The industry is governed by a disjointed, reactive, and largely ineffective set of laws and policies at the federal level that regulate only a small percentage of chemicals on the market today. As such, there are few drivers or incentives for companies to invest in safer and more sustainable chemicals and processes.[4]

The exponential growth of the chemical industry and its products is one of the great success stories of global industrialization. However, the current generation of chemicals and materials were designed based only on fulfilling functional needs, not sustainability.[5] In 1973 Biologist Barry Commoner estimated that the benefits of petrochemicals in terms of jobs and economic value were far outweighed by the industry's adverse impacts on society.[6] Yet federal policy to date has failed to internalize these

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[1]Commoner, B. (1973). The Environmental Impact of Chemical Technology. Proceedings American Chemical Society Southeast Regional Meeting, Charleston, SC, Nov. 7-9: 49-70.

[2] Tickner, J. K. Geiser, and S. Baima. (2021). Transitioning the Chemical Industry: The Case for Addressing the Climate, Toxics, and Plastics Crises. *Environment: Science and Policy for Sustainable Development* 63:6, 4-15.

[3] Tickner, J. (2026). The time has come to fully reimagine the chemical industry. Chemical & Engineering News. April 29. https://cen.acs.org/articles/104/web/2026/04/chemical-industry-restructure-resilience-toxic-waste-climate-steel-energy-renewable-hexion-solugen.html (Accessed May 26, 2026).

[4] Tickner, J. (2014). Chemicals Policy in the United States – The Need for New Directions. In Kleinman, D et al. Controversies in Science & Technology Volume 4. Oxford University Press: 183-195

[5]Turner, R, J. Tickner, and M. Jacobs. (2025). How to Catalyze a Safer and More Sustainable Chemical Industry. Issues in Science and Technology. Summer 2025: pp 64-69. https://issues.org/safer-sustainable-chemistry-industry-turner-tickner-jacobs/. (Accessed May 26, 2026).

[6] Commoner, B. (1973). The Environmental Impact of Chemical Technology. Proceedings American Chemical Society Southeast Regional Meeting, Charleston, SC, Nov. 7-9: 49-70.

costs into the costs of products of the industry and to incentivize more sustainable solutions. It is time to build a better chemical industry.

The *Chemicals Without Harm Act* aims to fix the nation's failed chemicals management infrastructure by creating a comprehensive policy framework to clean up the messes of the past, more effectively and holistically regulate present-day chemistries and chemical processes, and drive innovation and adoption of safer and more sustainable chemicals and materials to build a vibrant chemical industry for the future. In so doing it aims to internalize the industry's externalized costs to society including its contributions to climate change, chemical pollution and plastics waste, and the human health and ecosystem costs associated with these. Further, it aims to shift incentives away from polluting fossil fuel-based chemistry to sustainable, low carbon, circular, and safer chemicals and materials that can support domestic manufacturing, job creation, and supply chain resilience.

For the purposes of this background paper, we refer to the chemical industry broadly to include both industrial chemicals and pesticides.[7] These primarily fossil-fuel-based organic chemicals make up the main share of chemicals produced and on the market in the U.S. today. Bulk (basic or commodity chemicals) are produced in the highest quantities. These are the building blocks of most downstream chemistry, and competition is based generally on cost and new market creation, rather than innovation or sustainability. Commodity polymers (plastics) like polyethylene and PVC fit into this category. Specialty chemicals, including pharmaceuticals, electronics chemicals, consumer chemicals, and many agricultural chemicals tend to compete more on innovation, and, for consumer products in particular, on safety and sustainability. Research and development spending on commodity chemicals amount to only 2–3% of revenues, lagging well behind research and development spending on specialty chemicals (4–8%) and pharmaceuticals (10–25%).[8]

Impacts of the Chemical industry on Health and the Environment

The impacts of chemicals on health and environment have been well established for decades (or in some cases centuries), but the meteoric rise of the industry in the mid-20th century led to greater understanding of the industry's widespread and global impacts.

Climate impact

The chemical industry is integrally connected to fossil fuels both as a feedstock and an energy source. More than 90% of chemicals produced today are fossil-based. Chemicals represent only a relatively small part of overall fossil fuel use today (about 4-8% of global oil consumption, mostly for plastics). However, analyses indicate that as fossil fuel use in energy and transportation decline, chemicals and materials will be the main outlet for growth in the future.[9]

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[7] Inorganic fertilizers, an important chemical industry output (with the main production process dependent on fossil fuels) are not addressed directly in this paper.

[8] American Chemistry Council. (2020). 2020 Guide to the Business of Chemistry. https://www.americanchemistry.com/chemistry-in-america-industry-innovation-impact/chemical-industry-statistics-u.s.-jobs-economic-impact/resources/2020-guide-to-the-business-of-chemistry (Accessed May 26, 2026).

[9] Gardiner, B. (2025). The Fossil-Fuel Industry Has a Plan to Drown Earth in Plastic. Scientific American. November 18. https://www.scientificamerican.com/article/how-fossil-fuel-companies-are-driving-plastic-production-and-pollution/ (Accessed

The chemical industry is currently the largest single industrial energy user and CO_2 emitter in the US. The petrochemical industry accounts for 30% of industrial energy demand and 10% of energy demand globally, outstripping the iron, steel, and cement sectors combined. Annually, it emits 1.5 Gt of CO_2 globally, 18% of the industrial sector's greenhouse gas emissions, mostly driven by a small number of basic chemicals. Nearly 85% of the chemical industry's CO_2 emissions come from its energy usage, with the remaining 15% generated as process emissions.[10] Some of the carbon is stored in plastics that eventually release it into the atmosphere when burned or degraded. It is estimated that 0.9 tons of CO_2 equivalent emissions are generated for every ton of plastic burned.[11]

Health and ecosystem impacts

Products of the chemical industry have caused well known impacts, ranging from depletion of the ozone layer (chlorofluorocarbons) to the near loss of the bald eagle (DDT) to PCB contamination affecting children's neurological development. In many cases, these impacts were understood for decades before remedial action took place.[12] Chemical accidents were responsible for calamities including the 1984 Bhopal India disaster that killed thousands, and past chemical disposal created hazardous waste sites like the one in Love Canal near Buffalo, NY, that have decimated communities across the country.

The health and ecosystem impacts of chemicals are pervasive and span their life cycles, from worker and community exposures during production, to consumers, workers, and ecosystems during their use, and again to workers, communities, and ecosystems at end of the product life cycle. The Collaborative *on Health and Environment* links chemical exposures to more than 180 different illnesses.[13] The *World Health Organization* conservatively estimates that 1.6 million lives and 45 million disability-adjusted life-years were lost in 2016 due to exposures to selected chemicals.[14] The *United Nations Global Chemicals Outlook II* noted that known or suspected health impacts from chemical exposures, such as cancer, neurological damage, and reproductive damage, may be responsible for health costs equal to as much as 10% of global GDP.[15] Recent analyses estimate that exposures to just four groups of chemicals (PFAS, phthalates, bisphenols, and pesticides) generate $2-$3 trillion per year in preventable societal costs globally.[16] Scientists have concluded that society has already reached the limit of a "safe operating

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May 26, 2026); Larson, M. and P. Tilsted. (2024). The future of fossil fuels, chemicals, and feedstocks: Outlining a research agenda on the role of China in the global petrochemical industry. Energy Research & Social Science. Vol 118, Dec.: 103750.

[10]International Energy Agency. (2018). Future of Petrochemicals: Towards more sustainable plastics and fertilizers. https://www.iea.org/reports/the-future-of-petrochemicals (Accessed May 26, 2026).

[11]Center for International Environmental Law (2019). Plastic & Climate: The Hidden Costs of a Plastic Planet. https://www.1%.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf (Accessed May 26, 2026).

[12] European Environment Agency. (2002). Late Lessons from Early Warnings: The Precautionary Principle. 1896-2000. Copenhagen; Markowitz, G. and D. Rosner. (2013). Deceit and denial: The deadly politics of industrial pollution. Univ of California Press.

[13] Collaborative on Health and the Environment. The CHE Toxicant and Disease Database, https://www.healthandenvironment.org/resources/toxicant-and-disease-database/ Accessed May 26, 2026).

[14] World Health Organization. (2016). The Public Health Impact of Chemicals: Knowns and Unknowns. World Health Organization International Programme on Chemical Safety WHO/FWC/PHE/EPE/16.01, 2016. https://www.who.int/publications/i/item/WHO-FWC-PHE-EPE-16.01-eng (Accessed May 26, 2026).

[15] United Nations Environment Programme. (2019). Global Chemicals Outlook II – From Legacies to Innovative Solutions: Implementing the 2030 Agenda for Sustainable Development. https://www.unep.org/resources/report/global-chemicals-outlook-ii-legacies-innovative-solutions (Accessed May 26, 2026).

[16] Systemiq. (2025). Invisible ingredients: Tackling toxic chemicals in the food system. https://www.systemiq.earth/reports/downloads/Systemiq-Invisible_Ingredients-Tackling_toxic_chemicals_in_the_food_system-EN.pdf (Accessed May 26, 2026).

space" for "novel entities", noting that annual production and releases of chemicals are increasing at a pace that outstrips the global capacity for assessment and monitoring.[17]

About 124 million people, 39% of the U.S. population, live within three miles of approximately 12,500 chemical facilities at high risk for accidents. Low-income communities and ethnic or racial minorities are often most heavily impacted by chemical impacts. Fenceline communities - those living near industrial facilities - are significantly impacted by the cumulative effects of chemical manufacturing plants in their communities from routine emissions as well as accidental spills. Neighborhoods near chemical and energy production facilities in the US have African American and Latino populations 75% and 60% higher, respectively, than the national average and 50% higher poverty rates.[18] Hazardous chemical waste treatment and disposal facilities likewise are disproportionately located in poor and minority communities, exacerbating cumulative pollution burdens on top of higher rates of food insecurity, greater vulnerability to disease, and limited access to health care.[19] A 2022 report of a United Nations Special Rapporteur found that ongoing toxic contamination is causing environmental injustices and creating "sacrifice zones," impacting the right to health of African American communities in Louisiana's aptly named "Cancer Alley," a 60-mile stretch of the Mississippi River with a concentration of over 100 chemical and energy facilities.[20]

There are approximately 1,340 active sites on the Environmental Protection Agency's National Priorities List (NPL), also known as Superfund.[21] These are located disproportionately in minority and poor communities, and represent the most contaminated sites in the nation needing long-term cleanup. While EPA has attempted to recoup cleanup costs from responsible parties, the cost to taxpayers for cleanup and oversight costs runs into the billions of dollars. Moreover, this is a gross underestimate of the total number of hazardous waste sites in need of remediation. For example, the Department of Defense reported in 2014 that it had nearly 39,000 sites needing cleanup with more than $58.6 billion in environmental liabilities.[22] The state of California estimates that it has as many as 200,000 hazardous waste cleanup sites.[23] The state of Minnesota estimates that waste water treatment and cleanup costs

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[17] Persson, L, et al. (2022). Outside the Safe Operating Space of the Planetary Boundary for Novel Entities. Environmental Science & Technology. Vol 56, Issue 3. https://pubs.acs.org/doi/10.1021/acs.est.1c04158 (Accessed May 26, 2026).
[18]Orum, P., et al. (2014). Who's in Danger? Race, Poverty, and Chemical Disasters: A Demographic Analysis of Chemical Daster Vulnerability Zones. Environmental Justice and Health Alliance For Chemical Policy Reform. https://comingcleaninc.org/assets/media/images/Reports/Who's in Danger Report FINAL.pdf (Accessed May 26, 2026).
[19] Bullard, R. et al. (2008). Toxic wastes and race at twenty: Why race still matters after all of these years. Envtl. L., 38, 371.
[20] United Nations Human Rights Council. 2022. The right to a clean, healthy and sustainable environment: non-toxic environment Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment. A/HRC/49/53, January 12. https://docs.un.org/en/A/HRC/49/53 (Accessed May 26, 2026).
[21] US General Accountability Office. (2025). Superfund: Many Factors Can Affect Cleanup of Sites Across the U.S. GAO-25-108408, August 9. https://www.gao.gov/products/gao-25-108408 (Accessed May 26, 2026; Azhar, M. et al. Equitable cleanup of Superfund sites leaving no US community behind. Nature Communications 16, no. 1 (2025): 8584.
[22] Gomez, J. (2015). Numbers of Contaminated Federal Sites, Estimated Costs, and EPA's Oversight Role. Testimony Before the Subcommittee on Environment and the Economy, Committee on Energy and Commerce, House of Representatives. September 11. https://www.gao.gov/assets/gao-15-830t.pdf (Accessed May 26, 2026).
[23] California Department of Toxic Substances Control. (2021). 2021 Report on Estimated Direct Site Remediation Costs. https://dtsc.ca.gov/wp-content/uploads/sites/31/2021/08/2021-State-and-NPL-Orphan-Site-Report-Final-5.pdf (Accessed May 26, 2026)/.

for per- and polyfluoroalkyl substances (PFAS), just one set of toxic chemicals, could surpass $28 billion over the next 20 years.[24]

Plastics waste

One of the most visible impacts of the chemical industry is plastic waste. The properties that make plastics so attractive (durability, water resistance, lightweight) also make them highly problematic when released into the environment as waste. Single-use plastics are the most common plastic product, accounting for one-third of all polymer production. Plastics create a global pollution crisis whether they are incinerated (releasing toxic dioxins and metals), dumped in landfills, or enter the ocean.[25] Today 98% of single-use plastics are manufactured from new ("virgin") feedstocks.

Due to material complexity, limited systems of collection, and cost and market limitations, global recycling rates for most plastics are less than 10-15%.[26] Only 9% of the 6.3 billion tons of plastic produced up to 2015 have been recycled.[27]

In addition to plastics waste, there are serious concerns about the monomers (building block chemistries) used to make plastics, many of which are toxic and especially impact fenceline communities; the impacts of thousands of chemicals added to plastics to make them functional, which can hinder their recyclability; and the dangers of microplastics and nanoplastics, including their accumulation in our bodies and ecosystems with impacts including cellular-level damage.[28]

Monetary valuation of impacts

Studies on the monetary value of the health and ecosystem costs of toxic chemicals vary in coverage and methodology.[29] For the purposes of this paper, a useful starting point is the 2025 Systemiq analysis of exposure to four groups of chemicals - phthalates, pesticides, bisphenols, and PFAS – which estimated the associated health costs in North America to be $945 per person per year (in 2023 dollars), equivalent to $342 billion per year for North America as a whole.[30] For asbestos, another well-studied chemical, disease-related health costs and lost productivity have been estimated at approximately $86 billion per

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[24] Barr Engineering Company. (2023). Evaluation of Current Alternatives and Estimated Cost Curves for PFAS Removal and Destruction from Municipal Wastewater, Biosolids, Landfill Leachate, and Compost Contact Water. Prepared for the Minnesota Pollution Control Agency. May. https://www.pca.state.mn.us/sites/default/files/c-pfc1-26.pdf. (Accessed May 26, 2026).
[25]Geyer, R et al. (2017). Production, use, and fate of all plastics ever made. Science Advances 3, no. 7: e1700782; Wolf, S., et al. (2025). Scientists' warning on fossil fuels. Oxford Open Climate Change, 5(1), kgaf011.
[26]Charles, D and L. Kimman. (2023). *The Plastic Waste Makers Index.* Minderoo Foundation, 2023. https://cdn.minderoo.org/content/uploads/2023/02/04205527/Plastic-Waste-Makers-Index-2023.pdf (Accessed May 26, 2026).
[27]Geyer et al, 2017.
[28] Landrigan, et al. (2023). The Minderoo-Monaco Commission on Plastics and Human Health. Annals of Global Health. Oct;89(1):71; European Environment Agency. (2025). Impacts of microplastics on health. September 19. https://www.eea.europa.eu/en/european-zero-pollution-dashboards/indicators/impacts-of-microplastics-on-health-signal (Accessed May 26, 2026).
[29] See Landrigan, P., et al. (2023). The Minderoo Monaco Commission on Plastics and Human Health. Annals of Global Health Mar 21;89(1):23; Transande, L., et al. (2024). Chemicals Used in Plastic Materials: An Estimate of the Attributable Disease Burden and Costs in the United States. Journal of the Endocrine Society Jan 11;8(2):bvad163; Grandjean, P., and M. Bellanger. (2017). Calculation of the disease burden associated with environmental chemical exposures: application of toxicological information in health economic estimation. Environmental Health 16:123.
[30] Systemiq. (2025). Invisible ingredients: Tackling toxic chemicals in the food system. https://www.systemiq.earth/reports/downloads/Systemiq-Invisible_Ingredients-Tackling_toxic_chemicals_in_the_food_system-EN.pdf (Accessed May 26, 2026).

year in the United States in 2016 (with these costs likely to continue for many years).[31] Combining these, and converting to 2026 dollars, the estimated cost of these chemical-related harms is roughly $450 billion/year. This does not include the additional costs of harms from exposure to other chemicals, the clean-up of contaminated sites, and restoration of damaged ecosystems, which would add billions more. *Conservatively, we can conclude that the total cost of impacts of toxic chemical production, use, and disposal in the U.S. are at least $500 billion per year.*

Failed federal policy

The U.S. system for regulating toxic chemicals in production systems and products is reactive rather than proactive, complex rather than straightforward, and disjointed rather than coordinated. Different types of chemicals are regulated in differing ways, with different information and testing requirements, different assessment approaches, and different thresholds for regulatory action.

This leads to situations where the same chemical is evaluated and regulated differently by separate agencies. Some laws require pre-market evaluation and testing for chemicals, as for pesticides, while in other cases, like cosmetics, no pre-market evaluation is required. Some laws, like the Occupational Safety and Health Act and the Clean Air Act, regulate emissions of chemicals into workplaces or the environment. There is no federal policy for plastics, however. Different aspects of plastics, such as risks of monomers or additives, are addressed under different laws. Microplastics currently are not regulated by any Federal agency. Table 1 summarizes various federal laws regulating chemicals.

TABLE 1: Policies regulating chemicals in products and manufacturing processes[32]

Chemical Type/Use	Law	Implementing Agency
Pharmaceutical/Medical device	Federal Food Drug and Cosmetics Act (FFDCA)	Food and Drug Administration
Cosmetics	Federal Food Drug and Cosmetics Act	Food and Drug Administration
Food additive/food contact article	Federal Food Drug and Cosmetics Act	Food and Drug Administration
Toys	Consumer Product Safety Improvement Act (CSPIA) and Federal Hazardous Substances Act	Consumer Product Safety Commission
Other types of products and manufacturing processes	Toxic Substances Control Act (TSCA) and Lautenberg Chemical Safety for the 21st Century Act.	Environmental Protection Agency
Pesticides	Federal Fungicide Rodenticide and Insecticide Act (FIFRA) and Food Quality Protection Act (FQPA)	Environmental Protection Agency
Chemical safety (accidents) in manufacturing processes	Clean Air Act Section 112r, Risk Management Plan Rule	Environmental Protection Agency

[31] Furuya, S., et al. (2018). Global Asbestos Disaster. International Journal of Environmental Research and Public Health. May 16;15(5):1000

[32] Tickner, J. (2014). Chemicals Policy in the United States – The Need for New Directions. In Kleinman, D. et al. Controversies in Science & Technology Volume 4. Oxford University Press: 183-195

The main law regulating industrial chemicals is the 1976 Toxic Substances Control Act (TSCA), a catch-all statute for chemicals in commerce. It was updated in 2016 with the passage of the Frank R. Lautenberg Chemical Safety for the 21st Century Act (also known as the Lautenberg Amendments). TSCA gave the EPA the authority to require testing of chemicals, regulate their manufacture and distribution, and regulate those that posed unreasonable risks to human health or the environment. A fatal flaw in TSCA, however, was the "grandfathering" of the more than 60,000 chemicals already on the market at the time of its passage. These were assumed to be safe unless and until EPA determined them to be harmful on a cumbersome chemical-by-chemical basis and issued risk management measures. New chemicals coming onto the market were subject to pre-manufacture review, which some observers maintain successfully kept many dangerous chemicals from coming on the market.[33]

While the original TSCA required companies to submit a pre-manufacture notification prior to manufacturing or importing the new chemical – with an EPA ability to regulate those that the agency concluded might present an unreasonable risk - the bipartisan Lautenburg Amendment established a new, stricter safety standard for new chemicals, requiring EPA to make an affirmative health based finding of safety before the new chemical is allowed into the market. It also required EPA to systematically evaluate existing chemicals in commerce, with court-enforceable deadlines for assessing chemicals and determining risk management measures. EPA was required to start at least 20 risk evaluations by 2019 (EPA undertakes about 5-10 per year), each to be completed in a 3-to-3.5-year period, with the agency required to finalize regulations within two years when unreasonable risks are identified. The decision to act is to be based solely on the health and environmental assessment, considering the cost and availability of alternatives only in determining what actions to take.

While thousands of new chemicals have been reviewed in the 50 years since TSCA passed, with a large portion subject to some form of regulation or testing requirements (such as requirements for personal protective equipment), little action has occurred for chemicals already on the market – the vast majority by number and volume. Since the passage of the Lautenberg Act in 2016, only 22 chemicals have undergone final risk assessments (with several being modified by subsequent administrations) and five have had final risk management rules published (with some still under court challenge).[34] In the 40 years prior only five risk management regulations were published. Few regulations requiring companies to collect information on chemical use or undertake toxicity testing have been completed.

Focusing on small incremental changes to an outdated law, the Lautenberg Amendments represented a compromise that failed to fundamentally change chemicals management in the United States or significantly improve EPA's ability to regulate chemicals already in commerce. At the current pace it will take decades, if not centuries, for the evaluations and risk management actions for existing chemicals of concern to take place. At the same time, the Act placed limits on states' abilities to regulate chemicals under consideration by EPA. Moreover, by placing a higher burden for review, assessment, and safety on newer chemicals that are often safer than the incumbents they would replace, the law created a potential incentive against innovation.

The Lautenberg Amendments thus failed to address many of the core defects of TSCA, including the assumption that the vast majority by volume of chemicals were innocent until proven guilty and implementation challenges around prioritization, assessment and action that are affected by changing

[33] Roberts, J and K. Hardy. 2010. Oral History of the Toxic Substances Control Act. Science History Institute. https://digital.sciencehistory.org/collections/olbbze5 (Accessed May 26, 2026).

[34] See https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluations-existing-chemicals-under-tsca

administrations.[35] Its slow chemical-by-chemical risk-based approach is outdated and inadequate to address chemicals challenges or drive innovation in safer substitutes.

Key gaps in federal chemicals policy

The federal industrial chemicals policy system today suffers from fundamental flaws that limit its ability to evaluate and prioritize chemicals, identify early warnings of potential harm, restrict the most dangerous chemicals, drive the transition to safer chemistry, and protect workers, consumers, communities, and ecosystems.[36] Its systemic gaps include:

- *The data gap:* Tens of thousands of chemical substances have been developed and put into commerce, often with little information about their environmental and health implications. While scientific tools to understand chemical toxicity and exposure have improved significantly, toxicological information on many chemicals, particularly at low doses in critical stages of physiological development, for particularly vulnerable populations, and in mixtures with other chemicals, is still lacking, and the cumulative effects of multiple exposures remain poorly understood. In addition, there is little information available on chemical use in manufacturing processes and products and on how chemicals flow through supply chains and the global economy.[37] Without this information, it is difficult to assess risks, set priorities, or measure policy effectiveness. Ironically, the lack of information on many chemicals is sometimes misrepresented as evidence of their safety.[38]
- *The safety gap*: Even when data are available, they are fed into a system that makes it difficult to take preventive action. The burden is generally on the government to make the case for why action is needed, frequently on a chemical-by-chemical basis, balancing costs and benefits. This leads to seemingly endless debates over risks (often litigated through the courts) and creates incentives to "manufacture uncertainty" to delay action.[39]
- *The technology gap:* Chemicals policies have been designed with a focus on limiting, restricting, or prohibiting certain chemical uses or exposures. This has not been balanced with complementary policies to stimulate innovation and the adoption of safer alternatives. The focus on regulation without innovation can lead to situations where action to restrict a specific chemical lead to its replacement by an equally problematic substitute.[40] Meanwhile, the lack of incentives for innovation inhibits progress towards safer solutions.
- *The jurisdiction gap:* Chemicals are assessed, regulated, and managed differently depending on their end uses. Separate legislation, regulations, and departments govern pesticides, consumer

[35] Schifano, J, K. Geiser, and J. Tickner. (2011). The Importance of Implementation in Rethinking Chemicals Management Policies: The Toxic Substances Control Act. Environmental Law Reporter. 48: 10527-10543. June.
[36] Tickner, J. (2014). Chemicals Policy in the United States – The Need for New Directions. In Kleinman, D. et al. Controversies in Science & Technology Volume 4. Oxford University Press: 183-195
[37] Wilson, M, et al. (2007). Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation. New Solutions *A Journal of Environmental and Occupational Health Policy*.16(4):365-372.
[38] European Environment Agency. (2002). Late Lessons from Early Warnings: The Precautionary Principle. 1896-2000. Copenhagen; Michaels, D. (2008). Doubt Is Their Product: How Industry's Assault on Science Threatens Your Health. Oxford University Press.
[39] Ibid.
[40] Tickner, J. (2014). Chemicals Policy in the United States – The Need for New Directions. In Kleinman, D et al. Controversies in Science & Technology Volume 4. Oxford University Press: 183-195; Maertens, A., E. Golden, and T. Hartung. (2021). Avoiding regrettable substitutions: green toxicology for sustainable chemistry. ACS Sustainable Chemistry & Engineering, 9(23), 7749-7758.

products, drugs, cosmetics, and industrial chemicals. This frequently leads to inter-agency conflict and inhibits systematic approaches to assess and manage hazards and to advance safer alternatives.[41]

While pesticides generally have greater oversight than industrial chemicals – due to their expected toxicity - US pesticide regulations suffer from a number of similar challenges and weaknesses. The Federal Fungicide Rodenticide and Insecticide Act (FIFRA), the main law regulating pesticides in agriculture, prioritizes cost–benefit balancing over health protection, relies on often incomplete and industry-driven science, and makes it difficult to restrict harmful pesticides once approved. Risk assessments under FIFRA (with infrequent review cycles) often only evaluate active ingredients and fail to require analysis of alternatives.[42] The 1996 Food Quality Protection Act put in place a new safety threshold for pesticides used on food: A "reasonable certainty that no harm will result" to people exposed to pesticides through food and other non-occupational routes. This change created a double standard and increased disparities for primarily immigrant farmworker communities compared to the general population.[43]

In sum, the existing chemicals policy framework favors incumbent chemicals and processes which have benefited from decades of subsidies, investment, and integration into value chains, in addition to limited regulation (or threat of). There is little incentive to innovate in safer and more sustainable chemicals and processes. External costs are not reflected in the prices on the market, and current laws have fallen short in requiring the industry to cover the cost of past and present environmental and health impacts.

The Chemicals Without Harm Act: A Preview

The Chemicals Without Harm Act proposed here is a bold omnibus policy to fundamentally restructure and transform the nation's chemicals economy. It is a long-term industrial strategy that coordinates government activities to achieve a clear goal: A safe, sustainable and vibrant chemicals sector that creates good jobs and brings societal benefits.

The Act has five pillars:

1. ***A National Chemicals Agency*** to coordinate and strengthen chemicals assessment and policy across the federal government, modeled after efforts in Europe.

2. ***A Comprehensive Chemicals Policy*** that increases information on chemical hazards; rapidly prioritizes chemicals for action, including restrictions on the most toxic chemicals and materials; and incentivizes the development and adoption of safer alternatives.

3. ***A Chemical Industry Roadmap*** that establishes a national industrial policy for transitioning the industry towards innovation, resilience, safety, and sustainability.

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[41] Canadian Environmental Law Association and Lowell Center for Sustainable Production. (2009). The Challenges of Substances of Emerging Concern in the Great Lakes Basin: A Review of Chemicals Policies and Programs in Canada and the United States. June. https://cela.ca/wp-content/uploads/2019/07/667IJC.pdf (Accessed May 26, 2026).
[42] Public Employees for Environmental Responsibility. (2020). Beyond 2020: A Vision for Pesticide Policies That Protect the Environment and Public Health. https://peer.org/beyond-2020-pesticides/ (Accessed May 26, 2026).
[43] Donley, N. et al. (2022). Pesticides and environmental injustice in the USA: root causes, current regulatory reinforcement and a path forward. BMC Public Health. Apr 19; 22:708.

4. ***A National Remediation Fund*** to clean up legacy pollution while supporting real community engagement and redevelopment, paid for by the corporations and government agencies responsible for the impacts.

5. ***A National Transition Fund*** for the development and deployment of safer and more sustainable chemicals and manufacturing processes and for the transition of workers and communities.

National Chemicals Agency

A National Chemicals Agency (NCA) is needed to implement a comprehensive chemicals policy; oversee information generation, assessment, prioritization, and risk management; and administer remediation and innovation funds.

As described above, the current structure for assessing and regulating chemicals – spread across multiple agencies and divisions of agencies with different mandates, approaches, standards of action, and oversight – is inefficient and ineffective and can lead to inter-agency conflict and inaction.

To take one example, Bisphenol-A (BPA) is widely used in a number of applications, including food can linings, plastics, dental sealants, and cash register tapes. Currently, BPA is evaluated by at least two different agencies, and its use is regulated under three different statutes. While the EPA encourages the voluntary adoption of safer alternatives, the Food and Drug Administration (FDA) has concluded that BPA is safe for the uses it regulates and has only updated its regulations for use of BPA in baby bottles and sippy cups.[44]

Similarly, when the EPA considered adding cosmetic ingredients and products to its highly regarded Safer Choice recognition program (an ecolabel for safer formulated products), the personal care products industry (and separately FDA) raised concerns that this would create jurisdictional challenges as well as confusion in the market for products that the industry believes are safe, despite the FDA having no pre-market safety approval over cosmetics.[45] A single agency would help to avoid jurisdictional differences and ensure a single source of information on chemical uses, hazards and risks, prioritization, and safer alternatives.

The European Chemicals Agency (ECHA) and Swedish Chemicals Agency (KemI) offer useful models for national chemicals agencies. ECHA was established in 2007 to implement the EU's chemicals legislation. With 600 employees, ECHA collects data, assesses and provides information on chemicals, identifies chemicals of concern, and then works with the European Commission and EU governments to take decisions on those chemicals. KemI works to achieve Sweden's Non-Toxic Environment Objective through assessment and regulatory action for industrial chemicals and pesticides.[46] At the state level in the US, the California Department of Toxic Substances Control (DTSC) coordinates hazardous waste site

[44] See https://www.fda.gov/food/food-packaging-other-substances-come-contact-food-information-consumers/bisphenol-bpa-use-food-contact-application (Accessed June 22, 2026)
[45] Myers, T. (2023). Comments presented in response EPA–HQ–OPPT–2023–0311; FRL–11016–01–OCSPP Safer Choice Programs' Potential Expansion into New Product Categories. September 11. https://downloads.regulations.gov/EPA-HQ-OPPT-2023-0311-0020/attachment_1.pdf (Accessed May 26, 2026); US Food and Drug Administration. (2025). FDA Authority Over Cosmetics: How Cosmetics Are Not FDA-Approved, but Are FDA-Regulated. https://www.fda.gov/cosmetics/cosmetics-laws-regulations/fda-authority-over-cosmetics-how-cosmetics-are-not-fda-approved-are-fda-regulated (Accessed May 26, 2026).
[46] Geiser, K. (2011). Redesigning Chemicals Policy: A Very Different Approach. New Solution Vol 21: 329-344

clean-up, hazardous waste management, pollution prevention, and toxic chemicals management activities under its Safer Consumer Products Program.[47]

The NCA will coordinate testing and assessment of all chemicals (industrial chemicals and pesticides) based initially on their intrinsic hazards. It would categorize and prioritize chemicals for action and publish lists of problematic chemicals and safer substitutes for specific functions, enabling decision-makers in industry, investors, and others to identify risks as well as providing government backed evaluation of solutions. The agency will regulate uses of chemicals, including pesticides, in industrial processes and products, with some exceptions such as medical devices where more specialized review is needed. A key goal would be primary prevention, leveraging the pollution prevention and industrial hygiene hierarchies where substitution and restriction of problematic chemicals should be prioritized over emissions controls.[48] Nonetheless, remaining chemical emissions – for example, into water, air, and in workplaces – would continue to be regulated by other agencies under separate laws. The agency would coordinate safer chemicals incentives with other agencies and serve as a focal point and resource for chemical information. In addition, the agency could coordinate funding and other activities under the *Remediation Fund and Transition Fund*.

Comprehensive Chemicals Policy[49]

Chemicals policy in the US is today reactive and disjointed, with chemicals regulated across multiple laws that together place high burdens on government to require preventive action. It is time to rethink our antiquated laws – established when our understandings of chemical impacts and safer chemistry were far more rudimentary – and adopt a *Comprehensive Chemicals Policy*. Its key features are that the policy will be proactive and solutions-oriented, ensure information disclosure across the chemicals value chain, and leverage the best available science to rapidly assess, prioritize, and act on chemicals of concern while incentivizing the transition to safer solutions.

Core design principles for a comprehensive chemicals policy include:

- *Integrated:* The policy covers all chemicals, including industrial chemicals, pesticides, and materials such as plastics and nanomaterials as well as most uses.
- *Transparent and information-rich:* The policy ensures that adequate and verified data are generated by manufacturers and users of chemicals on production, use, and toxicity to humans and ecosystems and that such information is available across value chains and to the public. No data means no market.

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[47] Tickner, J. et al. (2024). A Toolkit of Policy Instruments for Enhanced Chemicals Management and Sustainable Program Funding in California. June. https://www.sustainablechemistrycatalyst.org/s/Sustainable_Fees_Policy_Options_Report.pdf (Accessed May 26, 2026).

[48] Tickner, J. (2012). From Reactive Chemicals Control to Comprehensive Chemicals Policy: An Evolution and Opportunity. In, Bingham, Eula and Barbara Cohrssen, eds. Patty's Toxicology. John Wiley & Sons, Volume 7: 29-47.

[49] This section is adapted from Geiser, K. (2011). Redesigning Chemicals Policy: A Very Different Approach. New Solutions Vol 21: 329-344; Geiser, K. (2015). Chemicals Without Harm: Policies for a Sustainable World. MIT Press; Tickner, J. (2014). Chemicals Policy in the United States – The Need for New Directions. In Kleinman, D et al. Controversies in Science & Technology Volume 4. Oxford University Press: 183-195; and a detailed framework for comprehensive chemicals policy reform outlined in Lowell Center for Sustainable Production (2008). Options for State Chemicals Policy Reform: A Resource Guide. Available at: https://www.sustainablechemistrycatalyst.org/s/CP-Options-State-Chemicals-Policy-Reform-2008.pdf (Accessed May 26, 2026).

- *Efficient:* The policy establishes processes for governments to rapidly and robustly assess chemicals and chemical classes and categorize them into tiers of higher and lower concern.
- *Proactive, preventive, and innovative*: The policy focuses on hazard reduction while incentivizing innovation in safer and more sustainable solutions.

There are several models for such an approach. The proposed Comprehensive Chemicals Policy combines their best features while attempting to address their limitations. The most extensive chemicals policy now in place is the European Union's Registration Evaluation and Authorization of Chemicals (REACH) regulation. REACH requires that companies that manufacture or import industrial chemicals provide a basic set of toxicity data and share this data along their value chains, enabling the European Commission to restrict chemicals classed as Substances of Very High Concern. REACH has successfully driven supply chains to better manage chemicals and has led to numerous hazardous chemicals being phased out in the European Union. Nonetheless, a 2018 programmatic evaluation found that REACH was limited by slow, resource-intensive processes for regulatory action, among other challenges.[50] The 2019 European Chemical Strategy for Sustainability sought to remedy weaknesses and expedite regulatory processes for the most hazardous chemicals by, among other things: Applying a "generic risk approach", where chemicals of high concern are automatically restricted in sensitive applications based on their hazard classification; establishing a one-substance-one-assessment policy to avoid conflicts between agencies; and establishing the "essential use concept" under which the highest concern chemicals can be used only in cases necessary for health and safety, when no safer feasible alternatives yet exist.[51]

Despite the stagnation of chemicals policy at the federal level, or perhaps in response to it, U.S. states have been the innovators in more comprehensive chemicals policy.[52] The 1989 Massachusetts Toxics Use Reduction Act has been a model for pollution prevention worldwide. The law requires manufacturing firms using toxic chemicals above threshold amounts to report annually on chemical use, emissions, and waste and biannually to document how they plan to reduce toxics use per unit of output. Companies pay a small fee on chemicals (generating about $6 million/year) that funds the regulatory program, a state-run technical assistance program, and a research and training institute, the Toxics Use Reduction Institute at the University of Massachusetts Lowell. Since its inception, the program has successfully reduced toxic chemical use in Massachusetts by half. As an example, whereas EPA only in 2025 finalized a risk management action under TSCA on the carcinogenic solvent trichloroethylene, Massachusetts achieved a 95% reduction in its use in the early 2000s thanks to a pro-active focus on supporting companies in adopting safer alternatives.[53]

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[50] European Commission. (2018). Communication from the Commission to the European Parliament, the Council, and the European Economic and Social Committee. Commission General Report on the operation of REACH and review of certain elements. Conclusions and Actions. March 5. COM(2018) 116 final. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018DC0116 (Accessed May 26, 2026).

[51] European Commission. (2020). Communication from the Commission to the European Parliament, the Council, and the European Economic and Social Committee. Chemical Strategy for Sustainability. COM(2020) 667 final. October 14. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0667 (Accessed May 26, 2026). See factsheets and other information at: https://www.sustainablechemistrycatalyst.org/eu-chemical-policy

[52] Schifano, J. et al. (2009). State Leadership in Formulating and Reforming Chemicals Policy: Actions Taken and Lessons Learned. Lowell Center for Sustainable Production. https://www.sustainablechemistrycatalyst.org/s/CP-StateLeadership-Formulating-Reforming-Chemicals-Policy-2009.pdf (Accessed May 28, 2026); Belliveau, M. (2011). The drive for a safer chemicals policy in the United States. New Solutions, Vol 21, No 3: 359-386.

[53] Tickner, J, M. Jacobs, M. Whittaker. (2022). Addressing the Limits of Risk Assessment by Focusing on Safer Alternatives. In Toscano, W and M. Robson eds. Risk Assessment for Environmental Health Second Edition – 2022: 279-317.

More recently, a number of states have initiated chemical information reporting requirements for specific chemicals and product categories, restrictions on individual chemicals or chemical groups, and in some cases broader chemicals policies.[54] State agencies are increasingly collaborating to support improved coordination across policies and regions.[55] Notably, the Safer Products for Washington policy identifies and regulates harmful chemicals in consumer products, especially those affecting children and vulnerable populations. It requires the state to prioritize chemicals (including classes of chemicals) and significant sources and uses of those chemicals on a five-year cycle, evaluate availability of alternatives, and issue regulatory actions including restrictions and disclosure requirements.[56] The California Safer Consumer Products Regulation requires the state's Department of Toxic Substances Control (DTSC) to identify chemicals of concern in consumer products and prioritize specific product–chemical combinations for review. It requires manufacturers to evaluate safer alternatives and allows DTSC to impose actions—such as reformulation, research on safer alternatives, labeling, restrictions, or sales bans—to reduce human and ecosystem health risks.[57] In 2021, the state of Maine passed the first comprehensive restriction of all non-essential consumer product uses of PFAS, leading to extensive PFAS restrictions in other states.[58]

A key goal of the Chemicals without Harm Act is to elevate preventive chemicals policy at a federal level, so that everyone benefits from safer chemicals and products. This would reduce the need for a patchwork of state policies that are often a challenge for business compliance. Nonetheless, environmental policy innovation in the US has generally occurred at the state level and chemicals policy is no exception. As such, states should be allowed to continue their role as policy innovators under the Act.

Information generation and disclosure

Limited information on chemical production, use, and toxicity inhibits assessment, prioritization, and policy evaluation. It also makes it impossible to establish a clear baseline for how many chemicals are now in commerce (estimates range from 60,000-300,000), in what quantities and where they are used, and which are most concerning. For pesticides, toxicity testing is required as a prerequisite for market access; however, testing has been criticized as industry-driven and failing to fully account for human exposures.[59] Despite new AI and data tools to collect such information, the information problem has yet to be resolved.

A comprehensive chemicals policy would require chemical producers and users to develop sufficient information and make it available to all who need it, while protecting justifiable confidential business information. This should be a prerequisite to market access. Three types of information are needed:

- *Information on the inherent characteristics of chemicals:* A core set of data on health and environmental effects is needed for every chemical on the market. This should include physical-

[54] See Safer States. (2026). 2026 Analysis of State Policy Addressing Toxic Chemicals and Plastics. https://www.saferstates.org/resource/2026-analysis-of-state-policy-addressing-toxic-chemicals-and-plastics/ (Accessed May 28, 2026).
[55] See https://www.theic2.org/ (Accessed June 9, 2026)
[56] See: https://ecology.wa.gov/waste-toxics/reducing-toxic-chemicals/washingtons-toxics-in-products-laws/safer-products (Accessed June 1, 2026).
[57] See https://dtsc.ca.gov/scp/ (Accessed June 1, 2026).
[58] See https://www.maine.gov/dep/spills/topics/pfas/PFAS-products/ (Accessed June 8, 2026).
[59] Public Employees for Environmental Responsibility. (2020). Beyond 2020: A Vision for Pesticide Policies That Protect the Environment and Public Health. https://peer.org/beyond-2020-pesticides/ (Accessed May 26, 2026).

chemical characteristics, toxicological properties, biological behavior, and fate-and-transport characteristics in the environment.

- *Information on the production, use, and life cycle of chemicals*: Information is needed on the manufacture, importation, distribution, use, and disposal of chemicals across their life cycles. These data are critical for understanding exposure potential and managing risk, and also for prioritization and measuring progress towards reduction or substitution. It is simply impossible to manage chemicals effectively without such information. This data should flow through supply chains so that all those in the supply chain have sufficient information to safely manage the chemicals or advocate for safer alternatives.
- *Information on release and exposure of chemicals*. In order to understand threats from chemicals and to prioritize interventions, manage exposure, and measure prevention progress, information is needed on the releases of chemicals as emissions and waste, actual and potential human exposures to chemicals, potential byproducts or breakdown products when chemicals enter the environment, and the presence of chemicals in environmental media, humans, and other organisms. Importantly, data are needed on the cumulative exposure to toxic chemicals to which many communities are disproportionately exposed.[60]

Chemical production, use, and release information should be compiled by the companies using collection systems developed by either government or third parties. Toxicological, hazard, and exposure information (including environmental and biomonitoring) could be undertaken by government laboratories, universities, professional associations, consultancies, or corporate research facilities, but the responsibility for ensuring that this information is generated and made available should rest with companies. Third-party verification or a network of independent laboratories could ensure that data generated are of sufficient quality and detail. Organizations such as ChemForward and Underwriters Laboratory provide tools and databases to collect and assess chemical information.[61]

Prioritization and action

Science has evolved sufficiently to understand which types of chemicals and chemical classes are of higher and lower concern for toxicity or other health and ecosystem hazards. New computer modeling and high throughput tools for toxicological assessment now supplement traditional testing, allowing more robust and rapid assessments of hazards.

There are thousands of chemicals in commerce, making it infeasible to comprehensively assess and then undertake risk management on each individually. Evaluating chemical mixtures is even more complicated. Hence an important function for government is the development and maintenance of a prioritization system where all chemicals can be categorized as to their hazardous properties and prioritized for action. This rapid screening approach would enable prioritization and support risk management action as well as market decisions. The categorization process would identify chemicals as higher concern, some concern, lower concern, safer options, and those that need further data to make a determination – with a range of next steps based on the categorization. Such a rapid classification and

[60] Tulve, N. et al. (2024). Challenges and opportunities for research supporting cumulative impact assessments at the United States Environmental Protection Agency's Office of Research and Development. The Lancet Regional Americas. Vol 30: 100666; Political Economy Research Institute. (ND). How Accurate Are the RSEI Data on Toxic Air Pollution? https://peri.umass.edu/research-areas/environmental-and-energy-economics/toxic-100/how-accurate-are-the-rsei-data-on-toxic-air-pollution/ (Accessed June 8, 2026).

[61] See https://www.chemforward.org/ and https://www.ul.com/services/chemical-management-services-and-software (Accessed June 8, 2026).

prioritization approach is feasible. The Canadian government classified over 20,000 chemicals during a multi-year period, identifying about 4,000 as high hazard.[62]

The categorization should be based on intrinsic hazards – the properties that make the chemical toxic – rather than exposure risk. The UN Globally Harmonized System of Classification and Labelling provides a globally recognized and standardized approach to assessing a range of chemical hazards – both toxicity and safety.[63] Reducing hazard ensures that if exposure does occur, impacts will be lower. For example, the solvent perchloroethylene, used in drycleaning, is a potential carcinogen whether or not it is used in a closed looped dry-cleaning machine. PFAS, often called "forever chemicals" will almost inevitably persist for decades or more in the environment if released. And safety systems for hazardous chemicals can fail which is why intrinsically safer chemicals can reduce risks of accidental explosions and releases, a fundamental concept of "inherent safety".[64]

Further categorization could be based on broad classes of chemicals – for example PFAS, phthalates or bisphenols. Categorizing chemicals by classes – with a rebuttable presumption of potential harm – can not only speed up chemical-by-chemical assessment processes but also help avoid regrettable substitutions by chemicals with similar toxicity.

Additional categorization could be by use category such as consumer use, workplace use, etc. or physiological properties, such as mobility in water, as a surrogate for exposure.

An additional way to categorize chemicals is based on their function – the service they provide in an application, such as UV filtration or flame retardancy. There are only about 150 functions of chemicals, as compared to the tens of thousands of chemicals used in commerce. Categorizing chemicals as safer or less safe within a functional class could help greatly to accelerate the identification of safer solutions.[65]

Risk management actions could range from phase-out requirements for the highest hazard chemicals to required toxics use reduction or substitution planning (including consideration of non-chemical alternatives), to ingredient transparency and disclosure (including labelling), to exposure controls, to required funding of research on safer alternatives as a condition for continued use of chemicals of high concern. Exposure remains an important consideration in prioritizing chemicals and uses for action and understanding trade-offs between options. Two critical exposure considerations in prioritization and decision-making should be: (1) exposure to particularly vulnerable populations, such as children, and (2) the cumulative exposures of workers, communities and others to ensure that reductions are prioritized for those at greatest risk of harm.

In some cases, detailed risk assessment might be needed to make final decisions regarding risk management for chemicals that have wide ranging uses, such as PFAS, though tools exist to expedite such processes. For many chemicals, however, action based on intrinsic hazards is warranted – for example chemicals with high hazards, such as those that cause cancer or disrupt hormones or those that persist in the environment for a long time, or uses that lead to uncontrollable exposures or exposures to sensitive populations like children. Regulatory action based on hazard categorization rather than in-depth risk assessment is possible. In Europe, under the Generic Risk Approach, chemicals of high

[62] Geiser, K. (2011). Redesigning Chemicals Policy: A Very Different Approach. New Solutions Vol 21: 329-344
[63] See https://unece.org/about-ghs (Accessed June 8, 2026).
[64] Kletz, T. (2000). Trevor Kletz: By Accident...a Life Preventing Them in Industry. London: PFV Publications
[65] Tickner, J. et al. (2015). Advancing Safer Alternatives through Functional Substitution. Environmental Science and Technology, 49: 742-749.

concern (those that could cause cancer, reproductive harm, mutagenicity, or endocrine disruption) are automatically restricted from products where exposure is likely for vulnerable populations, including toys and cosmetics.[66] The Generic Cancer Standard of the US Occupational Safety and Health Administration, which was never fully implemented, set a zero exposure threshold for chemicals classified as potentially carcinogenic, with risk management measures based on technical feasibility and cost of substitution.[67] And the US EPA maintains a list of "safer chemicals", ones that have been assessed as having lower hazard profiles in their functional class, under its Safer Chemical Ingredient List.[68] This "positive list" of safer chemicals underpins the agency's Safer Choice program, providing an important market incentive for safer chemistry.

Incentivizing innovation in safer alternatives

The National Comprehensive Chemicals Policy should not only restrict problematic chemicals but also help guide the transition to safer and more sustainable alternatives. It is difficult to replace chemicals of concern without safer alternatives at scale. To be effective in driving innovation, regulations need to be supplemented with policies that provide capacity and opportunity through information, technical assistance, economic incentives, technology goals, and standards.[69]

As a starting point, companies manufacturing or using a chemical categorized as high hazard should be required to evaluate options for toxics use reduction or substitution – an alternatives assessment - as a condition for continued use. Alternatives assessment is an approach to identifying and evaluating chemicals of concern that compares the hazards, potential exposure trade-offs, performance, and costs of a wide range of alternatives to meet a specific chemical functional need. Those can include alternative chemistries or alternative means of achieving the same function (what has been termed "functional substitution"), such as replacing thermal cash register receipts containing bisphenol-a with electronic receipts.[70]

A focus on safer alternatives can help shift thinking to win-win solutions that create economic opportunity while reducing chemical hazards. Assessments should be completed in the context of any chemical restriction process to guide solutions and avoid regrettable substitutions. Both alternatives assessment and incentives should prioritize reducing impacts to high-risk and overburdened communities.

Along with the evaluation of alternatives, their development in cases where safer alternatives do not already exist and adoption need to be incentivized (see Figure 1). The current generation of chemicals benefited from decades of government and private sector support. Transitioning to safer alternatives

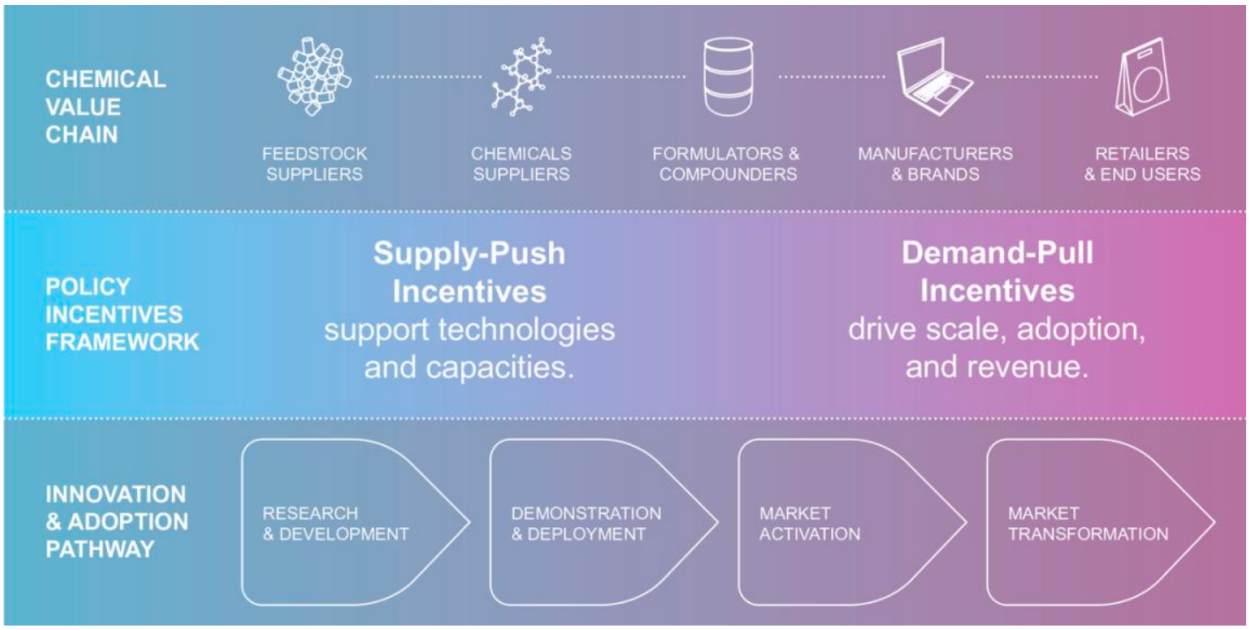
[66] See https://www.sustainablechemistrycatalyst.org/s/GRA_FinalDraft-June2024.pdf (Accessed August 26, 2026).
[67] Tickner, J, M. Jacobs, M. Whittaker. (2022). Addressing the Limits of Risk Assessment by Focusing on Safer Alternatives. In Toscano, W and M. Robson eds. Risk Assessment for Environmental Health Second Edition – 2022: 279-317.
[68] See https://www.epa.gov/saferchoice/safer-ingredients (Accessed June 9, 2026)
[69] See for example: Schot, J. and Geels, F. (2008). Strategic niche management and sustainable innovation journeys. *Technology Analysis & Strategic Management*, 20(5), 537–554; Ashford, N and Hall, R. (2011) The Importance of Regulation-Induced Innovation for Sustainable Development. *Sustainability* 3, no. 12, 270–292; Porter, M. and van der Linde, C. (1995). Toward a new conception of the environment–competitiveness relationship. *Journal of Economic Perspectives*, 9(4), 97–118.
[70] Tickner, J., M. Jacobs, M. Whittaker. (2022). Addressing the Limits of Risk Assessment by Focusing on Safer Alternatives. In Toscano, W and M. Robson eds. Risk Assessment for Environmental Health Second Edition – 2022: 279-317; National Research Council. (2014). A Framework to Guide Selection of Chemical Alternatives. Washington, DC: The National Academies Press.

will require similar support given the capital-intensive and global nature of chemical supply chains in which reformulation, recertification, and government approvals may be necessary.[71]

A robust and durable government incentives framework – similar to that which grew renewable energy technologies - is needed to:

- Create a level or preferential playing field for newer, safer, and more sustainable chemicals versus incumbents.
- De-risk investment and create demand pull for market adoption of better chemistries and materials.
- Support collaboration and collective action across chemical value chains.
- Support early stage technology development and commercialization given the market activation barriers to safer chemicals.
- Support innovators of different sizes.

FIGURE 1: Incentives for safer chemistry across the value chain[72]



Incentives need to be tied to clear safety and sustainability criteria to avoid greenwashing and should include review provisions to ensure that the incentives are meeting goals. Both supply-push and demand-pull incentives need to be included:

[71] Change Chemistry and Lowell Center for Sustainable Production. (2026). Incentivizing Sustainable Chemistry: A Policy Framework for Innovation, Manufacturing, & Market Transformation (Research Report). https://assets-002.noviams.com/novi-file-uploads/gc3/Incentivizing_Sustainable_Chemistry_RESEARCH_REPORT.pdf (Accessed May 28, 2026)
[72] Ibid

- *R&D grants* from basic research to deployment.
- *Tax incentives***,** including tax credits, deductions, or exemptions for businesses or individuals investing in specific technologies or activities.
- *Subsidies***,** that direct financial support to lower the cost of developing or adopting new technologies or capital investment or guarantee markets, including loan guarantees, infrastructure, technical support, and prizes (see "Plastics of Tomorrow Contest" in accompanying box).
- *Regulatory incentives* that include placing taxes or fees on incumbents, require disclosure of risks or provide preferential regulatory review.
- *Market support and de-risking* incentives, including content requirements; market guarantees (such as offtake or advance purchase agreements) or price guarantees.
- *Labelling, recognition, and preferential procurement* programs that identify and publicly recognize safer chemicals and materials and aggregate public demand for certified products.

Plastics of Tomorrow Contest

Open competitions have often played a key role in technological breakthroughs. An early example was the 1714 British Longitude Prize that led to the marine chronometers that became key navigational tools. The "Chicken of Tomorrow" contest co-sponsored by the US Department of Agriculture after World War Two, gave rise to the modern broiler industry by developing meatier chickens. More recently, the Rebuild by Design competition launched by the Department of Housing and Urban Development after Hurricane Sandy in 2013 produced innovative new technologies for climate resilience.

To spur innovation in the chemical industry and encourage engagement from new entrants as well as existing firms, a Plastics of Tomorrow Contest could be launched for the development of renewable, non-toxic, biodegradable, and sustainable plastics. Like these precedents, the contest could be organized in collaboration with multiple partners, including the private sector, with prizes for inventions that meet specific performance and design criteria. The winners could receive support for technology scaling from the National Transition Fund and through preferential government procurement or advance government purchasing commitments.

Chemical Industry Roadmap

The chemical industry's core structure contributes to its toxic, climate, and waste impacts and inhibits its future transformation towards sustainability.[73] The industry grew quickly from the 1930s to 1960s with little consideration of health, safety, or the environment, partly as a result of wartime urgency, and propelled by government incentives through procurement, research, finance, and infrastructure support. After the 1960s, the industry became "mature" focusing on new markets for existing chemicals and materials and economies of scale, not innovation. More recently, the dominant commodity chemicals sector of the industry has suffered from financialization (where investors and executives are focused primarily on short-term returns), global competition from Asia and the Middle East, and economic disruptions that lead to feedstock price volatility.

This confluence of factors has led to an industry that is rigid and unable to pivot or innovate effectively in safer and more sustainable chemicals, leaving it highly vulnerable to obsolescence. The current generation of chemicals and chemical processes was not the result of a grand plan but rather a series of crisis interventions coupled with the availability of patient capital. But the next generation's transition to safer chemistry will require a clear transformation pathway to address the industry's multiple impacts.[74]

Industrial policy has been relatively limited in the US, with exceptions such as the SEMATECH program and the Chips and Science Act to revive the US semi-conductor industry, and the Inflation Reduction Act's effort to boost climate neutrality and the bioeconomy.[75] Other countries and regions, including China and the European Union, have leveraged long-term planning to build new sectors and transition existing ones, such as Europe's Clean Industrial Deal. Globally, there are many roadmaps for transitioning the chemical industry to climate neutrality, but few that address the industry's toxic and plastics waste burdens as well.[76]

The Louisville Charter for Safer Chemicals, created in 2004 and updated in 2021, represents a shared vision and roadmap developed and endorsed by more than 125 environmental, environmental justice, and health organizations for changing the way we use, make, and regulate chemicals.[77] The Charter includes ten "planks" supported by in-depth policy analysis (see accompanying box). The Charter's principles and vision help to shape the Chemicals Without Harm Act so that it protects those most impacted by chemicals and chemical manufacturing.

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[73] Tickner, J. (2026). The time has come to fully reimagine the chemical industry. Chemical & Engineering News. April 29 (online). https://cen.acs.org/articles/104/web/2026/04/chemical-industry-restructure-resilience-toxic-waste-climate-steel-energy-renewable-hexion-solugen.html (Accessed May 28, 2026).

[74] Turner, R, J. Tickner, and M. Jacobs. (2025). How to Catalyze a Safer and More Sustainable Chemical Industry. Issues in Science and Technology. Summer 2025: pp 64-69. https://issues.org/safer-sustainable-chemistry-industry-turner-tickner-jacobs/. (Accessed May 26, 2026).

[75] Ibid.

[76] Harrandt, J. et al. (2025). Evaluation of Recent Reports on the Future of a Net-Zero Chemical Industry in 2050. Nova Institute. November. https://renewable-carbon.eu/news/renewable-carbon-feedstocks-building-a-net-zero-chemical-industry-in-2050/ (Accessed May 28, 2026).

[77] Coming Clean Inc. (2021). The Louisville Charter for Safer Chemicals: A Platform for Creating a Safe and Healthy Environment Through Innovation. https://comingcleaninc.org/louisville-charter/read (Accessed May 28, 2026).

Louisville Charter for Safer Chemicals: Ten Planks

- Address the Significant Impacts of Chemical Production and Use on Climate Change.
- Prevent Disproportionate Exposures and Hazards, and Reduce Cumulative Impacts on Environmental Justice Communities.
- Require Safer Substitutes and Solutions for a Non-Toxic Economy.
- Use Scientific Data to Support Health-Protective Policies and Practices.
- Take Urgent Action to Stop Production and Recover Chemicals that are Unsafe and/or Accumulate in the Environment and People.
- Act with Foresight to Protect Health and Prevent Pollution.
- Take Immediate Action to Protect, Restore and Strengthen Communities.
- Ensure the Public and Workers Fully Have the Right-To-Know, Participate and Decide.
- Incentivize Responsible Business & Safer Chemicals.
- Build an Equitable and Health-Based Sustainable Economy.

A national Chemical Industry Roadmap – to be developed by an Advisory Committee consisting of government agencies, industries across the value chain, investors, academic scientists, workers, and environmental groups – is needed to establish goals for a "future-proof" chemical industry and outline its policy and investment requirements, research needs, timelines, responsibilities for the public and private sectors, and evaluation criteria. Special consideration will be paid to ensuring that fenceline communities and those historically impacted by the industry are represented in the roadmap development process (see next section).

To address the industry's multiple impacts, the roadmap will need to address transformations in five core areas: (i) the industry's energy sources, (ii) the feedstocks from which chemicals are created, (iii) the molecules it creates, (iv) the processes to make chemicals, and (v) the products, including plastics, that the industry makes.[78] The roadmap should outline potential future structures for the industry that will advance resilience, innovation flexibility, competitiveness, job creation, and reduced environmental impact. Similar to transitions in other energy-intensive industries, such as steel and electricity generation, new industrial structures for the chemicals sector are likely to be more distributed and modular than the highly concentrated status quo.[79] Critical to a future roadmap for the chemical industry is addressing the disproportionate impacts of the industry to date and the fair and equitable allocation of cleanup, restoration, and transition funds for legacy contamination sites and impacted communities.

[78]Tickner, J., K. Geiser, and S. Baima. (2022). Transitioning the Chemical Industry: Elements of a Roadmap Toward Sustainable Chemicals and Materials. Environment: Science and Policy for Sustainable Development 64:2, 22-36

[79] Tickner, J. (2026). The time has come to fully reimagine the chemical industry. Chemical & Engineering News. April 29 (online). https://cen.acs.org/articles/104/web/2026/04/chemical-industry-restructure-resilience-toxic-waste-climate-steel-energy-renewable-hexion-solugen.html (Accessed May 28, 2026).

National Remediation Fund

The production, use, and disposal of chemicals have left a costly legacy of impacts on communities, workers, consumers, and the environment. Today the externalized costs of these impacts are primarily borne by communities, consumers, workers, and governments, not by chemical producers and users. They disproportionately impact black, Latino, impoverished, and other marginalized communities. In addition to hazardous waste sites left behind by companies and government agencies over decades, toxic impacts occur to workers and communities from current industrial facilities and to consumers from products containing toxic chemicals. Ecosystems and biodiversity – on which many communities rely directly for subsistence, and all of us rely upon indirectly - are at risk globally due to chemical pollution.

To pay for cleanups, remediate damaged ecosystems and communities, and assist those impacted by past and current chemical pollution, the Chemicals Without Harm Act will create a National Remediation Fund to support:

- Clean-up of hazardous sites
- Sustainable redevelopment of sites and communities impacted by toxic chemicals and production
- Ecosystem restoration in impacted places
- Exposure and disease monitoring in communities impacted by toxic chemicals, including health assessments and long-term biomonitoring modeled after the CDC's National Health and Nutrition Examination Survey and the Agency for Toxics Substances and Disease Registry
- Payments for health care and wage loss in cases where disease associations have been established; and
- Independent expertise to assist impacted communities

The Environmental Justice for All Act of 2021 and the Environmental Justice Legacy Pollution Cleanup Act of 2021 provide frameworks for addressing past and potential future inequities associated with production and disposal of hazards materials and for reducing cumulative environmental burdens on historically underserved and socially vulnerable communities. Two key pillars of these bills include codifying Executive Order 12898, requiring federal agencies to "make achieving environmental justice part of [their] missions",[80] and providing environmentally overburdened communities with legal tools to challenge discriminatory practices in facility siting, permitting, and enforcement decisions of regulatory agencies, for example, by amending to Title VI of the Civil Rights Act.[81]

The Justice40 Initiative was designed to help ensure equity in the distribution of funds authorized by the Inflation Reduction Act and Bipartisan Infrastructure Law, which included climate resilience and infrastructure projects to reduce toxic exposures.[82] It ensured that 40 percent of the benefits of certain federal climate and energy investments flow to communities that are disadvantaged, marginalized, and

[80] White House. (1994). Executive Order No. 12898, Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations. February 11.. https://www.govinfo.gov/content/pkg/WCPD-1994-02-14/pdf/WCPD-1994-02-14-Pg276.pdf (Accessed June 22, 2026)

[81] Cohen, R., & Chang, C. C. (2025). Toxic Injustice: Private Rights and Public Wrongs Post-*Sandoval. Tulane Environmental Law Journal*, *38*(2), 185-213.

[82] White House. (2021). Executive Order No. 14008 Tackling the Climate Crisis at Home and Abroad. January 27. https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad (Accessed June 22, 2026).

overburdened by pollution. Justice40 required the use of a geospatial mapping tool to identify socially vulnerable and environmentally overburdened communities, which will also be important for planning and monitoring the distribution of community benefits from the Chemical Without Harm Act.[83]

Incorporating these and other provisions into the Chemicals Without Harm Act would help broaden support and effectuate the vision of the Louisville Charter.

An independent advisory committee – modeled after the National Science Board and the White House Environmental Justice Advisory Council (WHEJAC) – would be established to administer the fund. The advisory council would consist of a broad set of representatives from impacted community-based organizations, academia, environmental and health groups, labor, and business to set policies, establish budget targets, recommend priorities, and advise the Administration and Congress on the Fund's progress.

Representation and participation of environmental justice communities and organizations can draw from the experience of the National Environmental Justice Advisory Committee (NEJAC) and the Whitehouse Council on Environmental Quality (CEQ) in convening stakeholder groups.[84] To ensure equity goals of the Chemicals Without Harm Act are achieved, one or more of its independent advisory committees should develop guidelines for agencies and corporations to engage productively with fenceline communities and ensure that community voices are heard and cultural differences understood and respected. Special consideration must be made to respect the nation-to-nation consultative duties of the U.S. to federally-recognized Tribes by incorporation of the Whitehouse 2021 Memorandum on Tribal Consultation and Strengthening Nation-to-Nation Relationships and Best Practices on Consultation.[85]

Adopting legally-binding tools, such as good neighbor agreements[86], requires investing in building community capacity, funding, and technical assistance to support effective participation in stakeholder engagement processes.[87] Enhanced public participation is collaborative and empowering for communities.[88]

[83] Walls, Margaret, Sofia Hines, and Logan Ruggles. "Implementation of Justice40: Challenges, opportunities, and a status update." *RFF Report* (2024).
[84] WHEJAC (2021) Final Recommendations: Justice40 Climate and Economic Justice Screening Tool & Executive Order 12898 Revisions. https://www.epa.gov/sites/default/files/2021-05/documents/whejac_interim_final_recommendations_0.pdf (Accessed June 5, 2026).
[85] Biden, J. (2021). Memorandum on tribal consultation and strengthening nation-to-nation relationships. *The White House*.
[86] Lewis, S. and D. Henkels. (1996). Good neighbor agreements: a tool for environmental and social justice. Social Justice. Vol 23, No. 4. Winter
[87] Gonzalez, T., and G. Saarman, (2014). Regulating pollutants, negative externalities, and good neighbor agreements: Who bears the burden of protecting communities. Ecology Law Quaterly, 41, 37.
[88] Schulz, A. J., et al. (2025). Procedural Justice in Environmental Decision-Making: An Analysis of Public Participation Language in State-Level Cumulative Impact Legislation. Environmental Justice, *18*(6), 411-422.

National Transition Fund for Safer and More Sustainable Chemistry

Transitioning the chemical industry – including piloting and scaling new production facilities, building infrastructure, retiring polluting assets, and supporting workers and communities in the transition – will be expensive and require sustained investment over decades. But the benefits of this investment in a safer and more sustainable chemical industry will far exceed the externalized costs of harm caused by the industry today. One key goal for the Transition Fund is to engage and de-risk private finance, as in the case of climate finance.

Models for transition funds already exist. As early as the 1990s, Greenpeace and the Oil Chemical and Atomic Workers Union (led by its Vice President, Tony Mazzohcci) supported a phase out of industrial uses of chlorine, advocating for a fee on chlorine production to support a just transition for workers. The phase out was subsequently recommended by the US/Canada International Joint Commission as critical to protecting the Great Lakes from chemical pollution, though no action was taken on this recommendation.[89]

More recently, Spain's Just Transition plan for coal workers, launched in 2019, combines a rapid coal phase-out with regional economic revitalization. Through tripartite agreements among government, trade unions, and companies, the plan guarantees income support, early retirement options, retraining, and redeployment for coal miners and coal-plant workers, while prioritizing jobs for them in dismantling, land restoration, and clean-energy projects. Territorial Just Transition Agreements tailored to specific regions of the country coordinate funding for new industries, clean energy, and environmental remediation, supported by over $1 billion in funding from the government, the EU Just Transition Fund, COVID-19 recovery financing, and the private sector. Coordinated by the Spanish government's Just Transition Institute, the strategy has created thousands of new jobs and has successfully phased out the mining and burning of coal.[90]

Another useful model is the European Innovation Fund. Funded by carbon fees from the EU Emissions Trading System, this $40 billion fund supports the demonstration and scale-up of low-carbon technologies to address the high initial capital costs and risks of first-of-a-kind deployment.[91]

Here in the U.S., the Tobacco Transition Payment Program (TTPP), established in 2004, helped farmers and communities adjust to the end of long-standing tobacco price supports and assisted farmers in retiring or divehewrsifying into new crops and livelihoods. Funded by tobacco fees, the program disbursed approximately $10 billion over 10 years.[92]

The Chemicals Without Harm Act can help ensure that the benefits of investing in an environmentally and socially sustainable chemical industry are widely shared by ensuring – as per the Justice40 initiative - that marginalized communities benefit from the transition and by creating public-private partnerships and grant programs that support Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs) and Asian American and Pacific Islander

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[89] Moberg, D. (1999). Brothers and Sisters - Greens and Labor: it's a coalition that gives corporate polluter fits. Sierra Magazine January/February. https://vault.sierraclub.org/sierra/199901/unions.asp (Accessed May 28, 2026).

[90] Touza, L. et al. (2025). From phasing-out to phasing-in: lessons from Spain's just transition governance framework. Real Instituto Elcano ARI 30/2025 February. https://www.realinstitutoelcano.org/en/analyses/from-phasing-out-to-phasing-in-lessons-from-spains-just-transition-governance-framework/ (Accessed May 28, 2026).

[91] See https://www.euinnovationfund.eu/ (Accessed June 22, 2026).

[92] U.S. Department of Agriculture, Farm Service Agency. (2007). Tobacco Transition Payment Program Fact Sheet. June. https://www.fsa.usda.gov/Internet/FSA_File/ttpp07.pdf (Accessed May 28, 2026).

Serving Institutions (AAPISIs). As noted by WHEJAC, "Expanding federal programs that support tribal colleges and universities is critical to supporting communities' efforts to develop local workforces and diversify their economies."[93]

Funding the Chemicals Without Harm Act

Some elements of the Chemicals Without Harm Act - including the Remediation Fund, the Transition Fund, and incentives for safer and more sustainable chemicals - will require sustained public and private investment in addition to administrative funding. The total costs of new capital infrastructure, R&D, reformulations, worker transitions, remediating contaminated sites, and restoring health are difficult to estimate. However, it is possible identify potential sources of revenue to fund the transition. Ideally, the costs of transitioning to a safer and more sustainable chemical industry, as well as the costs of cleaning up past and present impacts, should be borne primarily by the entities that benefited most from the manufacture and use of hazardous chemicals. While society as a whole has benefited from chemicals and should bear some of the costs, many of the impacts of "better living through chemistry" were unknown, not disclosed, or purposely obfuscated, making it difficult for governments and the public to make informed decisions.[94]

As a starting point, it is useful to consider the magnitude of the externalized costs of toxic chemicals, estimated above to be at least $500 billion/year in the United States. This is a conservative estimate and additional work to estimate the cost of toxic chemical exposures – similar to work completed on the social cost of carbon – is needed.[95] The policies envisioned here will reduce these costs only gradually over time as (1) technology changes will take place over a 20-30 year timeframe; (2) the persistence of many chemicals in the environment means that exposures will continue for decades despite reductions in production; and (3) many diseases associated with chemical exposure have long time lags between exposure and disease, as much as decades (as in asbestos-related diseases), so health costs will continue well into the future. By way of a comparison, the total revenues of the US chemical industry in 2025 were approximately $625 billion.[96] The industry is expected to spend approximately $40 billion on capital expenditures and $14.8 billion on R&D in 2026.[97]

The National Remediation Fund and National Transition Fund will be funded through a combination of industry fees and general budget appropriations. The two funds could be managed under a common structure, with a single board and separate advisory committees to include required expertise and stakeholder engagement. A key goal is to tax "bads" to support "goods," including a sustainable chemistry industrial transformation. This is the case with the European Innovation Fund, which forms

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[93] Supra, note 69, p. 27

[94] Michaels, D. (2020). The triumph of doubt: Dark money and the science of deception. New York: Oxford University Press.

[95] Rennert, K, C. Kingdon, B. Prest. (2019). Social Cost of Carbon 101. Resources for the Future. https://www.rff.org/publications/explainers/social-cost-carbon-101/ (Accessed June 9, 2026).

[96] See American Chemistry Council How Chemistry Flows through the Economy. Updated 10/2025. https://www.americanchemistry.com/chemistry-in-america-industry-innovation-impact/chemical-industry-statistics-u.s.-jobs-economic-impact/economic-impact-of-the-u.s.-chemical-industry/how-chemistry-flows-through-the-economy (Accessed May 29, 2026).

[97] See American Chemistry Council. The Business of Chemistry by the Numbers. https://www.americanchemistry.com/chemistry-in-america-industry-innovation-impact/chemical-industry-statistics-u.s.-jobs-economic-impact/u.s.-chemical-industry-by-the-numbers (Accessed May 29, 2026).

part of an overall European Union Strategy to coordinate climate transition and adaptation finance, including disclosure policy and measures to leverage private finance.[98]

Several funding models that would generate revenue could also serve to drive behavioral change in firms.[99] Taxes and fees could be toxicity weighted so that manufacturers and users of the most hazardous chemicals pay more, based on prioritization from the National Chemicals Agency. The Danish Pesticide Tax provides a successful example of a tax tiered by chemical hazard.[100]

Potential funding models include:

- *Excise taxes* imposed on specific materials, goods, services, or activities. For example, the International POPs Elimination Network (IPEN) and the Center for International Environmental Law (CIEL) proposed a 0.5% coordinated global tax on all basic chemicals production, generating about $11.5 billion annually, to be deposited in an international fund to support chemicals management activities.[101] A 2% tax on chemical sales in the US would raise roughly $13 billion/year. The most well-known example of a tax-based model is the Superfund, established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the clean-up of hazardous waste sites. Superfund money also has come from budget appropriations and from fines, penalties, and recoveries from responsible parties.
- *Toxic chemical fees* are similar to excise taxes, but revenue uses are typically earmarked. The level of the fee is intended to reflect the cost of providing services to address the impacts from a polluting activity, including monitoring and cleanup. An example is the California Childhood Lead Prevention Program in which manufacturers that contributed to historical lead burdens are assessed a fee to cover the costs. Another example is the Massachusetts Toxics Use Reduction Act, under which fees help to fund the regulatory program and research and technical support for companies and communities.
- *Settlement funds* from state and federal lawsuits against companies that knowingly harmed environmental or public health harm have been secured on numerous occasions, including in the cases of PFAS, PCBs, asbestos, and lead (as well as tobacco and opioids). These funds generally cover treatment and monitoring, remediation, and prevention.
- *Toxic legacy bonds* are long-duration debt instruments to clean up or remediate impacts after the original industrial activity. Like construction bonds or mining bonds, they create mechanisms to internalize the potential future costs of impacts from toxic chemical production or use. Requiring companies to secure a bond for future damages would place such liabilities on their balance sheets, helping to motivate changes in behavior to reduce risk as well as providing funds to address impacts.

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[98] European Council (2025). Financing the climate transition. https://www.consilium.europa.eu/en/policies/climate-finance/ (Accessed June 1, 2026)

[99] Tickner, J. et al. (2024). A Toolkit of Policy Instruments for Enhanced Chemicals Management and Sustainable Program Funding in California. June. https://www.sustainablechemistrycatalyst.org/s/Sustainable_Fees_Policy_Options_Report.pdf (Accessed May 26, 2026).

[100] Neilsen, H, et al. (2023). Ex-post evaluation of the Danish pesticide tax: A novel and effective tax design. Land Use Policy Vol 126: 106549.

[101] Eisen, N, D. Azoulay, and J. DiGangi. (2020). Financing the Sound Management of Chemicals Beyond 2020: Options for a Coordinated Tax. Center for International Environmental Law and International Pops Elimination Network. https://www.ciel.org/wp-content/uploads/2020/09/ipen-ciel-producer-responsibility-vf1_9e-web-en.pdf (Accessed June 1, 2026).

Additional research is needed to determine the exact amounts required for the remediation and transition funds and to support incentives for sustainable chemistry that can leverage further funding from the private sector. While a precise funding target requires further analysis, the revenue options summarized in the Appendix suggest that a multi-source financing package in the low tens of billions annually is plausible and would provide a meaningful starting point for national remediation and transition investments. While the estimated $500 billion externalized cost is the cost of doing business as usual, it also represents the benefit society could reap by funding change. The policies outlined above are thus expected to pay for themselves overtime, and then some, through economic growth.

Importantly as part of funding the Chemicals Without Harm Act, current subsidies for polluting chemicals production would need to be phased down and shifted towards safer and more sustainable chemistry. This is not without precedent in the renewables sector. A key element of the European climate finance strategy is to discourage "environmentally harmful and economically inefficient subsidies." The International Monetary Fund (as analyzed by the Environmental and Energy Study Institute - EESI) estimates that US fossil fuel subsidies totaled $757bn in 2022, including $3bn in explicit subsidies and $754bn in implicit subsidies (externalized costs of climate change).[102] In its FYI 2024 budget, the Biden-Harris Administration proposed eliminating almost $9bn in fossil fuel subsidies per year while increasing funding for climate transition and adaptation.

Conclusion

The impacts of chemicals on health and the environment create enormous costs that are currently borne by workers, communities, consumers, and the environment. While we have all benefitted from the products of chemistry, some have benefitted more than others, and some have felt the negative impacts disproportionately. In part because the industry has not had to internalize health and environmental costs, it has had little incentive to innovate in safer and more sustainable materials.

The next generation of the chemical industry must internalize these costs. This will require a bold new federal policy, here described as the Chemicals Without Harm Act. Simply stated, the Act will clean up the messes of past and present, turn off the faucet of dangerous chemicals that lead to harm, and drive the safer and more sustainable chemical industry of the future. The Act will:

- Comprehensively assess, prioritize, and regulate all chemicals in commerce, phase out the worst ones, and incentivize the development and adoption of safer and more sustainable alternatives.
- Ensure remediation and restoration of contaminated sites, affected communities, and injured populations.
- Support innovation and worker and community transitions to sustainable chemistry.
- Establish a long-term industrial policy roadmap for a viable and sustainable chemical industry.

[102] International Monetary Fund. (2026). Climate Change. Fossil Fuel Subsidies. https://www.imf.org/en/topics/climate-change/energy-subsidies (Accessed June 1, 2026); BrindAmour, B. (2024). Fact Sheet | Proposals to Reduce Fossil Fuel Subsidies (January 2024). Environmental and Energy Study Institute. https://www.eesi.org/papers/view/fact-sheet-proposals-to-reduce-fossil-fuel-subsidies-january-2024 (Accessed June 1, 2026).

The development of safer chemicals will bring significant new economic gains and job opportunities. Point-of-sale data show that products marketed as sustainable, green, or safer are growing faster than conventional products across multiple consumer product categories.[103] From 2015 to 2019, these products accounted for just 14.3% of market share but drove 62% of market growth. Global Market Insights forecasts that the global green chemistry market will grow from $124 billion in 2025 to $292 billion in 2034, a compound annual growth rate of 10.9%.[104] For every new job in sustainable chemistry, up to eight additional jobs are created across the economy,[105] and each dollar of value added creates over six dollars of value added in the broader economy.[106]

The components of the Chemicals Without Harm Act can be phased-in over time, starting with the establishment of the National Chemicals Agency and the development of the Comprehensive Chemicals Policy to stop the continued flow of toxic chemicals into the environment. These can be followed by the establishment of the Remediation Fund and the Transition Fund. The Chemical Industry Roadmap can be developed in parallel to ensure that national policy guides industry towards an economically and environmentally sustainable future.

[103] Golden, J. et al (2021). Green Chemistry: A Strong Driver of Innovation, Growth, and Business Opportunity. Chain. Lowell Center for Sustainable Production and Green Chemistry & Commerce Council (Change Chemistry).r s
[104] Global Market Insights. (2025). *Green Chemistry Market Size & Share 2025-2034*.
[105] Golden, J. et al (2021). Lowell Center for Sustainable Production and Green Chemistry & Commerce Council (Change Chemistry).
[106] Ibid

Acknowledgements

The Chemicals Without Harm Act builds heavily on the work of Professor Kenneth Geiser, a leader in the US toxics movement and author of *Chemicals Without Harm: Policies for a Sustainable World* (MIT Press 2015). Many of the ideas embedded in this paper are drawn from over two decades of research at the University of Massachusetts Lowell led by the author on comprehensive chemicals policy and sustainable chemistry. Reports from that work can be found at www.sustainablechemistrycatalyst.org. Professor Robin Saha of the University of Montana contributed greatly to environmental justice documentation in this paper. Drs Paola Jaimes Santamaria and Tom Walter of UMass Amherst provided critical research for the cost estimates used in this paper and appendix. Professors Jim Boyce and Michael Ash of UMass Amherst contributed important insights and edits on drafts.

*For more information on this topic, including the **Policy Brief**, please visit our policy page.*

Contacts: Joel Tickner: Joel_Tickner@uml.edu

Appendix: Chemicals Without Harm Act (CWHA): Potential Funding Mechanisms

A. Revenue options

Mechanism	Description and precedent	Estimated revenue
Tax on chemical industry sales	Broad upstream excise-style tax on chemical manufacturers or chemical sales. Similar in logic to existing excise taxes on petroleum, tobacco, and hazardous substances. The American Chemistry Council estimates that the US "business of chemistry" generates approximately $673 billion annually.	A 1% tax on a ~$600–670 billion sales base would generate roughly $6–7 billion annually; a 2% fee would generate approximately $12–14 billion annually. This could provide a stable long-term funding source for remediation and transition investments.
CERCLA / Superfund excise tax	Federal polluter-pays financing model for hazardous waste cleanup established under CERCLA. Superfund has historically been financed through excise taxes on petroleum products, chemical feedstocks, imported chemical substances, and a corporate environmental income tax. Revenues support hazardous waste remediation and related environmental cleanup activities.	**Current baseline:** Treasury collected $1.44B in FY2023 and EPA/Treasury forecast $2.17B in FY2024. This is a useful lower-bound benchmark for CHWA because it shows that existing federal excise taxes on hazardous inputs can already raise around $1.5–2.2B/year. If CWHA expanded the tax base from selected feedstocks/imported substances to a broader set of toxic chemicals, revenue could plausibly exceed the current Superfund baseline.

California Childhood Lead Poisoning Prevention fee	California requires firms historically linked to lead contamination — including architectural coatings distributors, motor vehicle fuel distributors, and facilities reporting lead air pollution releases — to pay an annual fee into the Childhood Lead Poisoning Prevention Fund. CA Department of Public Health identifies the fee payers and calculates each firm's responsibility using "historical market share attributions." The fund supports health care referrals, environmental assessments, education, screening, and prevention activities.	California's Childhood Lead Poisoning Prevention Fund collects roughly $31 million annually through regulatory fees on responsible industries. A population-scaled national equivalent would generate approximately $250–270 million annually under a comparable federal model for lead pollution.

Hazardous waste generation and toxics use taxes and fees	Several US states impose fees tied to hazardous waste generation, toxic chemical use, or hazardous substance possession. Examples include California hazardous waste generator fees, the Massachusetts Toxics Use Reduction Act (TURA), and Washington State's Hazardous Substance Tax (HST). These systems finance hazardous waste management, environmental cleanup, toxics-use reduction technical assistance, and pollution prevention programs while also incentivizing firms to reduce toxic material use and waste generation.	Massachusetts Toxics Use Reduction Act fees were originally designed to generate approximately $4–5.5 million annually for toxics-use reduction activities. Washington state's much broader Hazardous Substance Tax generated approximately $302 million in FY2023 and $337 million in FY2024. It applies to petroleum products and hazardous substances on a statewide basis. A federal hazardous substance fee or toxic-use surcharge could plausibly generate revenues ranging from hundreds of millions to several billions annually, depending on the breadth of the taxable base and whether petroleum and large-volume industrial chemicals are included.

Settlement Funds: PFAS settlements (3M, DuPont, Chemours)	Large legal settlements have required PFAS manufacturers to contribute to drinking water treatment and environmental remediation after widespread contamination lawsuits brought by water systems and local governments. Similar settlement funds have been established in the case of opioids and tobacco.	3M corporation agreed to a settlement that could reach approximately $10.3 billion over 13 years, while Chemours, DuPont, and Corteva agreed to a separate settlement of approximately $1.2 billion. These cases demonstrate that liabilities associated with persistent toxic chemical contamination can reach tens of billions of dollars, strengthening the rationale for proactive industry-financed remediation systems rather than relying primarily on litigation after damages occur.
Plastic packaging taxes/virgin plastics fees	Excise taxes or fees imposed on virgin plastic packaging or plastic resin production. The UK Plastic Packaging Tax applies to packaging with less than 30% recycled content. Similar US proposals, including the REDUCE Act and Break Free from Plastic Pollution Act, envisage excise taxes on virgin plastic resin production.	The UK Plastic Packaging Tax generated approximately £268 million in FY2023–24 and £259 million in FY2024–25, with a tax rate of £217.85 per tonne in 2024–25. American Chemistry Council data indicate that U.S. production of major plastic resins is currently around 9 billion pounds per month, equivalent to roughly 100–110 billion pounds annually. Proposed U.S. legislation such as the REDUCE Act included fees rising to $0.20 per pound on virgin plastic resin used in single-use products. At that scale, a federal virgin resin excise tax could plausibly generate revenues in the high single-digit or low double-digit billions annually depending on the taxable base, exemptions, and behavioral responses. For example, applying a $0.20/lb fee to 40–60 billion pounds of taxable virgin resin would imply approximately $8–12 billion annually before exemptions and adjustments.
Transition financing fees	Existing transition-financing precedents include the federal Tobacco Transition Payment Program (TTPP), created after the	The Tobacco Transition Payment Program (2005–2014) provides a major precedent for industrial transition assistance in the United

	phaseout of the tobacco quota system and funded through assessments on tobacco manufacturers and importers.	States. The program distributed roughly $10 billion over 10 years to tobacco quota holders and producers after the federal government ended the tobacco quota system. Payments were financed through assessments on tobacco manufacturers and importers.
Toxic legacy bonds / environmental assurance bonds	Firms producing or using hazardous chemicals could be required to post financial assurance, reclamation bonds, insurance, or other guarantees to cover future remediation liabilities. Similar systems already exist in mining reclamation, oil and gas well closure, and hazardous waste facility closure/post-closure requirements under RCRA. CERCLA section 108(b) already provides limited authority for EPA to require financial assurance for industries handling hazardous substances, but implementation has been limited. The CWHA proposal could expand and systematize this approach by establishing broader, more proactive financial assurance and remediation financing mechanisms across the chemical sector.	EPA estimated that proposed federal hardrock mining financial assurance requirements under CERCLA Section 108(b) would require more than $7 billion in cleanup liability coverage from mining operators, while the Infrastructure Law allocated approximately $4.7 billion for remediation of orphaned oil and gas wells. Similar financial assurance systems could be extended to chemical manufacturing and hazardous chemical storage facilities, requiring firms to post bonds, insurance, or other guarantees sufficient to cover future remediation risks. Given the size of the U.S. chemical sector and the scale of existing toxic remediation liabilities, such requirements could plausibly involve multi-billion-dollar financial guarantees across high-risk segments of the industry.
Fees on high-concern chemicals (PFAS,	Differential fees or surcharges imposed on chemicals classified as high concern the	Recent studies estimate that PFAS exposure may impose approximately $5.5–63 billion in

endocrine disruptors, carcinogens)	categorization process. Such fees could create incentives for substitution toward safer alternatives while generating revenues for remediation and transition activities.	lifetime health-related costs in the United States, while broader estimates of annual PFAS-related health costs range from roughly $37–59 billion per year. Separately, estimates for nationwide PFAS drinking water treatment and remediation costs range from roughly $120–400 billion over time. Given the widespread industrial use of PFAS and other high-concern chemicals, even modest toxicity-weighted fees could potentially generate substantial revenues while encouraging substitution.

B. Subsidy shifting options

Existing subsidy or support mechanism	Description	Potential role in financing
Direct fossil fuel and petrochemical subsidies	The chemicals sector depends heavily on fossil fuels as both feedstock and energy source, so subsidies to oil and gas indirectly support fossil-based chemicals and plastics. Estimates vary substantially depending on methodology. EESI cites roughly $20.5 billion per year in direct U.S. fossil fuel subsidies, including approximately $14.7 billion in federal subsidies and $5.8 billion in state subsidies (2015–16 estimates). However, broader estimates that account for unpriced health, environmental, and climate damages are far larger. EESI cites total U.S. fossil fuel support at approximately $757 billion in 2022, including roughly $3 billion in explicit subsidies and $754 billion in implicit costs borne by society through environmental degradation and health impacts.	Redirecting even a modest share of existing fossil fuel subsidies toward safer chemistry could provide substantial financing for remediation and transition activities. For example, redirecting 10% of estimated direct fossil fuel subsidies would imply roughly $2 billion annually, while redirecting 25% would imply approximately $5 billion annually for safer chemistry investment, remediation, worker transition, or industrial conversion programs.

Petrochemical tax abatements and industrial incentives	State and local governments frequently provide tax abatements, infrastructure subsidies, industrial revenue bonds, utility support, and other incentives for petrochemical facilities and plastics production infrastructure. Louisiana's Industrial Tax Exemption Program (ITEP) — one of the largest industrial subsidy programs in the United States — has awarded more than $20 billion in local tax exemptions to industry since 1998, much of it benefiting petrochemical and fossil-based manufacturing. Texas and Gulf Coast petrochemical projects have similarly received billions in tax abatements and subsidy support tied to plastics and petrochemical expansion.	Redirecting existing industrial incentives toward safer chemistry manufacturing, green chemistry infrastructure, circular material systems, and less-toxic industrial alternatives could provide substantial support for CWHA transition objectives. Recent analyses estimate that U.S. plastics manufacturers received roughly $9 billion in state and local subsidies since 2012 for new or expanded plastics facilities, while Texas plastics projects alone received more than $1.6 billion in tax breaks since 2013.