Exploring Policy Choices for Addressing Forever Chemicals

By Kristin Ziv, Isabel Guajardo Retamales, and Morgan D. Bazilian

On March 20, the U.S. Senate Committee on Environment and Public Works (EPW) convened a pivotal hearing titled "Examining PFAS as Hazardous Substances." The session focused on the risks associated with per- and polyfluoroalkyl substances (PFAS), a group of synthetic chemicals found in various industrial and consumer products.

The hearing shed light on the need for effective regulation and mitigation strategies to safeguard communities from PFAS contamination. As concerns rise over the impact of these persistent chemicals on human health and the environment, policymakers and experts gathered to seek solutions that can protect our water, soil, and well-being.

PFAS, or aptly named Forever Chemicals, are of growing concern because they do not break down. They persist in the environment and contaminate drinking water, accumulate in fish and wildlife, and some can remain in human bodies for years. Increasing unease about their risk has spurred international reactions.

The risks to human health are not fully known. Some studies of certain PFAS on humans have found an association between PFAS exposure and a wide range of health effects, including increases in cholesterol levels, changes in liver enzymes, pregnancy problems, lower birth weight, and kidney and testicular cancers.

PFAS are now so widespread in society that the CDC estimates that PFAS are found in the blood of 97% of the U.S. population.

In widespread use since the 1940s, PFAS resist heat, oil, stains, grease, and water, which is why they are found in a vast array of consumer products. The list includes clothing, furniture, adhesives, food packaging, non-stick cookware, cleaning products, plus coatings for carpeting, upholstery, and electrical wire.

PFAS refer to roughly 15,000 synthetic chemicals. They are also widely used in industry because of their stability, strength and durability. PFAS play an essential role in the oil and gas sector, construction, electronics, firefighting, pharmaceutical manufacturing, semiconductors, aerospace, automotive, and several military applications. One of the most widely studied substances is Aqueous Film-Forming Foam (AFFF), which is primarily used for fighting fires.

These chemical substances are part of several essential supply chains and products. Examples include some high-capacity batteries, certain membranes for green hydrogen production, aspects of semiconductors, specific coatings for cables and wiring, and limited solar panel sheets. Troublingly, a few recycling strategies are also known to release PFAS compounds.

THE GLOBAL COMMUNITY MOBILIZES

Increasing concern for the potential harm to public health has prompted various jurisdictions to take action. Most efforts involve collecting data, characterizing and better understanding the health effects of PFAS exposure, identifying routes of PFAS exposure, obtaining samples, and creating inventories.

In the U.S., the Environmental Protection Agency (EPA), the Food and Drug Administration, the Department of Defense, the CDC, and others are conducting research related to PFAS, with funding from the Bipartisan Infrastructure Law and National Standards. The law contemplates investing $9 billion over five years to address emerging contaminants and to remove PFAS from affected communities. Most of these efforts focus on ensuring clean air, water and food. (Details can be found in the White House Fact Sheets 2021, 2022, 2023.) In 2023, the EPA distributed roughly $1 billion through the BIL State Revolving Fund Emerging Contaminants programs and announced $2 billion in grant funding to different communities and territories. Approximately 20 federal initiatives target drinking water, consumer products/food packaging, hazardous substances, surface water, wastewater, among other areas.

One of the latest efforts from the EPA has been to finalize a rule that prevents companies from starting or resuming the manufacture or processing of 329 PFAS that have not been used or made for many years without a complete EPA review and risk determination. The EPA has also proposed to amend the Resource Conservation and Recovery Act regulations to identify two PFAS compounds as hazardous constituents and to modify the definition of hazardous waste to protect communities from PFAS. In addition, the agency announced new methods to better measure PFAS in the environment, PFAS exposure, and PFAS effects on health.

Forty-one U.S. states also have programs in operation, totaling roughly 145 initiatives. State and territory program goals align with those of federal programs. But states emphasize fish consumption, cleanup levels or criteria, AFFF, consumer products, wastewater treatment residuals and biosolids, hazardous wastes, air quality, and landfills. In the first two months of 2024, several bills have been introduced in different states, including Colorado's SB 81, restricting and prohibiting PFAS in a variety of products, with proposed effective dates between 2024 and 2032.

Internationally, Australia and New Zealand have one program serving as a framework for regulations on PFAS. Canada has two programs focused on drinking water and AFFF. In the EU, the European Chemicals Agency (ECHA) published a proposal in February 2023 prepared by Germany, Denmark,

the Netherlands, Sweden and Norway. The goal is to determine how best to evaluate the proposal, then make the plan public.

EU industry representatives have expressed concern about the breadth of the PFAS proposal, which they characterize as a ban. They point out that the definition used in the ban proposal comes from the OECD, which explicitly cautions against using the definition for regulatory purposes. This ban, if it goes forward, is not expected to be fully in effect until 2027.

While the EU has had regulations for some specific PFAS since 2009 -- including in the international Stockholm Convention and the EU's Persistent Organic Pollutants Regulation to eliminate their use -- individual countries have their own programs regarding PFAS. For instance, Germany and the Netherlands have restriction proposals for specific PFAS; Italy, Sweden, Denmark, and the United Kingdom are focused on drinking water; and Norway is focused on consumer products and food packaging.

Asian countries have taken different paths toward regulating PFAS. Japan's Ministry of Health, Labor and Welfare as recently as February announced a proposal to regulate PFOAs and related compounds. Other Asian countries have made no material efforts to address production and use. While the U.S. and Europe move to minimize the use and production of PFAS, China has increased its share of global production from 40% to 65%. China's relatively lax attitude may encourage Western countries and companies to further outsource manufacture of products that use PFAS to China in a form of regulatory arbitrage.

China is not oblivious to the problem of PFAS, though. In 2023, the country's Ministry of Ecology and Environment published a list of New Pollutants for priority management. China's list is part of an action plan that includes bans and restrictions on 14 controlled pollutants also listed under the Stockholm Convention. China's management makes exceptions regarding the processing and use of these chemicals.

MOVING FORWARD

A difficult balancing act is playing out as the search for alternatives gains steam. PFAS are a diverse group of chemicals that are not equally toxic. Subgroups of these chemicals carry different risks. Meanwhile, researchers and industry are actively exploring alternatives to PFAS—some sectors are easier than others.

Substitutes exist for 90% of the coating market for cables and wiring. Substitutes have also reduced PFAS use in solar panels in recent years. Some optimists see PFAS being phased out of solar panels by 2030. The wind industry is also attempting to reduce reliance on PFAS. Membranes used in hydrogen production have relied on PFAS for 20 years, and the EPA is close to finalizing a rule that

would transition the chlorine manufacturing industry to PFAS technologies as well. Batteries, critical for electric vehicles and clean energy storage, also continue to rely on PFAS.

These so-called Forever Chemicals will linger in the environment for the foreseeable future. Removing them from the air, ground and water may have received less attention than has use reduction. But removal research is underway. The chemical companies DuPont, Corteva and Chemours recently reached a $1.19 billion settlement agreement with the federal government to set up a fund to remove toxic PFAS from public drinking water systems.

For now, PFAS are both indispensable to modern life and a pestilence. PFAS were invented in the 1930s. It has taken almost a century, but society seems to have reached an inflection point.

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