CHE Collaborative for Health & Environment

Webinar Highlights

Chemical Recycling of Plastics Part 1: Health concerns

Chemical recycling of plastics is an umbrella term for processes that use heat, pressure, chemicals, and/or other agents (e.g., enzymes) to create chemical products from plastics. There has been increasing interest in the potential of chemical recycling technologies to break down plastics into chemical products that can be used to make fuels, other chemicals, or new plastics. Proposals for, and construction of, chemical recycling facilities have increased globally, entailing significant public and private investments and potential impacts that range from the planetary to the local community scale.

In the first part of this webinar, **Dr. Veena Singla** discussed the basics of chemical recycling and health concerns with different technologies, giving examples from existing facilities in the U.S.

Featured Speakers: Veena Singla, PhD, an affiliate at the University of California, San Francisco Program on Reproductive Health and Nihan Karali, PhD, who works at the intersection of energy, material, and environmental impacts of industrial production systems, speaking March 5, 2026.

This fact sheet has been created by CHE based on information presented in a webinar done in partnership with the Physicians and Scientists Network Addressing Plastics and Health (P-SNAP). Selected quotes in bold are from the webinar speaker(s). For the full set of resources provided by the webinar presenters, see the webinar page, where you'll also find associated Slides & Resources.

The Problem

Plastics are made from fossil fuels and petrochemicals. These chemicals can be released throughout the plastic product lifecycle. Harmful human exposures can occur at every stage, from feedstock extraction to production, use, recycling, and end-of-life disposal.

"Chemical recycling" is an umbrella term for multiple processes that include pyrolysis, gasification, solvolysis, and solvent-based processes. These processes break down existing plastic products into fuel, chemicals, and/or plastic feedstock. All of the processes used in "chemical recycling" carry risks of perpetuating harmful human exposures. These processes variously generate air pollution, hazardous waste, and other wastes that must be disposed of.

Chemical recycling facilities are disproportionately sited in low-income areas and in areas with above-average populations of people of color. Many of these communities are already burdened by industrial pollution. Siting these facilities in these communities creates risks for additional hazardous exposures.

Singla noted that the terminology around chemical recycling can be confusing. There are many umbrella terms that can be used interchangeably by the industry, such as "advanced recycling," "molecular recycling," and "plastics renewal." These interchangeably used terms generally refer to three basic processes:

- Pyrolysis/gasification (incineration)
- Solvolysis (not incineration)
- Solvent Purification (not incineration)

Pyrolysis

Pyrolysis is the process used at about 80% of the operating or proposed chemical recycling facilities in the US. Most pyrolysis facilities convert plastics to fuel. They use high heat and pressure to break down plastics. Some of the breakdown products are burned in the process to provide the necessary heat. Some of the product breaks down into an intermediate pyrolysis oil that can eventually be refined into fuel.

If the product is burned as fuel, then it's not part of a circular economy and it's not reducing the demand for virgin resources. Most of what is produced by pyrolysis is burned as low-value fuel or waste – not for producing new durable products – and therefore is not truly "recycling."

Pyrolysis also results in hazardous waste which must then be disposed of. Singla highlighted three pyrolysis facilities which, together, produced more than two million pounds of hazardous waste in under four years. This waste is a threat to the communities where it is generated, transported through, and disposed of. Singla highlighted a report about a pyrolysis facility in North Carolina that has been cited for numerous safety violations, including failing to safely manage its hazardous waste. Pyrolysis facilities also generate hazardous air pollutants and present fire and explosion risks.

Solvolysis

In solvolysis, the plastic products are broken down with solvents. These solvents are themselves hazardous chemicals. The resulting outputs are chemical components from the plastic, as well as additives and by-products. The desired chemical components must then be separated out. With further processing, these components can be used as chemical and plastic feedstocks. Like pyrolysis, these processes can create significant amounts of hazardous waste.

Only one solvolysis facility is currently running in the US, and it is part of a larger complex. As a result, there is a lack of transparency about what is happening there, such as details about the hazardous waste that they are producing.

Solvent Purification

This process has also been called “plastic to plastic,” “physical recycling,” “and “disolution-precipitation.” Solvent purification dissolves the plastic in solvents, resulting in polymers and additives. These must be separated and purified. The polymer is then used to make new plastic.

Like the other processes, this generates hazardous waste. As an example, a solvent purification facility in Ironton, OH is permitted to release volatile organic compounds (VOCs), is required to burn off VOCs that it produces, and also generates other hazardous waste.

Recommendations

All these technologies generate harmful air pollution. They all use hazardous chemicals, produce hazardous chemicals, and/or generate hazardous waste.

Singla stressed that while chemical recycling technologies could theoretically be improved over time, the fundamental challenges will remain. Plastics are composed of fossil-fuels, so any process that breaks down and reconfigures the make-up of those plastics will involve toxic chemicals. Those chemicals will come out as emissions, releases, hazardous waste, or contamination in the recycled plastic.

Singla stressed that recycling has a place as part of the answer to the problem of plastic pollution, but that it is one piece of a much larger puzzle. Solutions involving recycling should contribute to a truly circular economy. We should eliminate the use of non-essential, disposable single use products. We need to find ways to reduce virgin plastic production and consumption.

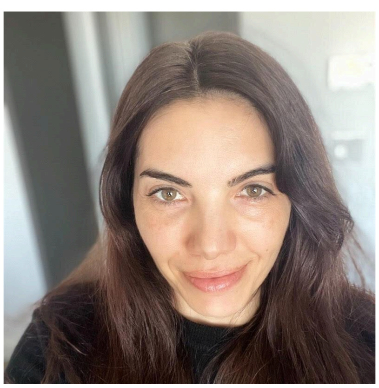
“We have to address the upstream production and the harms that come with that in order to really get at the root of this problem.”

To Find Out More

- Watch the March 5, 2026 webinar: Chemical Recycling of Plastics: Health concerns & technological limits
- Watch Singla's Science Explainer: Understanding "Chemical Recycling" in 9 minutes
- Read Singla's presentation slides: Chemical recycling of plastic and health concerns
- Read Karali's presentation slides: The Technical Limits of Chemical Recycling
- Read our 2-part blog series about "advanced recycling":
  - "Advanced Recycling" of Plastics: Largely waste disposal by another name (Part 1)
  - "Advanced Recycling" of Plastics: Largely waste disposal by another name (Part 2)

About the Speakers

Veena Singla, PhD is an affiliate at the University of California, San Francisco Program on Reproductive Health and the Environment and a Senior Fellow with Halt the Harm Network. She consults for non-profits and academia on environmental health science and policy. Her research investigates how toxic chemicals and pollution related to systems of materials use, production, and disposal, including plastics, threaten the health of impacted communities, especially those experiencing environmental injustices. Her work seeks to address health disparities linked to harmful environmental exposures using an interdisciplinary approach incorporating environmental health, exposure science, public health, and policy expertise. She focuses on advancing comprehensive solutions in collaboration with communities that center public health, racial and health equity. She received a B.S. from the University of California, Berkeley in chemistry and a Ph.D. in cell biology from the University of California, San Francisco.



Nihan Karali, PhD works at the intersection of energy, material, and environmental impacts of industrial production systems. She focuses on identifying sustainable, non-polluting, and safe pathways for industrial production and consumption, including plastics production and recycling. Her recent research demonstrating that 75% of plastic production-related greenhouse gas emissions occur upstream of polymerization has been cited in over 100 international media outlets. She holds a Ph.D. in Industrial Engineering.