POSITION STATEMENT

SUSTAINABLE PACKAGING COALITION®

CHEMICAL RECYCLING

Last Updated November 2023

SPC's mission is to bring together sustainable packaging stakeholders to catalyze actionable improvements to packaging systems and lend an authoritative voice on issues related to packaging sustainability.

SPC recognizes the need for multiple solutions to the myriad problems of material extraction, waste, and pollution. Chemical recycling is one of these solutions. However, chemical recycling facilities and processes need to be sited and developed with care, and companies looking to chemical recycling as a solution should pay attention to possible unintended consequences.

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SPC's use of the term chemical recycling

Chemical recycling refers to a spectrum of physical and chemical processes for transforming plastic or polymer waste into new products. **SPC considers the term chemical recycling to be interchangeable with the terms molecular recycling, non-mechanical recycling, advanced recycling, and feedstock recycling**. Chemical recycling technologies fall under three main categories: purification, depolymerization, and conversion. The use of technologies in these categories does not guarantee recycling; rather, recycling occurs when reprocessed material is incorporated into a new product. Thus, **chemical recycling does not include energy recovery, fuel production, or the incineration of plastics**, although these outcomes may involve the same or similar technologies as chemical recycling, and in some cases, fuels may be co-produced with recycled materials in the same process.

Chemical recycling's role in the circular economy

Chemical recycling offers opportunities to divert hard-to-recycle plastics from landfills or incineration and to reduce dependence on virgin fossil plastic by providing an additional supply of high-quality recycled plastics. That said, chemical recycling is not a perfect solution. Like all other production and recycling processes, chemical recycling has associated impacts such as energy and water use, waste streams, greenhouse gas emissions, and health hazards. The potential and actual benefits and impacts of chemical recycling vary widely based on facility location, the type of technology, the feedstocks accepted, and the chemicals and solvents used, among other factors. While the packaging industry is eager for at-scale solutions to keep hard-to-recycle plastics in circulation, indiscriminately scaling up any and all forms of chemical recycling is not the right approach. **Rather, we should aim to scale up the solutions with the best environmental performance and to support solution providers committed to transparency and continuous improvement**.

We are in an exciting time of technology development and innovation in chemical recycling. However, chemical recycling does not exist in a vacuum, and historical and geographical contexts are equally important as technology when considering how chemical recycling can play an optimal role in the circular economy of plastics. The most widespread class of chemical recycling technologies today is conversion, and it is only in recent years that conversion processes have begun to be used for the production of feedstocks for new plastics rather than fuels.

Chemical recycling facilities are similar in nature to other chemicals and plastics production facilities—and approximately half of U.S. states have classified chemical recycling as manufacturing—which means **the environmental concerns surrounding chemical manufacturing apply to chemical recycling as well**. Like the broader chemicals and plastics industry, chemical recycling faces concerns of toxicity, greenwashing, and harm to nearby communities. In order to realize their full potential as sustainable solutions, chemical recycling companies will have to transcend the status quo in the chemical industry and build trust among the public that their technologies will not do more harm than good.

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How can chemical recycling best contribute to a sustainable future?

Companies seeking to partner with, provide materials to, or source materials from chemical recyclers should ask the following questions:

Could upstream solutions circumvent the need for recycling? We live in a world of finite resources, and preventing waste in the first place is better than dealing with it after the fact. Before turning to recycling as a solution for plastic packaging waste, the SPC encourages companies that make or use plastic packaging to take a step back and reimagine their packaging with a focus on reduction and design for reuse.

How does the chemical recycler fit into the larger recycling system? Is there evidence that they are complementary to mechanical recycling? Recycling is the next-tier strategy after reduction and reuse. Chemical recycling tends to be more resource-intensive than mechanical recycling, so packaging should be designed for compatibility with mechanical recycling systems as much as possible, and recycled plastics should be sourced from mechanical recycling processes as much as possible. Chemical recycling should be used as an end-of-life strategy for material streams that are considered "hard-to-recycle" using mechanical methods and as a material source for applications and markets where high-quality resin is essential. Chemical recycling should serve as a complement to mechanical recycling. Complementarity in practice looks like chemical recyclers partnering with mechanical recyclers in their region so that easier-to-recycle plastics enter mechanical recycling and mixed, hard-to-recycle, or residue plastics are captured by chemical recycling.

Does the company employ the principles of green chemistry? Since chemical recycling processes offer an opportunity to manage materials that would otherwise end up as waste, chemical recycling processes themselves should be designed to minimize waste generation. Chemical recycling processes should be energy-efficient, including avoiding high temperatures and pressure when possible and using renewable sources of energy. In addition, solvents and reagents used in chemical recycling processes should be selected with careful consideration of their health and environmental hazard profiles. The chemistry of the future is "benign by design."

Is the company transparent about the life cycle impacts of their recycling process? Do they track and account for recycled plastics in a credible way? It is difficult to compare across diverse chemical recycling technologies, each with its own inputs and outputs, but pay attention to the type of information that companies share about the impacts of their process. Look for companies that have conducted a life cycle assessment (LCA) using process- and facility-specific information and that when sharing the results of the LCA, they state their assumptions and describe any alternative scenarios that were evaluated. Be skeptical of companies that state a single number, such as percent carbon footprint reduction, without giving any detail as to where the number came from. Look for companies that participate in credible chain of custody third-party certification programs that explicitly exclude fuel production from being counted toward recycled material claims.

What are the impacts on communities surrounding the company's facilities? How is the company addressing environmental justice concerns? The chemicals and plastics industry in the U.S. has historically had disproportionate negative impacts on low-income communities and communities of color, and building new chemical processing infrastructure in already heavily impacted areas, even if in service of the circular economy, is not progress toward a more sustainable and equitable future. Chemical recycling companies will need to go above and beyond compliance with current zoning and permitting requirements. Look for companies that have taken environmental justice into account when siting their facilities and that have engaged with local communities to address questions and concerns, rather than assuming that job creation outweighs all other factors.

The criteria listed above may be aspirational today. However, the SPC believes they should serve as a guide for where chemical recycling needs to go to scale sustainably and to be part of the circular economy of the future.

See also: ***Introduction to Chemical Recycling***

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Chemical recycling principles from other organizations and industry groups

	WWF Principles	CGF Vision & Principles (pyrolysis)	Recycling of the Future (NRDC)	Cefic Position
Prioritize reduction and reuse	X		(X)	
Demonstrate reduced (or equivalent) carbon footprint compared to virgin production	X	X		
Demonstrate safety for human health and environment	X	X	X	
Do not compete for feedstock with mechanical recycling	X	X		
Match waste streams with least impactful applicable technology	X		X	
Only material to material is recycling, and plastic to plastic yields should be maximized	X	X		
Products from recycling should be recyclable	X			
Claims should be clear, true, relevant, transparent	X	X		
Verify recycled material claims with chain of custody and 3rd party certification	X	X		X
Collect more data, conduct LCAs, and contribute to common methodologies				X
Policy should not disadvantage mechanical recycling				
Require environmental justice assessments for chemical recycling facilities				

This table indicates the principles listed in chemical recycling position documents from a range of organizations. An X means this principle is included in the position statement, and no X means the principle is not addressed in the position statement.

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Chemical recycling principles from other organizations and industry groups

	ACC Key Principles	APR Position	ISRI Position	AMBR Guide to Plastic Policy	ZWE Position
Prioritize reduction and reuse				X	
Demonstrate reduced (or equivalent) carbon footprint compared to virgin production					
Demonstrate safety for human health and environment					
Do not compete for feedstock with mechanical recycling		X			X
Match waste streams with least impactful applicable technology					
Only material to material is recycling, and plastic to plastic yields should be maximized		X	X	X	
Products from recycling should be recyclable					
Claims should be clear, true, relevant, transparent					X
Verify recycled material claims with chain of custody and 3rd party certification	X				X
Collect more data, conduct LCAs, and contribute to common methodologies					
Policy should not disadvantage mechanical recycling			X		
Require environmental justice assessments for chemical recycling facilities				X	
Chemical recycling should not negate design for recycling guidelines		X			

This table indicates the principles listed in chemical recycling position documents from a range of organizations. An X means this principle is included in the position statement, and no X means the principle is not addressed in the position statement.

See also: ***EJScreen Mapping Tool***