Deep Dive
Chemical Recycling and Senate Bill 54

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SB 54 **does not permit producers to use harmful chemical recycling technologies** to meet the law's recycling mandates. This prohibition was reinforced in a letter by Senator Allen to the Senate Journal by reiterating that "technologies using pyrolysis, gasification, solvolysis, and similar technologies that involve combustion and incineration, as well as the generation of hazardous waste, are… prohibited from being considered recycling under SB 54."

SB 54 also restricts harmful technologies by including strong definitions, prohibitions on how producer responsibility organization (PRO) funds can be used, and protections for disadvantaged, low-income, and rural communities.

Definitions in SB 54

The definitions in SB 54 **prohibit the use of incineration, pyrolysis, distillation, biological conversion, and engineered municipal solid waste conversion (including gasification)** from counting as recycling under the program's mandates.

Recycling: SB 54 prohibits combustion, incineration, energy generation, fuel production, and other forms of ***disposal***. CalRecycle is required to adopt regulations to "encourage recycling that minimizes the generation of hazardous waste, generation of greenhouse gases, environmental impacts, environmental justice impacts, and public health impacts." PRC §42041(aa).

Responsible end market (REM): To be considered recycled, SB 54 requires materials be sent to a REM, defined as a market where the recycling of materials and disposal of contaminants is "conducted in a way that benefits the environment and minimizes risks to public health and worker health and safety." PRC §42041(ad).

Recycling rate: In calculating the recycling rate, which is especially important for plastics which need to meet a 65% recycling rate by 2032 to stay on the market, SB 54 also excludes "covered material ***disposed*** of, as defined in subdivision (b) of Section 40192." PRC §42041(ab).

Statutory definitions that SB 54 relies on

"***Disposal***" includes "landfill disposal, ***transformation***, or ***EMSW conversion.***" PRC §40192(b).

"***Transformation***" includes "incineration, pyrolysis, distillation, or biological conversion other than composting." PRC §40201.

"***Engineered municipal solid waste conversion***" or "***EMSW conversion***" is a process that meets certain criteria including the displacement of fossil fuels, low moisture content, and where the waste has a high energy content, which would include gasification technologies. PRC §40231.2(a)

Prohibitions on use of PRO fees

The PRO may not use any fees collected to "subsidize, incentivize, or otherwise support incineration, ***engineered municipal solid waste conversion***, the production of energy or fuels, except for fuels produced using anaerobic digestion of source separated organic materials, or other ***disposal*** activities." PRC §42051.1(j)(2).

Protections for disadvantaged, low-income and rural communities

SB 54 includes multiple provisions to protect disadvantaged, low-income, or rural communities, where chemical recycling facilities are often located. Importantly, both the PRO plan and CalRecycle in its implementation of the law must avoid and minimize negative impacts to these communities.

Chemical recycling is not a real solution

Focusing on chemical recycling or any other "quick fix" to the plastic pollution crisis risks delaying the systemic changes needed such as reducing single-use plastics and holding producers accountable for their waste. Non-conversion chemical recycling technologies such as solvolysis are not operational at scale and would take significant time and investment, which is better spent improving our existing recycling system.

What is chemical recycling?

Chemical recycling (sometimes known as **advanced recycling** or **molecular recycling**) is an umbrella term for a suite of technologies that use non-mechanical processes to break down plastics. Chemical recycling technologies can be roughly broken down into three categories:

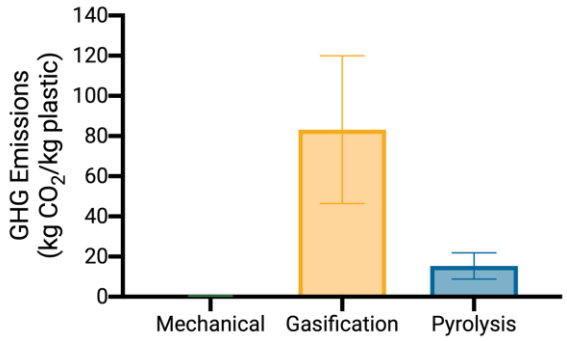
- **Conversion technologies** like **pyrolysis** and **gasification**, use heat and pressure to break the chemical bonds in plastics to produce hydrocarbons such as synthesis gas ("syngas") and crude oils, which are then used as fuel for energy. These technologies have been available at scale for decades and are largely another form of plastic-to-fuel.
- **Decomposition technologies** like **solvolysis** or **methanolysis**, use chemicals to break the bonds in plastics to produce monomers (the building blocks for new plastics) or other hydrocarbon feedstocks. These technologies are recent innovations and are largely not available at scale and may produce significant hazardous wastes.
- **Purification technologies** use chemicals to dissolve and extract out plastic polymers without breaking the chemical bonds. These technologies are recent innovations and are largely not available at scale.

What is the problem?

Chemical recycling technologies, especially pyrolysis and gasification, are being pushed as the solution to the plastic pollution crisis and the low and stagnant recycling rate for plastics. However, these conversion technologies do not recover plastics and therefore do not improve plastics recycling or help achieve a circular economy.

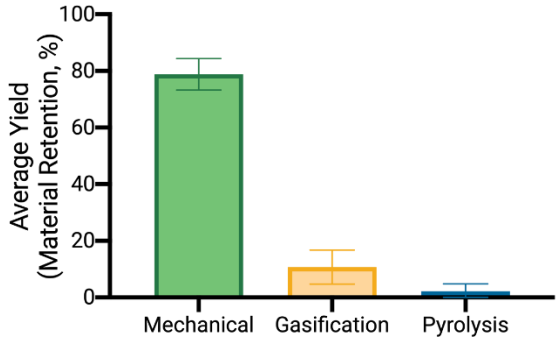
These technologies are known to release harmful emissions including polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), carbon monoxide (CO), and nitrous oxides (Nox) in addition to harmful greenhouse gas emissions.

- Toxics from plastics have been found in the products (e.g., oil), byproducts (e.g., char), and air emissions from chemical recycling like pyrolysis.
- Of the limited number of facilities currently operating, the majority are sited in low income communities.
- Conversion technologies release 30-200 times more greenhouse gas emissions than mechanical recycling.



Many of these technologies are expensive to build and operate, diverting funding that could be better spent improving our existing system. Another concern with the widespread deployment of these technologies is the "lock-in" effect, where given the significant financial investments in these systems, industry will be incentivized to continue producing single-use plastics to ensure there is a constant stream of waste.

In practice, these technologies do not recover usable plastics like mechanical recycling and therefore **perpetuate the need for virgin plastic production** to make new material.



As the world shifts away from fossil fuels for energy and transportation, the fossil fuel industry is increasingly relying on plastic production to make up the difference.

- Petrochemicals, driven by plastic production, are projected to be the largest source of oil demand growth through 2030 and plastics are estimated to make up 20% of oil consumption by 2050.

Chemical recycling technologies face the same challenges as mechanical recycling: poor product design, limited collection, and difficulties sorting.

- Despite promises that these processes can handle a broader range of plastics, these technologies need careful sortation and pre-treatment like mechanical recycling technologies.