NCEL Issue Brief

CHEMICAL RECYCLING

ENVIRONMENTAL HEALTH

Overview: What is Chemical Recycling?

Chemical recycling refers to the processes and technologies that break down post-consumer plastic with some combination of heat, pressure, catalysts, and/or solvents to turn it into either fuel or new plastic products.

THE ISSUES WITH CHEMICAL RECYCLING

- **Unproven technology:** few projects are operational and claims are largely inflated.
- **Not climate-friendly:** Processing in a pyrolysis facility emits three tons of CO_2 for every one ton of plastic.
- **Toxic hazard:** The process releases toxins (CO, CO_2, and NO_x) into the environment as air emissions and residues.

Types of Chemical Recycling

Plastic-to-Fuel: The action of heating plastic waste to convert it into fuel.

- **Toxic Hazard**: Releases toxins as emissions in a similar way to waste incineration.
- **Climate Implications:** Emits CO_2 in both the production and burning of plastic-derived fuels.
- **High Costs and Low Returns:** Plastic-to-fuel processing has a track record of major failures and lost more than $2 billion as of 2017.

Compostable Bio-Based Plastic: Plastics that are biodegradable and compostable must be broken down with a special process at a commercial or industrial composting facility.

- **Toxic Hazard:** These types of plastics have similar levels of toxicity to conventional plastics.
- **Climate Implications:** Bio-based plastics produce more GHG emissions than fossil-based plastic and wide-scale adoption could require 5% of all arable land to cultivate the crops necessary to make the materials.
- **Low Effectiveness:** Compostable bio-based plastic is often mismanaged, contaminating plastic recycling streams and ending up incinerated or landfilled where it could take up to a year to degrade.

Downcycling: The process of converting plastic waste into new products and materials such as “plastic-to-road” or “plastic-to-brick.”

- **Toxic hazard:** Hazardous chemicals can leach when downcycled materials are exposed to heat, UV rays, or water.
- **Climate Implications:** Downcycling turns plastic waste into materials with lower quality or value; products become no longer recyclable.
- **Other Hazards:** Plastic-based construction materials are significant fire hazards.

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Incineration: The process of placing plastic waste into a combustion chamber to be burned. The heat released from burning converts water to steam, which is then sent to a turbine generator to produce electricity.

- **Toxic Hazard**: Incinerating plastic emits toxins including cancer-causing, endocrine-and immune-disrupting chemicals and heavy metals including mercury, cadmium, and lead.
- **Climate Implications:** Burning one ton of plastic emits nearly 3 tons of CO2, compared to 2.1 tons of CO2 for one ton of coal.
- **Higher Costs:** Incineration is more expensive than landfilling; aging incinerators require significant additional public funds for upgrades.
- **Socio-economic and racial injustice:** Incineration facilities are disproportionately sited in low-income and marginalized communities.

Solutions for Chemical Recycling

Limit Chemical Recycling Infrastructure: States can ban or limit expansions of chemical recycling technologies and the construction of associated facilities.

- **Maryland's H.B. 21** alters the definition of recycling to exclude certain chemical conversion processes and prohibits the construction of facilities that convert plastic to fuel.

Address Plastic Pollution and Production: States can reduce the incentive for chemical recycling by implementing policies that limit the production of plastics and the associated waste.

- **California's A.B.1276** prohibits restaurants from providing single-use plastic service ware to consumers unless requested.
- **New York's A.5082** prohibits hotels from providing hotel guests small plastic bottles containing hospitality personal care products.

Support Recycling: Improving traditional recycling systems is a cleaner and cheaper way to address plastic pollution.

- **Vermont's H.175** amends the state's current bottle bill to include non-carbonated beverage containers. The bill also includes a provision that would increase the deposit value on all nonalcoholic beverage containers from 5 cents to 10 cents.
- **Connecticut's S.B.928** is meant to encourage the development of a market for recycled materials.