Plastic Production: Opportunities and Challenges

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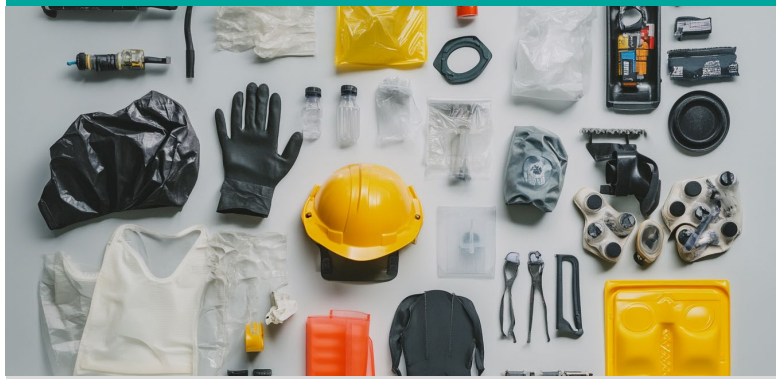
Circular Strategic Initiatives Manager

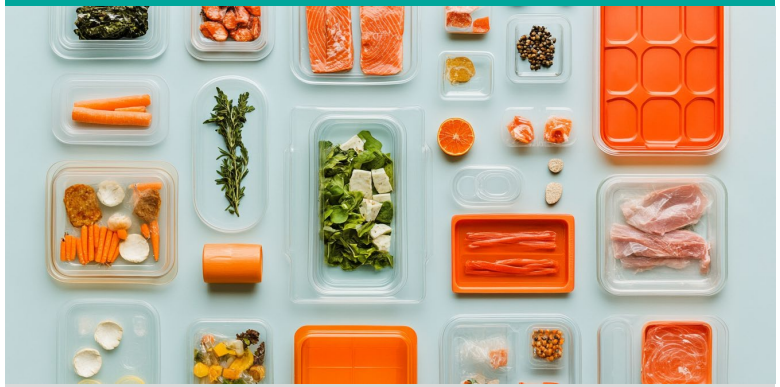
Plastics are essential, so is keeping plastic waste out of the environment

PROTECT



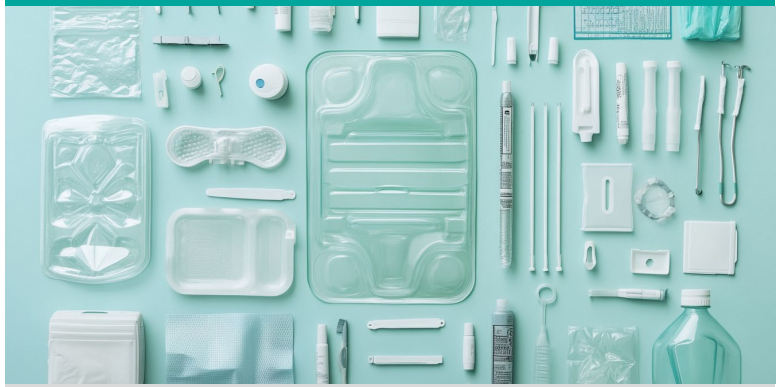
Specialty designed materials protect drivers, riders and frontline workers

FEED



Advanced packaging technologies preserve fruits, vegetables and meats

CARE



Plastics improve sterility, patient safety, and comfort in therapies

Today, just **16%** of plastic is collected for mechanical recycling and **12%** of plastics actually get mechanically recycled

- **40%** ends up in a landfill
- **25%** in incinerated
- **19%** falls into unmanaged dumps or leaks into the environment

Plastics have a lower total greenhouse gas impact than alternative packaging options in nearly all applications (McKinsey & Co. Report)

PET vs. ALUMINUM

Energy intensive

To make cans, aluminum is smelted at temps over 1,000 °C. PET requires 250-300 °C to make bottles.

More GHGs

Even with recycled content, manufacturing aluminum cans generates more CO_2 per ton of metal than PET bottles made with recycled PET.*

It must be mined

All aluminum starts out as a bauxite ore. Mining bauxite causes deforestation and land erosion, and it pollutes local streams.

PET vs. GLASS

Ten times heavier

Glass can weigh up to 10X more than equivalent plastic, adding to transport costs.

More GHGs

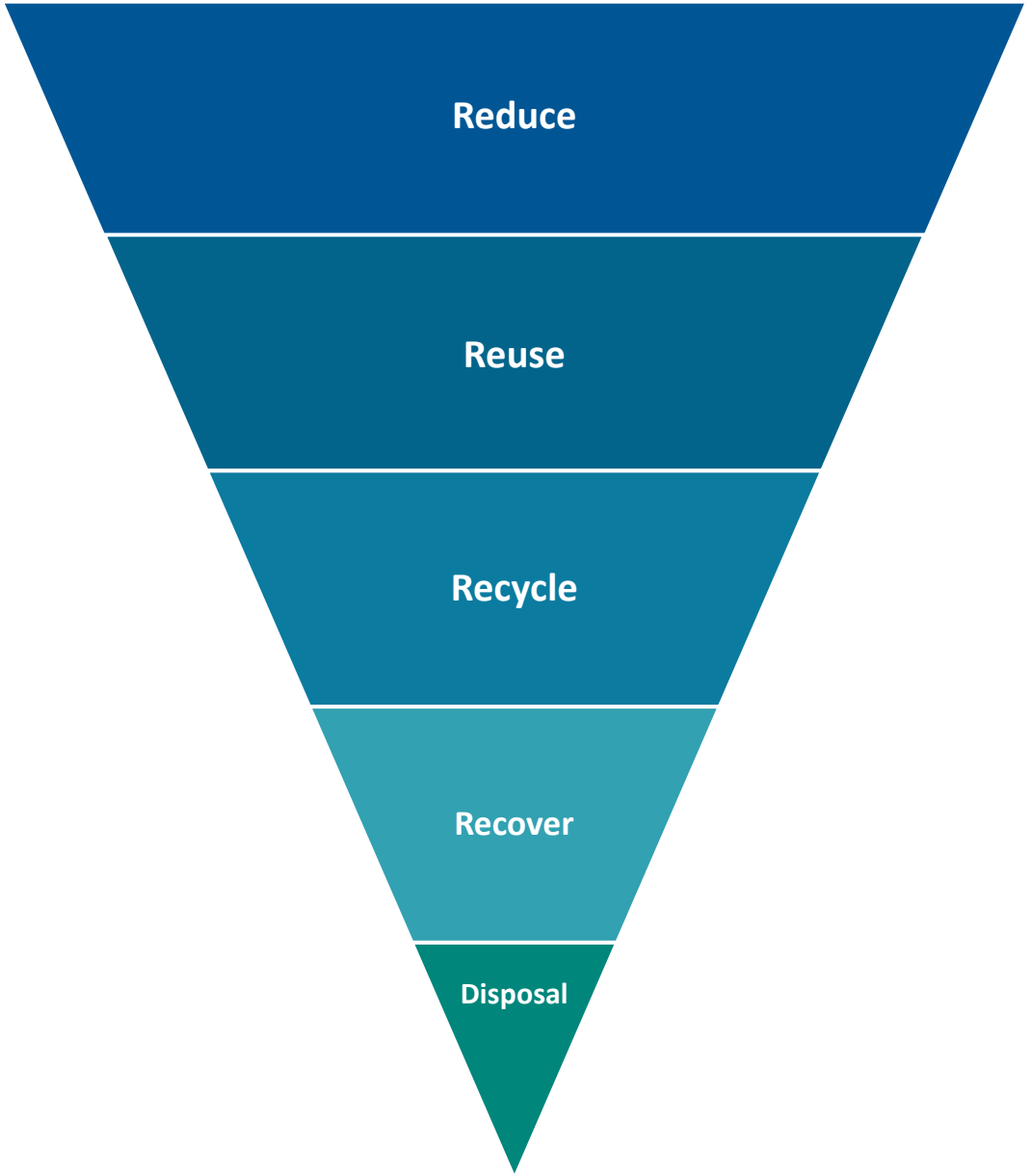
They create up to 33% more greenhouse gasses than plastic containers over their lifetimes.

Fragments in waste

Broken glass can contaminate other recycling streams. Many facilities cannot separate out broken bits of glass. Some no longer accept broken glass at all.

McKinsey & Company, Climate impact of plastics report, July 2022

The are many tools and technologies to keep plastic waste out of the environment



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Plastic waste reduction requires a system where mechanical & molecular recycling are complementary

MECHANICAL RECYCLING

Most carbon efficient when possible

Optimal GHG footprint, existing infrastructure

Limited to cleaning sources; majority must be downcycled or not recycled at all

Performance and quality limitations

Quality degrades with each cycle… eventually, everything becomes waste

+

MOLECULAR RECYCLING (PRT)

Most carbon efficient when possible

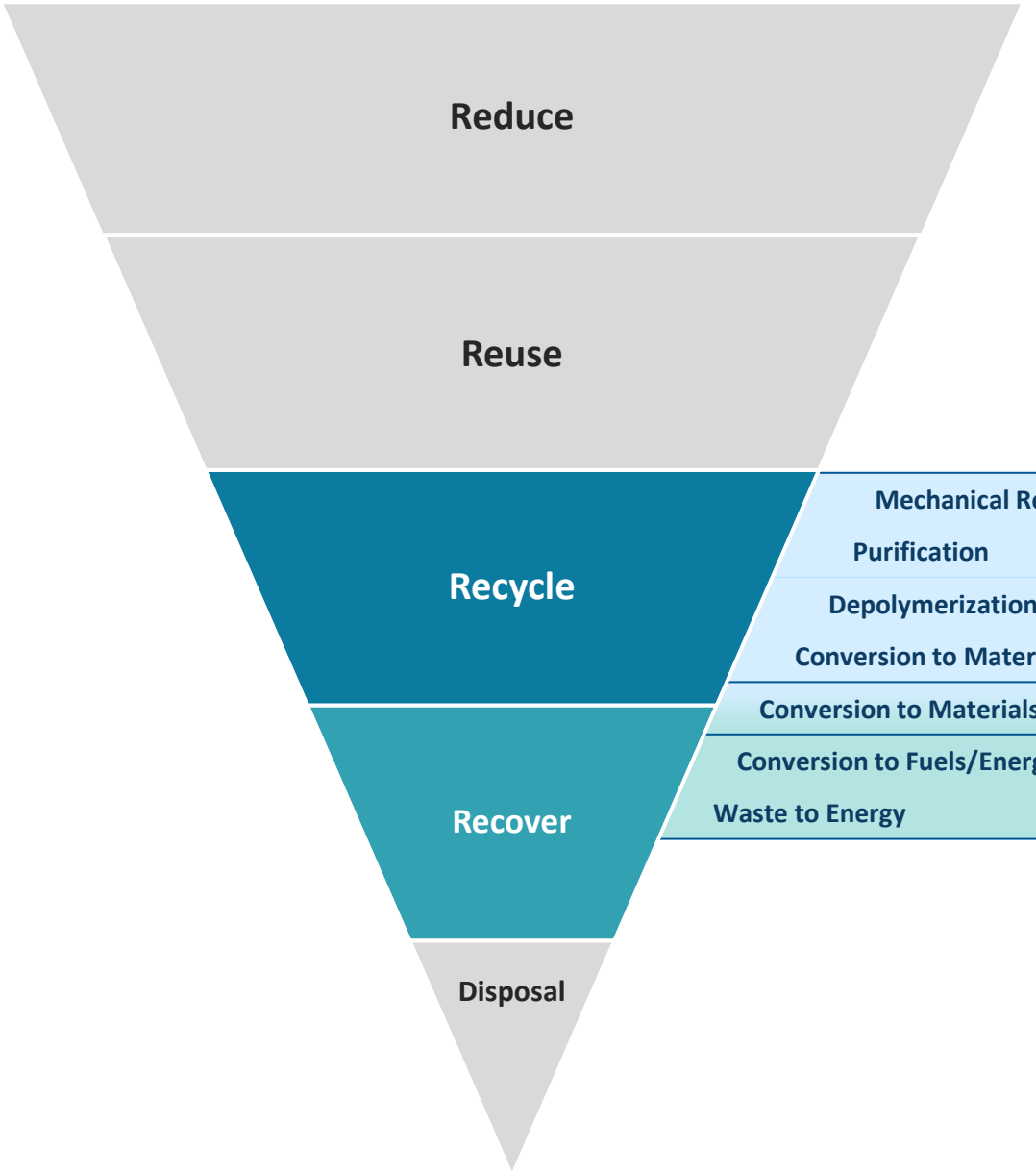
Eastman technologies deliver an improved GHG footprint compared to processes using fossil feedstocks

Can recycle materials that have little value or can not be mechanically recycled

No performance tradeoffs…upcycles the material back to premium quality / performance

Enables infinite ability to recycle polymer for a truly circular economy

The are many tools and technologies to keep plastic waste out of the environment



	Reaction or Technical Description:
Mechanical Recycling	Physical Sortation
Purification	Solvent Dissolution
Depolymerization	**Methanolysis**
Conversion to Materials	**Gasification**
Conversion to Materials AND Fuels	Pyrolysis
Conversion to Fuels/Energy	Gasification
Waste to Energy	Incineration

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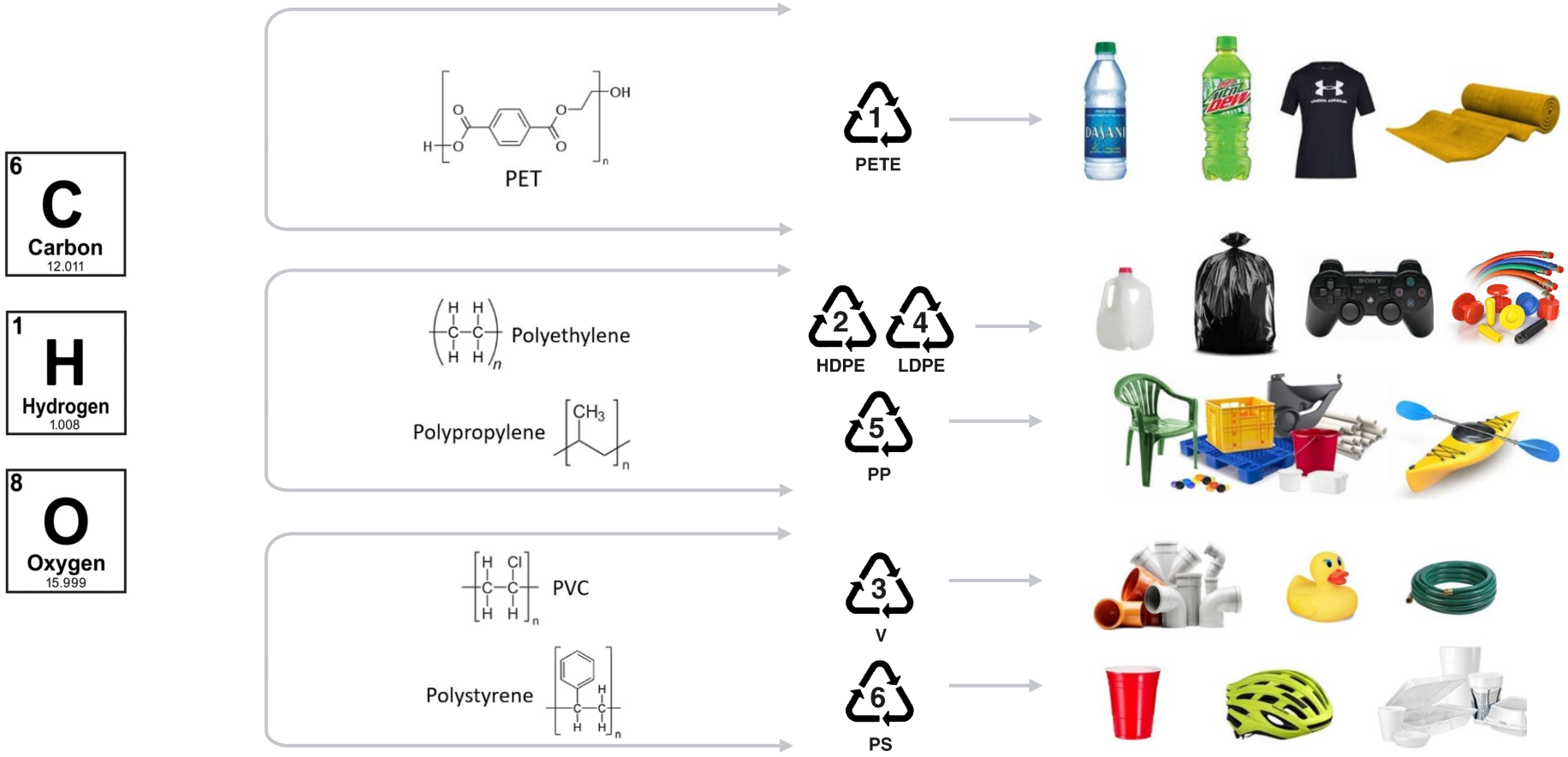
Different combinations of elements create different plastics used for a variety of materials and purposes



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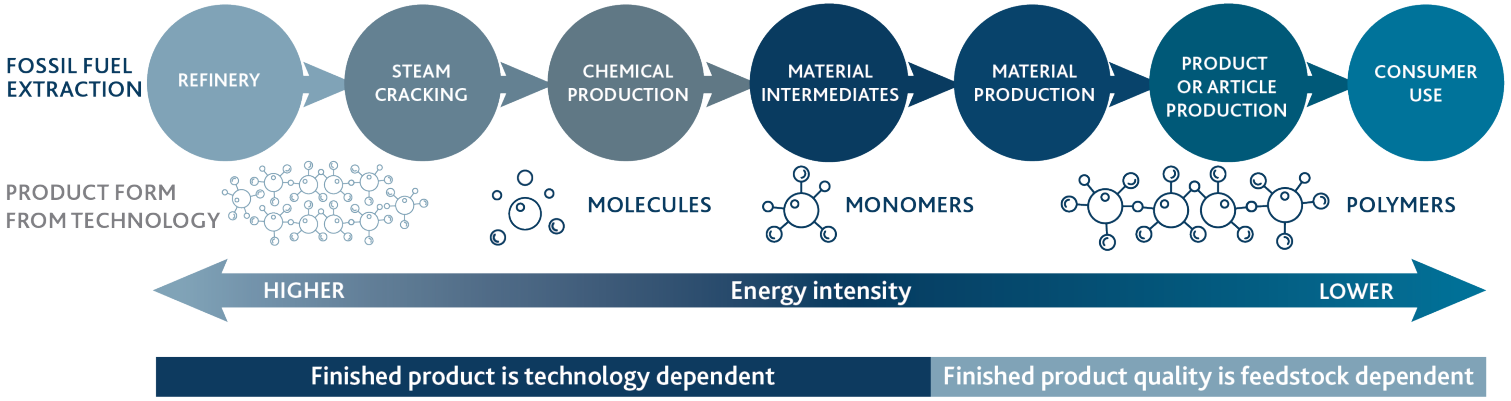
Recycling solutions can break down plastic to its molecular level



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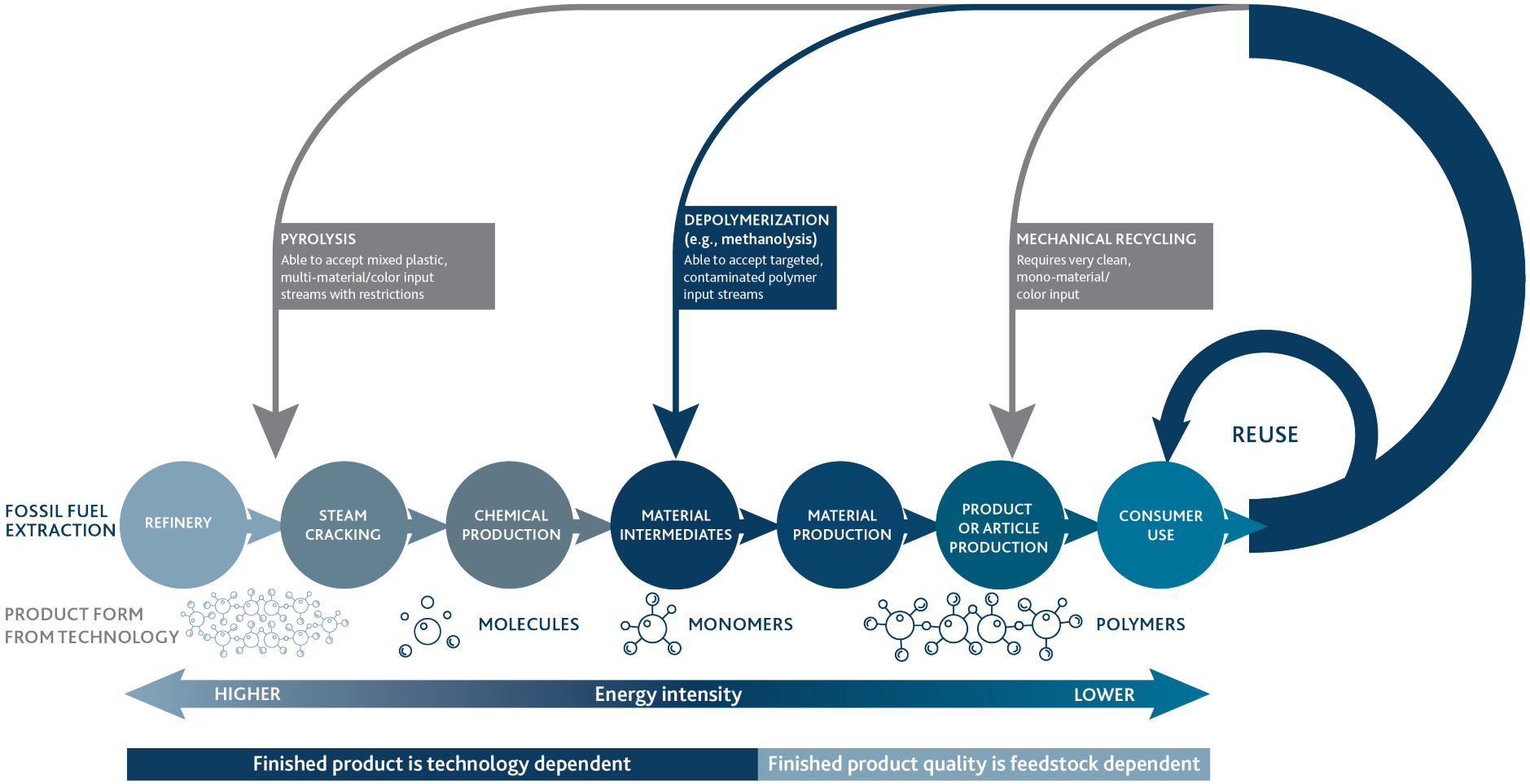

More information about how Eastman is enabling a circular economy: https://www.eastman.com/en/sustainability/environmental/circularity

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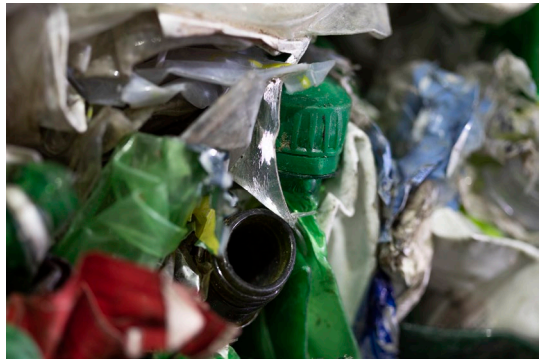
Eastman's technology creates circularity for hard to recycle polyester plastics



Colored rejects from mechanical recyclers

Post consumer purge from mechanical reclaimers

Green strapping

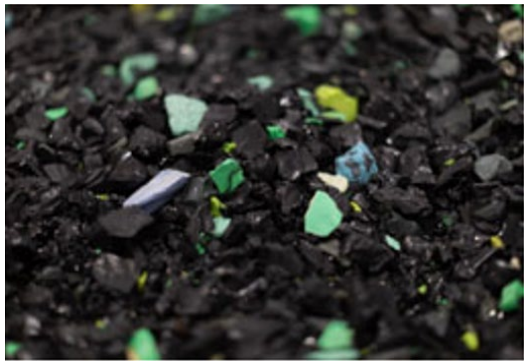
Strapping used to hold boxes and other items to pallets

Green bottle bales

Rejects from a mechanical recycler who only wants clear bottles

Pre-consumer carpet fiber

Waste face fiber (what you walk on) generated in the manufacturing process



Textile purge

This is from the textile industry, making solution-dyed polyester fiber. Hence the different colors.

Eastman's methanolysis recycling efficiently processes waste that's currently landfilled/incinerated to create a fully circular solution

RECOVERED POLYESTER

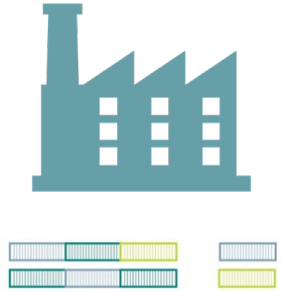
Uses hard-to-recycle waste plastics as feedstock

MECHANICAL PURIFICATION PROCESS

DEPOLYMERIZATION

Breaks down waste into monomers, the same monomers created from fossil-based feedstock.

POLYMER PRODUCTION



Produces materials with the same properties as legacy materials, with greater than **70% reduction of criteria air and hazardous pollutants** compared to virgin manufacturing of the same products.

MOLECULAR RECYCLED PET/PETG POLYMERS

Used to make products indistinguishable from virgin plastic that are infinitely recyclable through methanolysis

Eastman's Kingsport, TN facility will process
~110KMT of hard-to-recycle polyester waste
when fully ramped up

Life cycle assessment: https://info.eastman.com/LCA
See our facility: https://youtu.be/H2CWPuxu9mE

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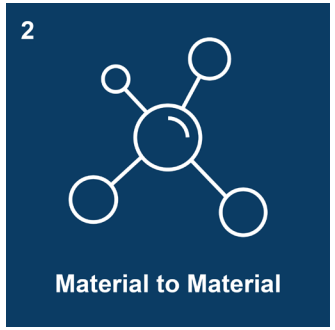
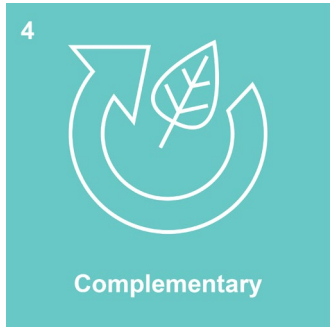
Eastman follows six key principles

Prioritize the reduction, reuse, and recycling of plastics packaging.



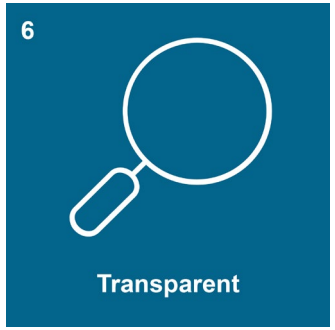
Recover plastics using high yield, material-to-material recycling.

Lower GHGs vs. virgin; Meet/exceed regulations to improve quality of life for employees & communities.



Enable a waste ecosystem where mechanical & molecular recycling are complementary

Ensure technologies are economically efficient for long-term success.



Claims are clear, transparent & accountable with 3rd-party certifications.

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Thank you!

Holli Alexander