

Zero Waste Live!



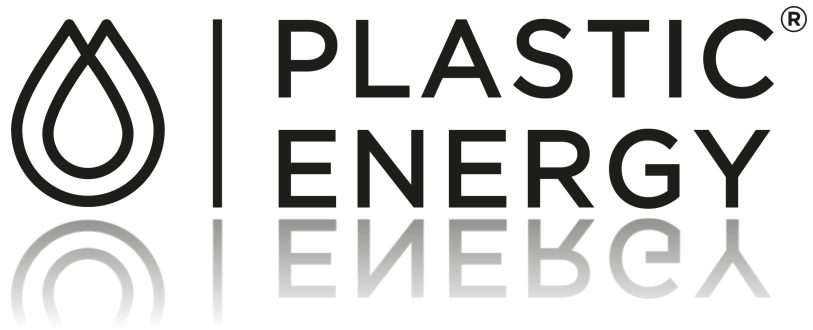
12 November 2019 - 2 p.m. CET

**CHEMICAL RECYCLING: WHAT IT IS AND DOES IT
FIT INTO THE CIRCULAR ECONOMY?**



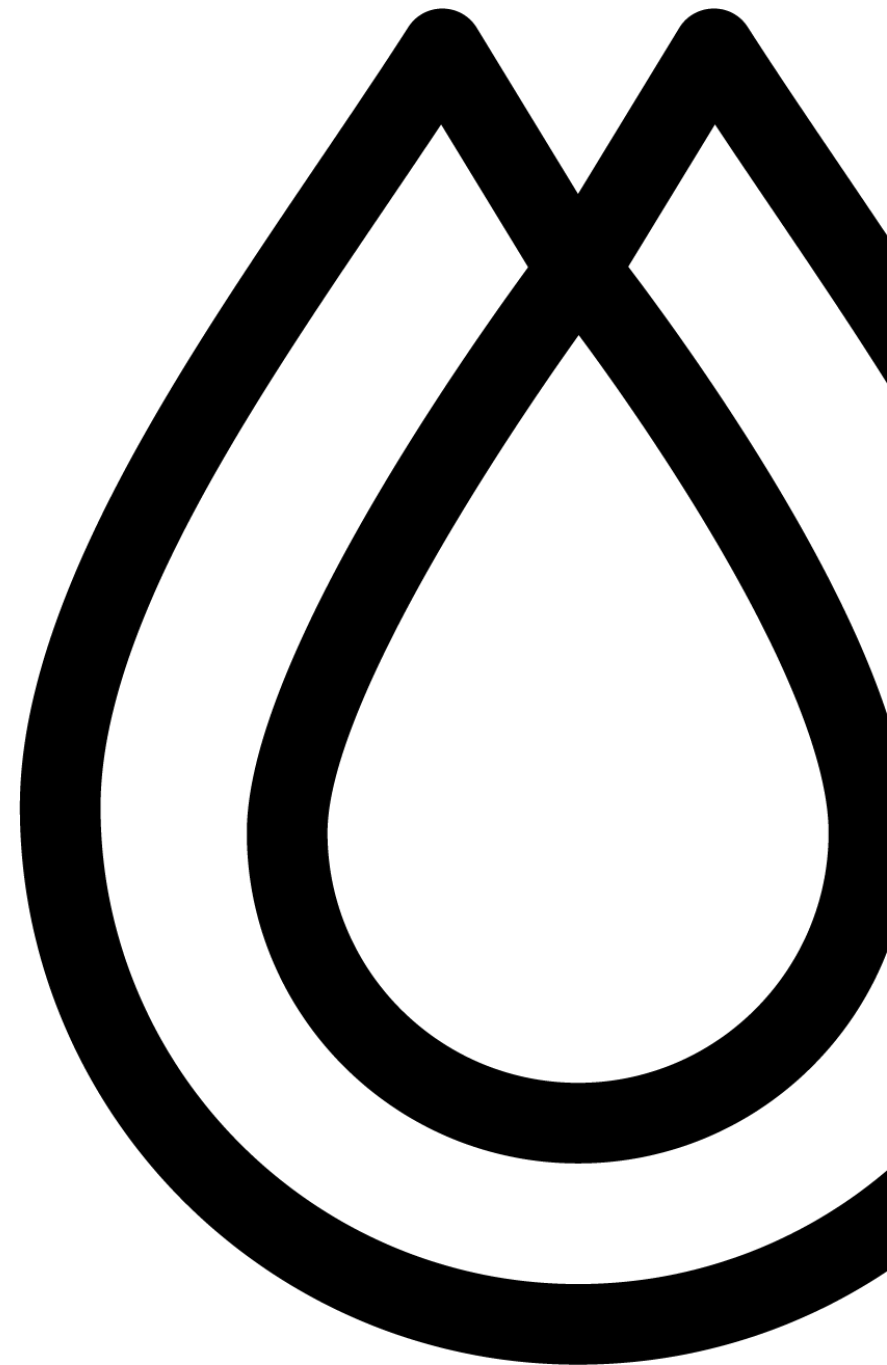
Carlos Monreal

CEO at PlasticEnergy

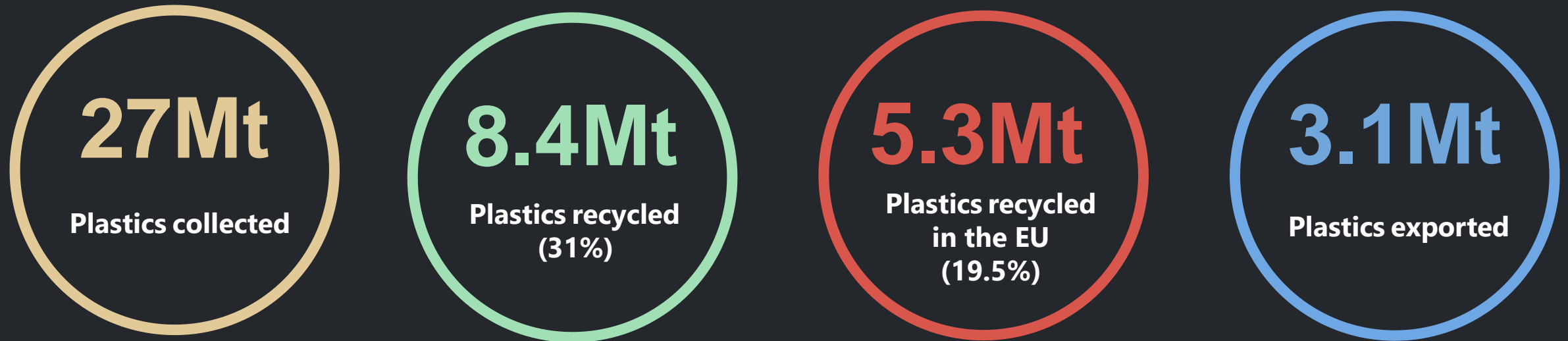


ZERO WASTE EUROPE WEBINAR

Chemical recycling
A solution to close the plastic loop



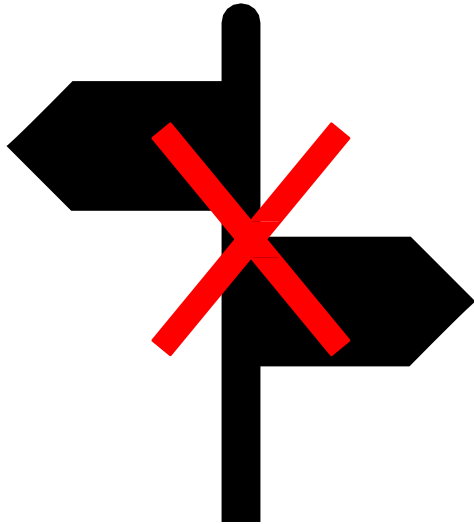
STILL A LONG WAY TO GO IN EU RECYCLING



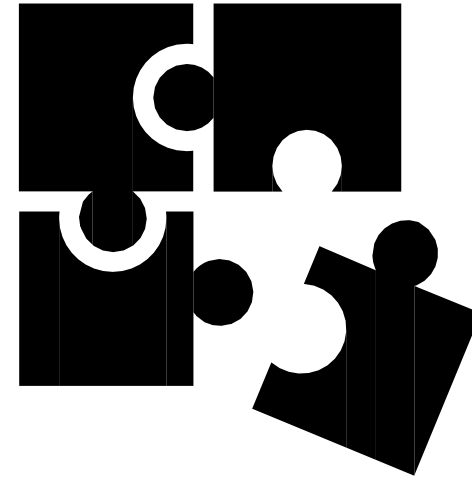
- **Improve waste management:** Improve collection and sorting systems to enable more recycling
- **Make the most of our resources:** Incentives to choose the highest option in the waste hierarchy
- **Innovate:** Develop the recycling market to capture more plastics for recycling

CHEMICAL RECYCLING IS PART OF THE SOLUTION ...NOT A SLIVER BULLET

It is not about choosing one solution

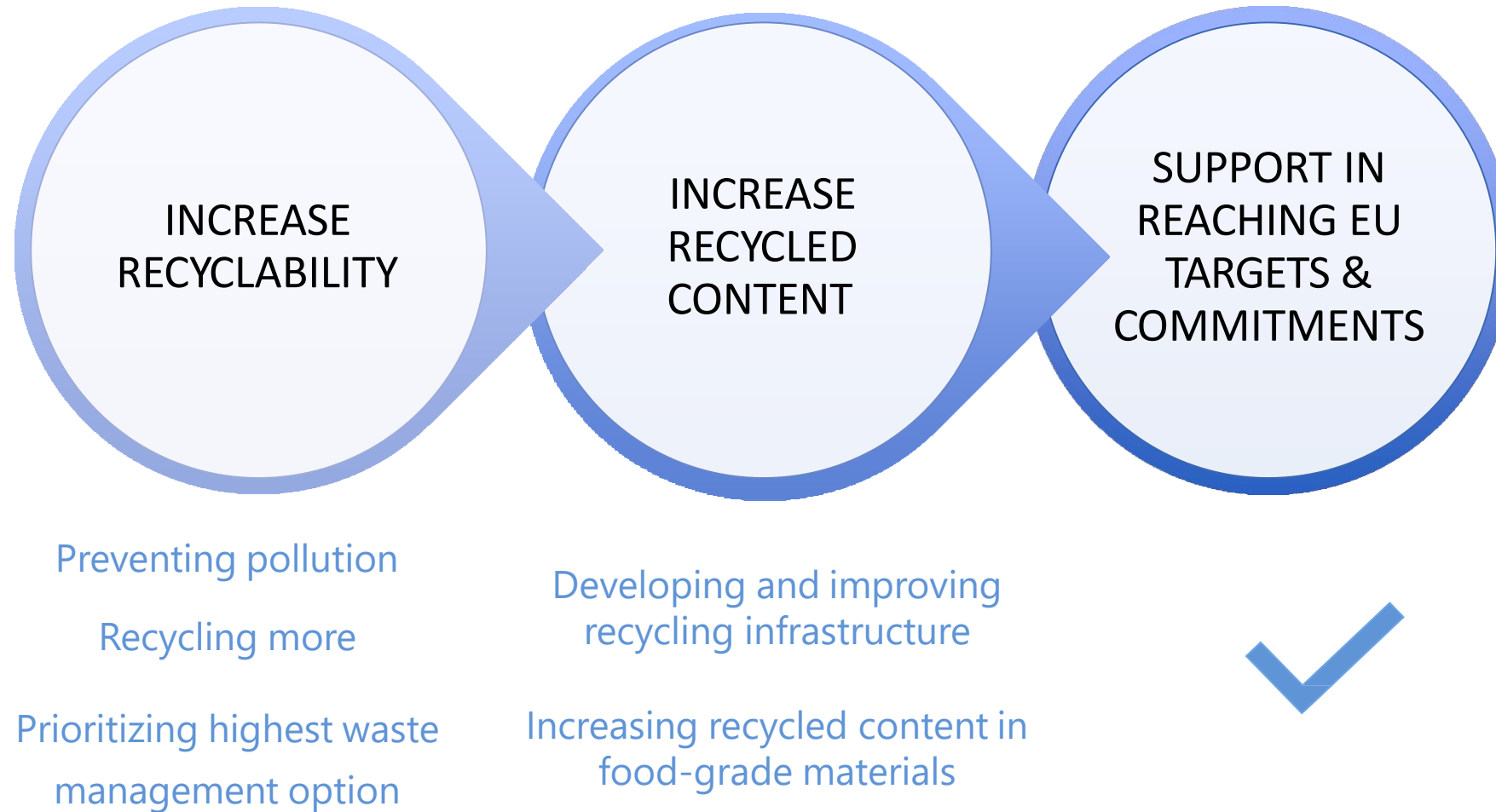


...But bringing different solutions to solve a complex problem



Chemical recycling is a new piece in the set of solutions

WHY CHEMICAL RECYCLING IS PART OF THE SOLUTION?



CHEMICAL RECYCLING COMPLEMENTS MECHANICAL RECYCLING.

Mechanical recycling is the preferred solution for:

- Homogenous waste streams
- Clean waste streams
- Large and constant waste streams

Projections*:

- Mechanical recycling rates could increase from 12% to 20% in 2030 globally.

Use:

- Mechanically recycled plastics are still mostly used for 'downcycling'
- Potential limitation of recycled content: quality, performance, processing, and aesthetics

Chemical recycling overcomes the limits of mechanical recycling:

- Heterogeneous waste stream (except for depolymerization/solvosis)
- Contaminated
- Mixed streams not economically feasible or technically challenging for mechanical recycling

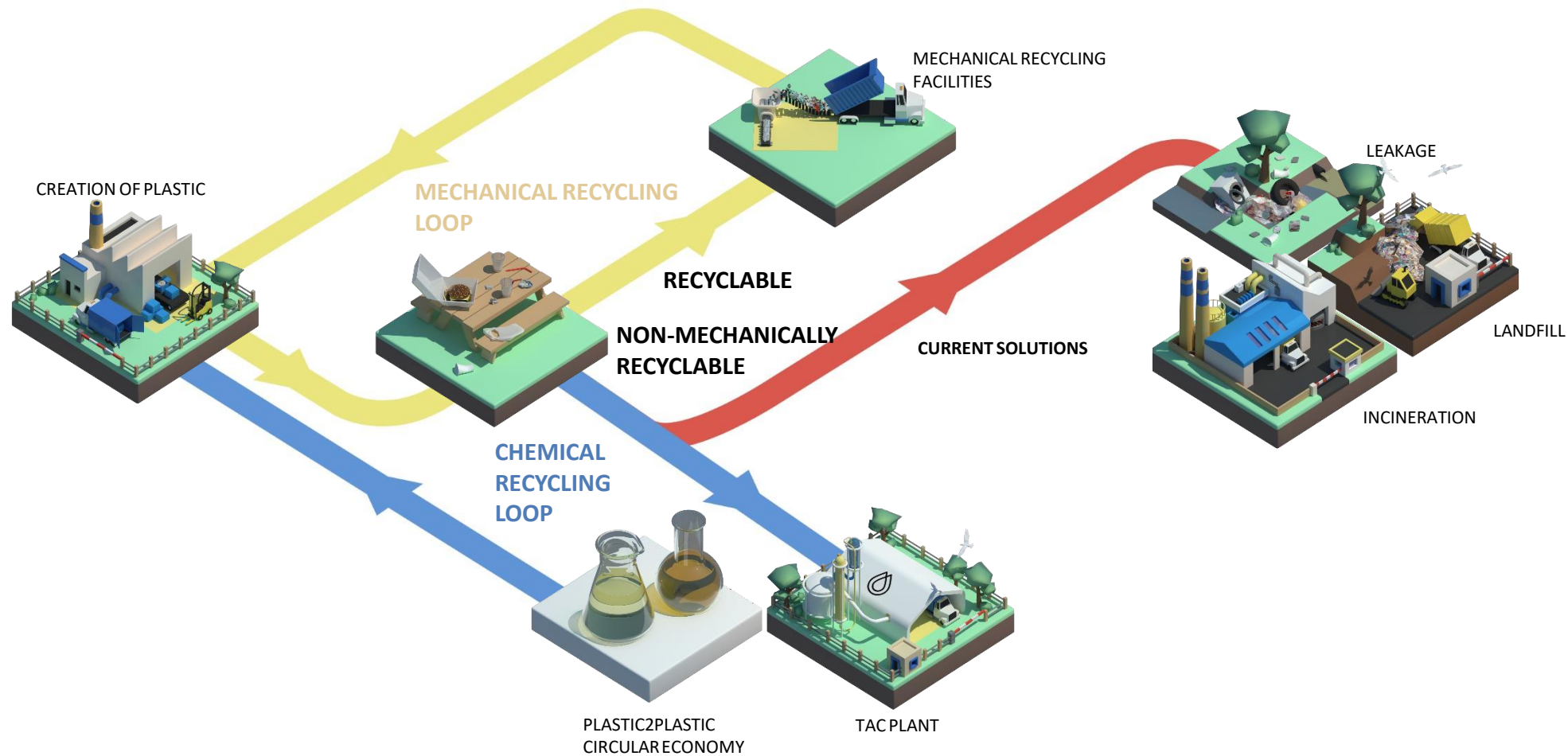
Projections*:

- Chemical recycling could recycle 17% of plastics by 2030 globally (13% for pyrolysis)

Use:

- Chemical recycling used to endlessly upcycle
- Solve the quality issues by removing contaminants
- Achieve virgin-quality recycled plastic

CHEMICAL RECYCLING INCREASE THE AMOUNT OF PLASTIC THAT CAN BE RECYCLED



CHEMICAL RECYCLING EXIST AND IS UP AND RUNNING

What we have

2

Commercial plants
(2015 & 2017)

3

Years experience

330

Days/year, 24/7

What is coming

20 plants in
construction
by 2023

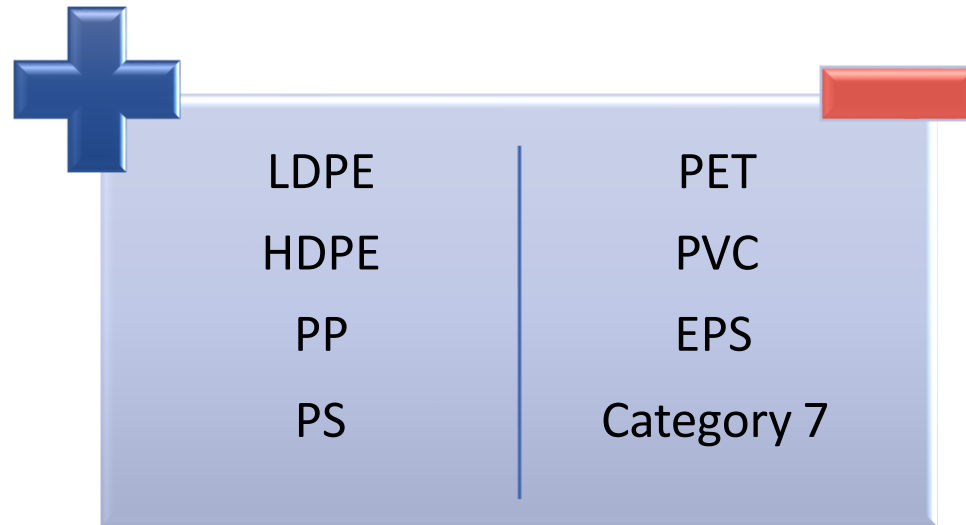
1 plant =
25,000 t/a
plastic
processed



PLASTIC ENERGY: WHAT FEEDSTOCK?

Basics

- Feedstock with no or little value from municipal waste
- Complementary to mechanical recycling: reject from recyclers or waste management ahead of incineration/landfill.
- Mixed, contaminated plastic waste (within limits)
 - Typical contamination: organics, paper, metals, inks, wood, textiles...*
- No need to wash or separate by polymer-type
- Pre-processing to achieve our feedstock specification



PLASTIC ENERGY: OUR TECHNOLOGY

03 — Plastic Energy



THERMAL ANAEROBIC CONVERSION (TAC)
The feedstock (waste plastic) is heated in the absence of oxygen until it melts and the polymer molecules break down to form a rich saturated hydrocarbon vapour.

As a result of this TAC process, the condensable gases are converted to hydrocarbon products while the non-condensable gases are collected separately and combusted to process energy.

04 — Naphtha And Diesel



The atmospheric distillation columns receive the hydrocarbon vapour and according to molecular weights separates the vapour into **raw diesel** (greater molecular weight accumulating at the bottom), **light oil** (at the middle), and **synthetic gas components** (at the top).

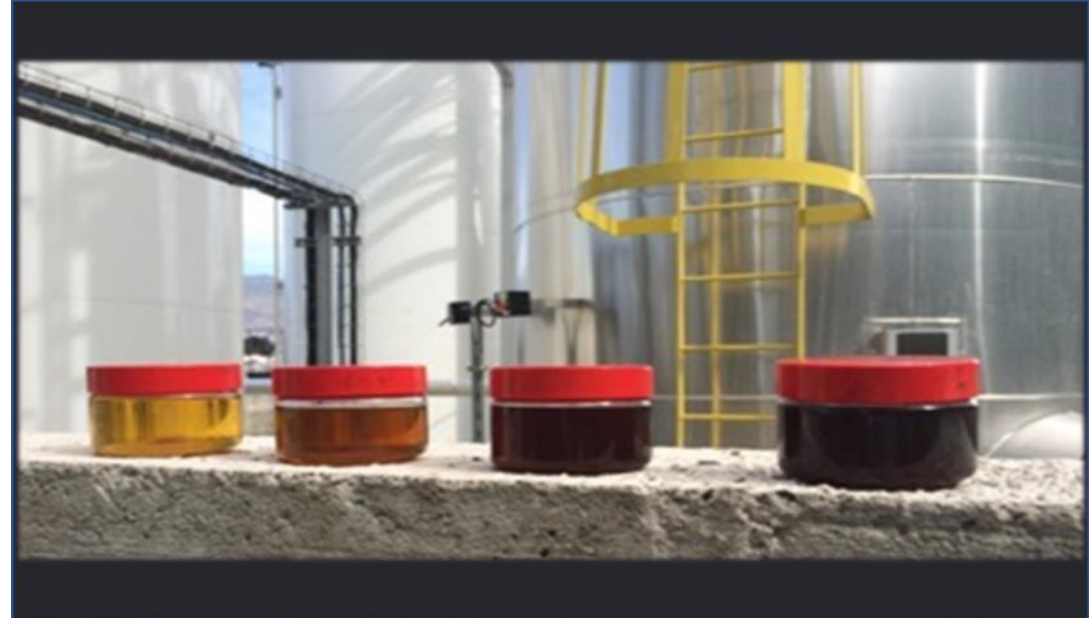
PLASTIC ENERGY: OUR PRODUCT

Final product

- TACOIL
- Each tonne of plastic waste chemically recycled will produce approximately 860 litres of TACOIL

Output specification & off-taker agreement

- Work collaboratively to reach these off-takers' specifications
- 1 plant = 1 off-taker
- Output directly replaces virgin oil in the cracker



CHEMICAL RECYCLING – CIRCULAR ECONOMY OF PLASTICS.

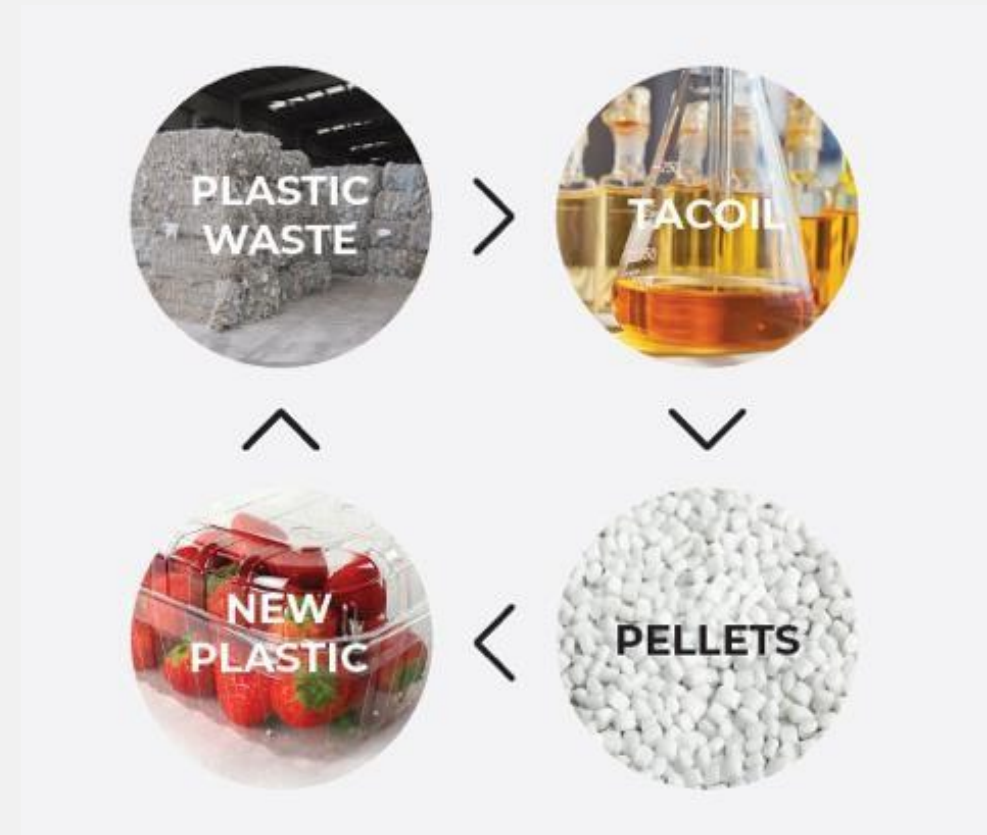
CIRCULAR POLYMERS :

1ST company worldwide having validated the circular economy of end-of-life plastics.

- Announced in Davos 2019
- Renewi, PLASTIC ENERGY, SABIC, Unilever / Vinventions / Walki Group
- Certified circularity and traceability by the ISCC+
- Recycled content following mass-balance approach

PROPERTIES:

- Virgin quality oil made from end-of-life plastic waste
- Food-grade packaging
- Endless recycling without degradation



FOOD-GRADE PACKAGING – REAL-LIFE EXAMPLES.



**K TRADE FAIR
October 2019**



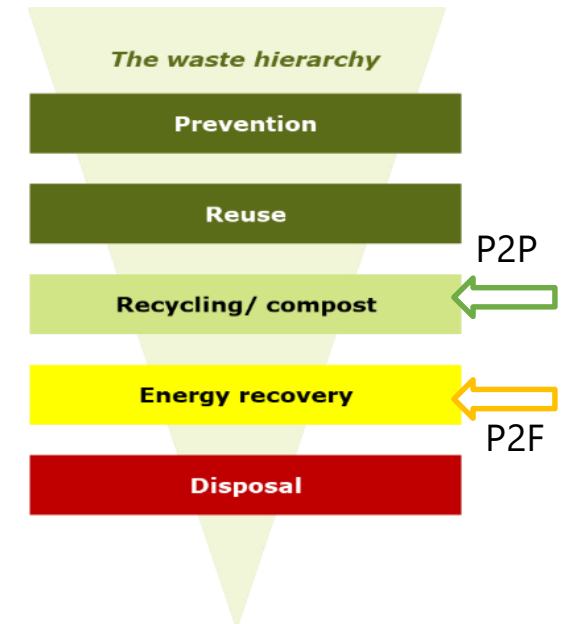
IS IT RECYCLING?

Directive 2008/98/EC, Article 3, Waste Framework Directive:

17. 'recycling' means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

YES

- There is no legal distinction between mechanical and chemical recycling at EU level, as long as not used as fuel
- Technology neutral, what matters is the final use.



POLICY CHALLENGES.



Recognition of chemical recycling

- Inclusion of chemical recycling (Plastic2Feedstock) under the recycling targets
- Harmonization of chemical recycling status at the EU level



Creating a market for virgin-quality recycled content

- Recognition and development of the mass-balance methodology
- Clarification on the use of recycled content from chemical recycling in food-grade packaging



Access to the feedstock

- Reducing export of plastic waste
- Reducing amount of plastic waste suitable for chemical recycling going towards incineration
- Harmonization of collection/segregation systems



Incentives

- To speed up the deployment of the solution
- To invest in R&D

PLASTIC ENERGY – OUR MISSION



PREVENT POLLUTION – IMPROVE WASTE MANAGEMENT

Diverting plastics away from
landfills or incineration



RECYCLE

Support countries in reaching
recycling targets by recycling
previously non-recyclable
plastics



CIRCULAR ECONOMY

Contribute to closing the
plastic loop



REDUCE OIL DEPENDENCY

And the production of virgin
plastics



ECONOMY

Boost local economies by
building new plants and
creating jobs



Global
Commitment

- Plastic Energy signed the Ellen MacArthur Foundation New Plastic Economy Global Commitments
- By 2025, Plastic Energy will convert at least 300,000 tonnes of low-grade plastic waste into feedstock for new plastic manufacturing (Plastic2Plastic).



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