THE ENDLESS REGENERATION OF PLASTICS THROUGH MICROWAVES
A SOLUTION TO THE GLOBAL CHALLENGE OF PLASTICS END OF LIFE CYCLE MANAGEMENT

Plastics have become key products in our modern economy and their use has increased year after year. Despite their many benefits, plastics end-of-life problems are a global challenge to which we have to quickly find innovative solutions.

Pyrowave provides a solution to regenerate post-consumer plastics by turning post-consumer plastics into identical applications for virgin plastic resins and restate their full value. Pyrowave opens the way to a true circular economy of plastics.

Plastics are made up of “blocks”, the monomers, which are assembled into long chains called “polymers”.

The Pyrowave technology helps undo the links between the blocks without damaging them. The blocks can then be reassembled as new chains to form new plastics, identical to brand-new plastics. Plastics regeneration enables complete endless recycling and avoids the GHGs associated with the extraction of virgin material.

ENDLESSLY REGENERATING POST-CONSUMER POLYSTYRENE PRODUCTS

THE CIRCULAR ECONOMY OF PLASTICS

Preconditioner prepares plastic feedstock including shredding below 5 cm

The Pyrowave CMD reactor detaches plastic building blocks using proprietary microwave technology

Liquid monomer is purified and identical to virgin

Plastic made from recycled monomer are identical to virgin and can make new products
“INSTEAD OF MAKING PRODUCTS FROM RESOURCES, LET'S MAKE RESOURCES FROM PRODUCTS.”
– Jocelyn Doucet, Pyrowave CEO
THE PYROWAVE TECHNOLOGY

Pyrowave’s patented microwave catalytic depolymerization technology offers the most advanced high-power microwave technology worldwide, now at the forefront of a new revolution designed to increase resource efficiency.

The 600 Series CMD reactor is specifically designed for polystyrene raw materials and can process the full range of expanded polystyrene (EPS) and high impact polystyrene (HIPS).

1) The continuous process first prepares plastics into a mixture that removes contaminants such as labels and films as well as other impurities.

2) The conditioned polystyrene is introduced into the reactor where it is mixed with silicon carbide particles to interact with a high energy microwave field.

3) Microwaves heat up these particles very quickly, at very high temperatures, to break polymer chains and retrieve monomers (depolymerization).

4) Post-consumer polystyrene is thus converted into a liquid rich in blocks - the monomers – to be purified and meet the same specifications as the virgin blocks.

5) These purified and recycled blocks are then taken up by a manufacturer and transformed again into virgin resins, to manufacture new products.
THE PYROWAVE TECHNOLOGY BENEFITS

An adaptable and flexible module that enables PS local recycling and is easily incorporated into already existing equipment in a restricted space (the size of an 8’x 40’ container).

A process that generates a recycled resin fully compatible with the petrochemical industry standards.

Low energy consumption (roughly 1 to 1.5 kWh/kg of processed materials), which is approximately 10 times less energy than making styrene from virgin resources and recoverability of released heat to warm up buildings.

Allows recycling of post-consumer polystyrene products and packaging, including contaminated food containers.

Its current yield can reach up to 90% in monomer production and has a processing capacity ranging from 100 to 200 kg/h.

Regeneration of plastics avoids the extraction of virgin materials; each ton of processed plastics prevents the release of more than two tons of greenhouse gases.

Pyrowave technology is chiefly designed to process polystyrene (plastic # 6), but could possibly process polypropylene (plastic # 4) and polyethylene (plastics # 2 and # 3).
RECOGNITION OF PYROWAVE’S INNOVATION

2018
2018 Innovation Grand Prix of Ordre des ingénieurs du Québec

Nominated in the Global Cleantech 50 Ones to Watch List

2017
Top 20 Most Innovative Company as selected by the Canadian Innovation Exchange

Nominated in the Global Cleantech 100 Ones to Watch List

Ranked 1st in the Industrial Chemistry International Competition

ABOUT PYROWAVE

Pyrowave is a leader in the plastics microwave recycling business. A member of the World Alliance for Efficient Solutions, the company was nominated in the Global Cleantech 100 Ones to Watch List in 2017. Pyrowave’s patented technology – catalytic microwave depolymerization – helps convert locally mixed plastics, including polystyrene, into value-added products to be used by the chemical industry to manufacture new plastics. Pyrowave therefore provides a circular economy solution to meet the global challenge of plastic recycling.

Are you a city official, a recycler interested in Pyrowave’s plastic regeneration technology or an environmental innovation investor? Please feel free to contact us to visit the pilot plant and meet our experts.

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