

**HMC Polymers****A Most Admired Company***An associate of PTTGC & LyondellBasell*

HMC Polymers Ltd.

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About HMC

HMC Polymers Ltd. is a leader in the manufacture and marketing of polypropylene, one of the most versatile plastics used in products which bring significant value to society and - managed responsibly - to the environment. With an annual capacity of more than 800,000 tonnes, HMC is the second largest producer in SE Asia and the eighth largest in Asia.



HMC's world class innovative capabilities enable our customers to respond to fast-changing demands to meet society's needs for sophisticated and affordable products across a broad range of applications – for example, IV bottles/bags for medical use; piping systems for clean water, sewage and drainage; automotive and electrical components; household and personal care products; and clear, thin wall packaging and film to enable hygienic food shipping, storage, preparation and consumption.



The Benefit of Plastics to the Environment

The consumer benefits of plastics are easy to recognize, but these – and the overall benefit of plastics to the environment – are being over-shadowed by the major issue of plastic in the ocean. We at HMC believe this issue of marine litter must be solved, quickly and decisively. We also believe this is possible – but in solving the marine litter problem, we must not adopt alternatives that exacerbate the larger problem of greenhouse gas emissions. As an example, 85% of the greenhouse gases from production and consumption of cheese are derived from making the cheese itself. But only 3% is from the plastic packaging used to extend the product life of cheese for shipping and storage,

which minimizes food wastage and hence greenhouse gas emissions when compared to alternatives.

For shipping, plastic packaging can be less than 20% of the weight of alternatives such as metal and glass. That saves 2 litres of diesel for every 100 km that food has to be transported. And although paper and cardboard packaging is also light, the carbon footprint to produce an equivalent package is three times that of plastic.

It is these benefits that have led to the dominance of plastics in our daily lives, a miracle of modern technology - but the use of plastics has grown faster than the systems which are required to manage them after one-time use.

The Circular Economy - Promise and Pitfalls

The circular usage of plastics (or Circular Economy) is an exciting vision, meaning that we reduce the wastage of natural resources by re-using plastic products as much as possible and then at the end of their life they are either recycled or their energy or raw material value is recovered. This plastics life cycle approach is described by the words: Reduce – Reuse – Recycle – Recover.

The required infrastructure and consumer behavior for segregation, collection and recycle/recover are operational in the most developed economies, for example Northern Europe. However in Asia, we miss the basics of collection and containment of waste. And mechanical recycling is difficult to achieve and will only ever be a partial solution. Feedstock recycling technologies to recover the raw materials for re-use are being developed, but not yet commercially proven.

Hence circular economy is not a quick fix and even risks distracting focus from our most urgent issue, which is to solve the marine litter issue. Society is not going to be tolerant of a slow response, and if we do not address this quickly, governments and brand owners will elect to take action in response to consumer pressure, adopting alternate materials or banning plastics in certain applications – regardless of the potential for negative impact on climate change.

Marine Litter

80% of global marine litter is estimated to come from Asia, and Thailand is one of the top 10 culprits.

Marine litter is primarily an issue of consumer waste collection and containment. Every household and every public place needs to have facilities for storage and collection of waste. Also, public awareness programs to change behaviours are important for success. Then once collected, what do we do with the waste?

PLASTIC PACKAGING IS **LIGHTER** THAN ALTERNATIVE MATERIALS, THEREBY

- Saving energy
- Reducing CO₂ emissions
- Saving resources



50%
of all European goods are packed in plastics



However, plastics account for only **17%** of all packaging waste

PLASTIC PACKAGING HELPS PREVENT FOOD WASTE.

Modern packaging increases Parmesan cheese shelf life from 20 to 50+ days

20
days



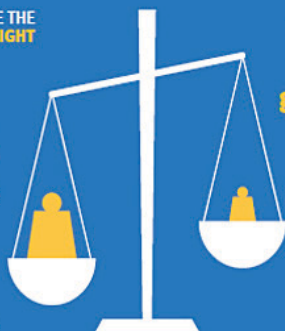
50+
days



PLASTICS REDUCE THE VOLUME AND WEIGHT OF PACKAGING:

88
grammes
alternative materials

Average packaging weight for 1 kg of product



22
grammes
plastics

Using plastic packaging for all products would:



reduce by around

800 kg
an average truck load

Save up to

2 litres
of diesel
per 100 km



Decrease

5 kg
of CO₂
per 100 km



Source: PlasticsEurope / Plastics - the Facts 2017

Plastics such as polypropylene has a calorific value similar to oil and gas and 50% higher than coal. Hence given the time required to develop solutions for mechanical or feedstock recycling, energy recovery to treat dry consumer waste is a good solution, reducing dependence on burning coal, oil and gas and better than landfill which can only be a temporary solution.

Energy recovery is fully proven in Europe, US, Singapore and Japan, with lower carbon footprint and lower emissions of noxious gases than conventional energy generation from fossil fuels. Some Northern European countries collect 99% of their plastic waste, of which as much as 60% is sent to energy recovery plants, and generating 10% of their national energy requirement.

Recommend reading: McKinsey report: Saving the ocean from plastic waste.



What are we doing at HMC?

Customers ask us about recyclable products. Our answer is that polypropylene is already 100% recyclable but the problem is how to collect and contain concentrated clean streams of a single plastic to be able to recycle. Customers also ask us about bio-based and bio-degradability. Applications for bio-based products are possible, but without subsidies will be more expensive and require large amounts of agricultural land to replace even 10% of today's plastic volumes. And bio-degradable products can be great to collect and compost wet waste, but degradation of litter in a marine environment can still be slow. Improvements to the sustainability issue will come from the cumulative impact of many different approaches, but we remain convinced that the biggest

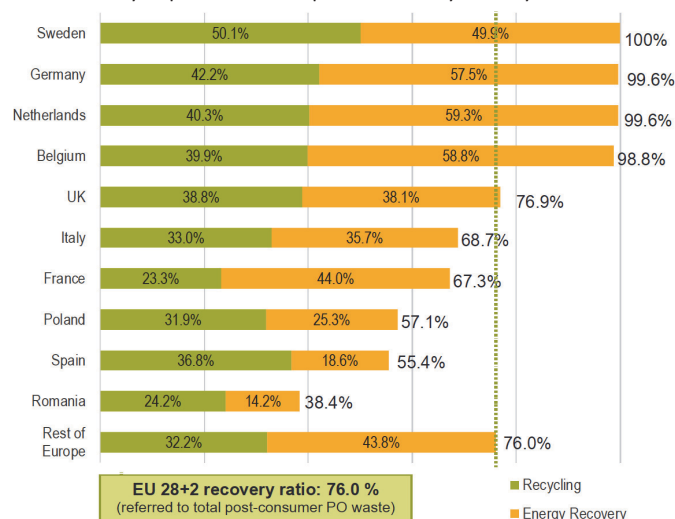
contribution from "Reduce, Reuse, Recycle and Recover" – and manage waste properly to recover its intrinsic value.

So what is HMC doing? Our main focus is in three parts:

1. Supporting industry to understand what makes environmental sense in order to rapidly resolve the marine litter issue. We are participating in the Private Public Partnership under the Federation of Thai Industry to help develop waste collection and containment infrastructures for selected areas.
2. Seeking to support customers with specific projects for mechanical recycling.
3. Working to educate our employees, local community, students etc. on understanding the environmental life-cycle benefits of plastics, their responsible use and disposal.

Alone one company cannot address all the issues, but with a focus on the priority of marine litter first – and collaboration with all stakeholders - we believe the problem of marine litter can and will be solved. Thereafter we can work on maximizing the capture of the value of waste, further progressing towards the vision of circular usage.

Total recovery of post-consumer plastic waste by country 2016



Source: PlasticsEurope / Plastics - the Facts 2017