The Plastics industry & Stopping Ocean Plastics

Steptoe and Johnson
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Edward Kosior Managing Director, Nextek Ltd London UK, Sydney Australia and Pune India

Catch Plastics
Protecting our Oceans

nextek
SUSTAINABLE SOLUTIONS FOR POLYMER & RECYCLING

NEXTEK Ltd - What we do

- Recycling plant design and Feasibility studies
- Strategic advice to Multi-National Corporations and Recycling Co's
- Food grade recycling of post consumer plastics – process development
- Research and development of novel materials and processes including plastics and bioplastics
- Business support, productivity improvement and problem solving
- Ground breaking projects for governments and major commercial organisations in the EU, UK, India, Malaysia, USA, South America, Middle East, North Africa and Australia/NZ
- Strong ties to Universities and Scientific Centres of Excellence in the UK and Europe

What is the media saying about Plastics?

38 Million Pieces of Plastic Trash Cover Remote Henderson Island

In the remote Arctic islands of Jan Mayen and Svalbard, annual beach clean-ups show that plastic waste is building up in these areas

Annual Flows of plastic into the marine environment (Eunomia, 2016)

- **Land-based coastal**
  - **9 million tonnes** from mismanaged waste within 50 Km of coastlines around the world
- **Land-based inland**
  - **0.5 million tonnes** based on plastic samples in rivers
- **At sea sources**
  - **1.75 million** tonnes
- **Microplastics**
  - **0.95 million** tonnes
- **Total = 12.2 million tonnes**

Destinations for plastics in the marine environment (Eunomia, 2016)

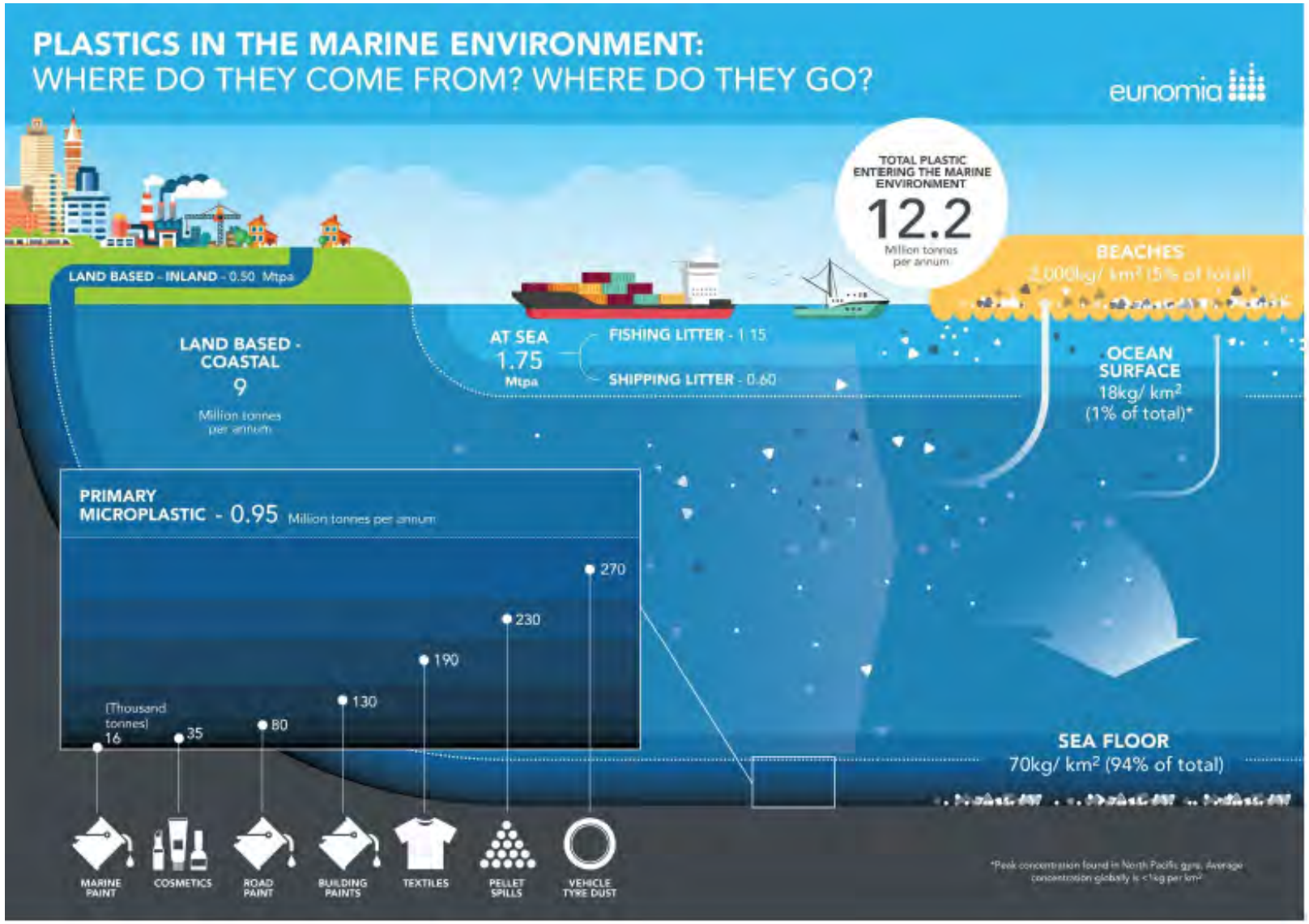


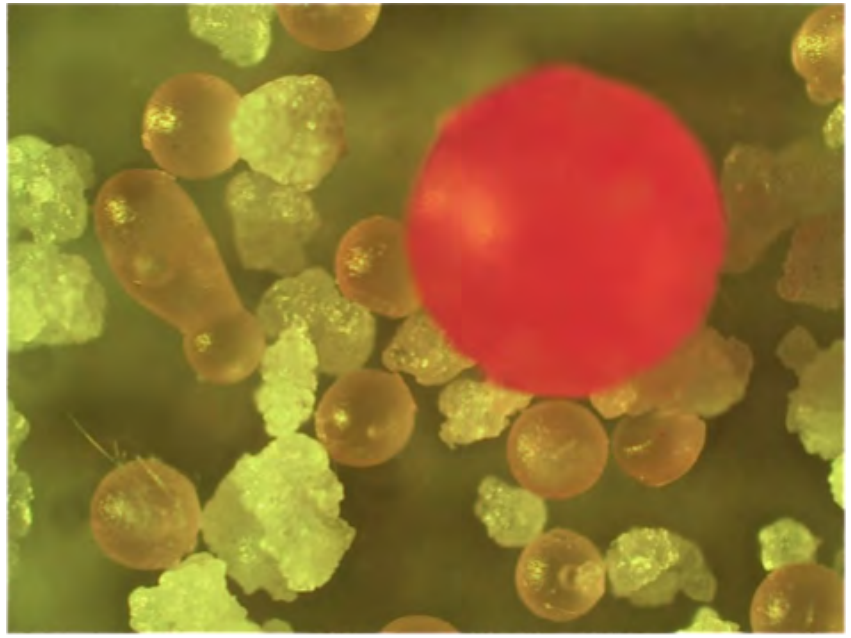
Figure 1 – Concentration of plastic per km²

Plastics, "End of Life destinations"

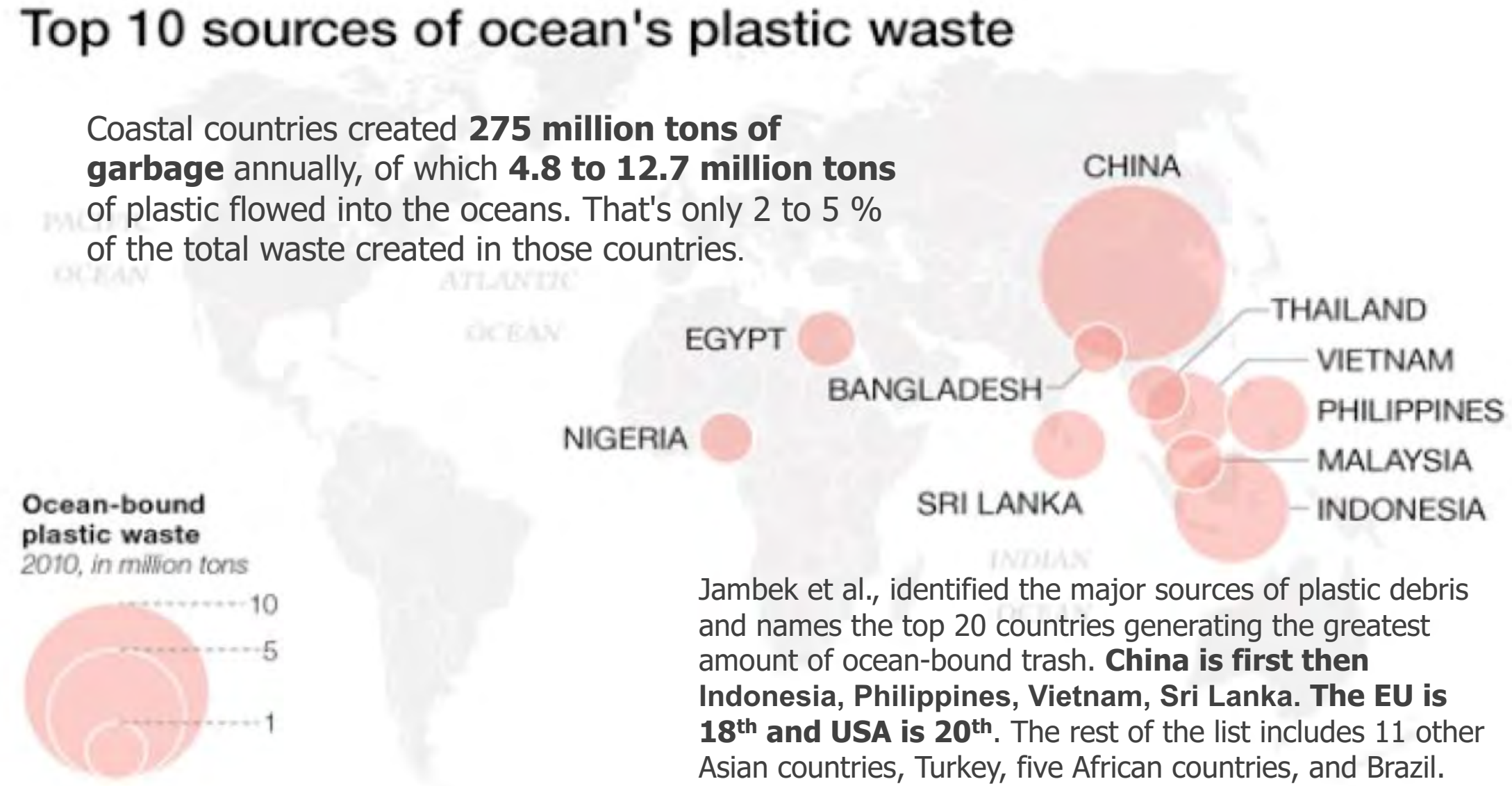
- The **global production of plastics is 311 million tons in 2014** and expected to **double again over the next 20 years and almost quadruple by 2050**
- **9 million tonnes** of plastics ended up in the ocean from coastal countries (Eunomia 2016)
- The amount of **floating plastic is estimated to be 268,000 tons** (Eunomia, 2016)
- The disparity has not been resolved
- **94 %** of the plastic entering the ocean ends up on the sea floor.
- There is an estimated **70 Kg of plastic** in each km2 of the sea bed
- Barely **1%** of marine plastics are found floating at or near the ocean surface ave global concentration of 0.74 Kg/ Km^2
- 640,000 tons of discarded fishing gear gets added to the oceans yearly, or 10 per cent of the world total of marine debris.
- Only **14 per cent of plastic packaging is collected for recycling and 40 per cent is landfilled and 32 per cent leaks out**; it is not collected at all or it is collected and then illegally dumped or mismanaged
- There are over **150 million tons of plastic waste in the ocean today** (Ocean Conservancy, 2015) and there is a high risk that without significant intervention, there may be more plastic than fish in the ocean, by weight, by 2050 (Ellen McArthur Foundation, 2016)

Microplastics

- **Primary microplastics are manufactured as microbeads, capsules, fibers or pellets**
- Examples include microbeads used in **cosmetics and personal care products**, industrial scrubbers used for abrasive blast cleaning, **microfibers used in textiles**, and **virgin resin pellets** used in plastic manufacturing processes
- Secondary microplastics are the result of larger pieces of plastic breaking down into smaller pieces
- Microplastics have been found in the stomachs of many marine organisms from plankton species to whales. **Chemical additives can leach out of microplastics** into the ocean; conversely, **contaminants from the water may adhere to microplastics**



Sources of plastic waste coming from land



Coastal countries created **275 million tons of garbage** annually, of which **4.8 to 12.7 million tons** of plastic flowed into the oceans. That's only 2 to 5 % of the total waste created in those countries.

Jambek et al., identified the major sources of plastic debris and names the top 20 countries generating the greatest amount of ocean-bound trash. **China is first then Indonesia, Philippines, Vietnam, Sri Lanka. The EU is 18th and USA is 20th**. The rest of the list includes 11 other Asian countries, Turkey, five African countries, and Brazil.

Recent Media Announcements by Big Brands on packaging responsibility

- Netherlands From 2021 there will be a deposit on small plastic bottles, unless the packaging industry recycles 90 percent of the disposable bottles within two years
- Coca Cola making all its consumer packaging 100% recyclable by 2025 and to have 50% recycled content in its packaging by 2030. It will recycle a bottle for every bottle it sells.
- Danone-Evian - whose bottles are already 100% recyclable, will make all of its plastic bottles from 100% recycled plastic by 2025
- MacDonalds 100% of packaging will come from recycled, renewable or certified sources and recycle 100% of restaurant packaging by 2025 (currently 10%).
- Unilever - all plastic packaging is reusable, recyclable or compostable by 2025; and recycled plastic content in its packaging to at least 25% by 2025
- Pepsico - to design 100% of its packaging to be recyclable, compostable or biodegradable, increase recycled plastic by 2025
- Werner&Mertz - packaging is already 100% recyclable, to use 100% recycled plastic in at least 70 million bottles (2017) -65% of its entire annual bottle volume, then 100% by 2025
- Procter&Gamble (P&G)’s all packaging is 100% recyclable or reusable by 2030 achieved this by using bottles made from 100%PCR. Cut GHG by 50% and 5BL water from circular sources.

Recycled HDPE with no odour (from fragrances) is now possible.
One of each coloured bottle is shown with 25% recycled content

The choice between RPET and PET in Europe

- At rPET prices higher than virgin PET then many Brand Owners have reduced the level of rPET to contain costs.
- rPET provides reductions in environmental impact that virgin PET cannot deliver for brand owners.
- rPET content demonstrates to consumers that packaging is not simply wasted
- Brand owners that were using 50% recycled content still get a major benefit in packaging reduction when virgin resin is lower in cost even if rPET is not reduced in cost.
- rPET provides a social license to brand owners to use PET packaging
- Significant levels of rPET levels (>50 to 100%) will be needed to bolster consumer confidence that they are not polluting the planet and to avoid loss of market share and taxes on packaging.
- Governments in UK are considering Deposit Return Systems to boost the recovery of PET bottles and to address the litter and Ocean Plastics issues

Minimum and Maximum recycled content for rPET

- Are rPET and vPET the same chemically, physically and processability?
- No! Higher crystallisation rate, darker colour, IV variation
- What is the minimum level of rPET that could or should be used?
- Less than 15% rPET is uneconomic
- 30% rPET allows long term process and product stability
- 50% rPET requires very high quality rPET made to stringent specifications
- 100% rPET will create extreme shortages if applied to the whole market sector AND **create quality problems in a closed loop.**

	Glass transition temperature	Melting temperature	Degree of crystallinity	Recrystallization temperature	Degree of crystallinity
100% virgin (BK3180)	80.54°C	247.79°C	**28.28%**	161.41°C	**26.06%**
100% food grade	81.57°C	250.44°C	**33.53%**	192.95°C	**31.73%**
100% fibre grade	81.53	250.18	**31.38%**	190.39	**29.63%**

Strategies for Brand Owners and Retailers for a Circular Economy

- Identify All packaging they use as “Recyclable” or “Not Recyclable”
- Educate and encourage consumers to recover and recycle
- Ensure all packaging is approved for recyclability by recycling industry groups like EPBP, APR, PRE using guidelines such as RecyClass.
- Eliminate non recyclable packaging
- Use only PP, HDPE and PET
- Develop “mono-material compatible” clear packaging for high performance recycling
- Investigate marker technology for advanced sorting for difficult to recycle packaging
- Decoration minimal/removable inks
- Labels easy to remove and recyclable

OPRL
THE ON-PACK RECYCLING LABEL

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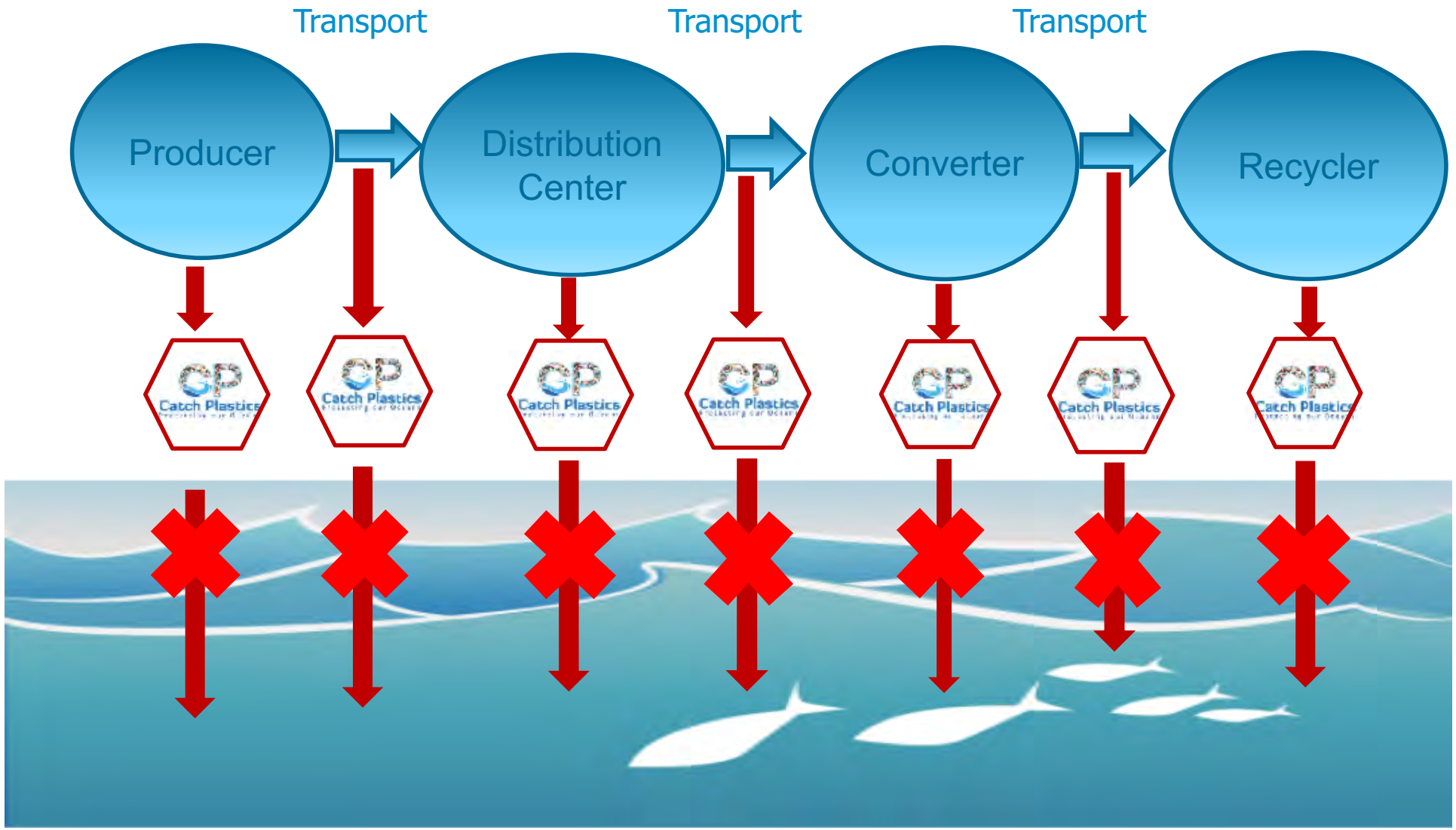
A New Initiative to Catch Plastics on Land

Catch Plastics

Protecting our Oceans



- At each of these points, including transport, there is a potential leakage of plastic pellets
- **Catch Plastics helps catching micro-plastics at the source**

How can companies get involved?

- By joining and supporting the Catch Plastics Programme, companies will make sure that the plastics they produce or use doesn't end up in the sea
- **Contact the Catch Plastics team**, or enrol on the website www.catchplastics.org
- Irene Crescenzi – Catch Plastics, Programme Manager irenecrescenzi@catchplastics.org
- Edward Kosior, Managing Director Nextek Limited, edkosior@nextek.org
- Fiona Mathews, CEO Earth Champions Foundation, fmathews@earthchampions.org

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