SDGs and Climate Change

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UN TRADE FORUM

UKaid
from the British people

What is the role that development agencies can play and what is DFID doing?

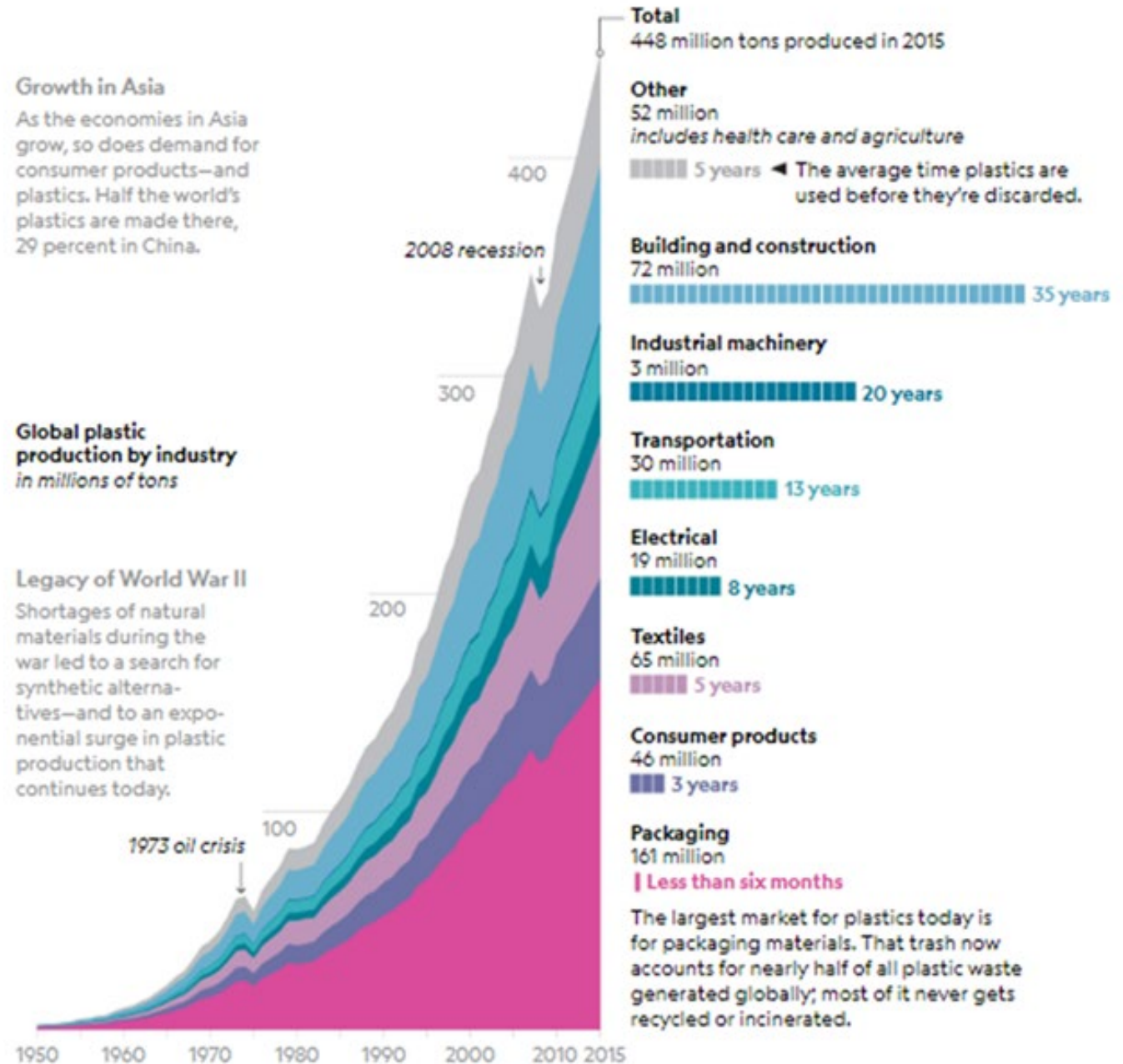# Circular Economy, Oceans and Plastic Pollution

Some key facts and figures

- According to an estimate by Geyer et al. (2017), there are currently around **9.2 billion tons** of plastic in the world;

- 50 % of consumer plastic is used just once and thrown away and we currently recover only 5% of the plastics we produce;

- Annually approximately 500 billion plastic bags are used worldwide. More than one million bags are used every minute.

- Jambeck et al. (2015) estimated that 8 million metric tons of plastic entered the oceans in 2010 alone;

- Plastic chemicals can be absorbed by the body, 93 percent of Americans age six or older test positive for Bisphenol A (BPA), an industrial chemical that has been used to make certain plastics and resins since the 1960s.

- Some of these compounds found in plastic have been found to alter hormones or have other potential human health effects.
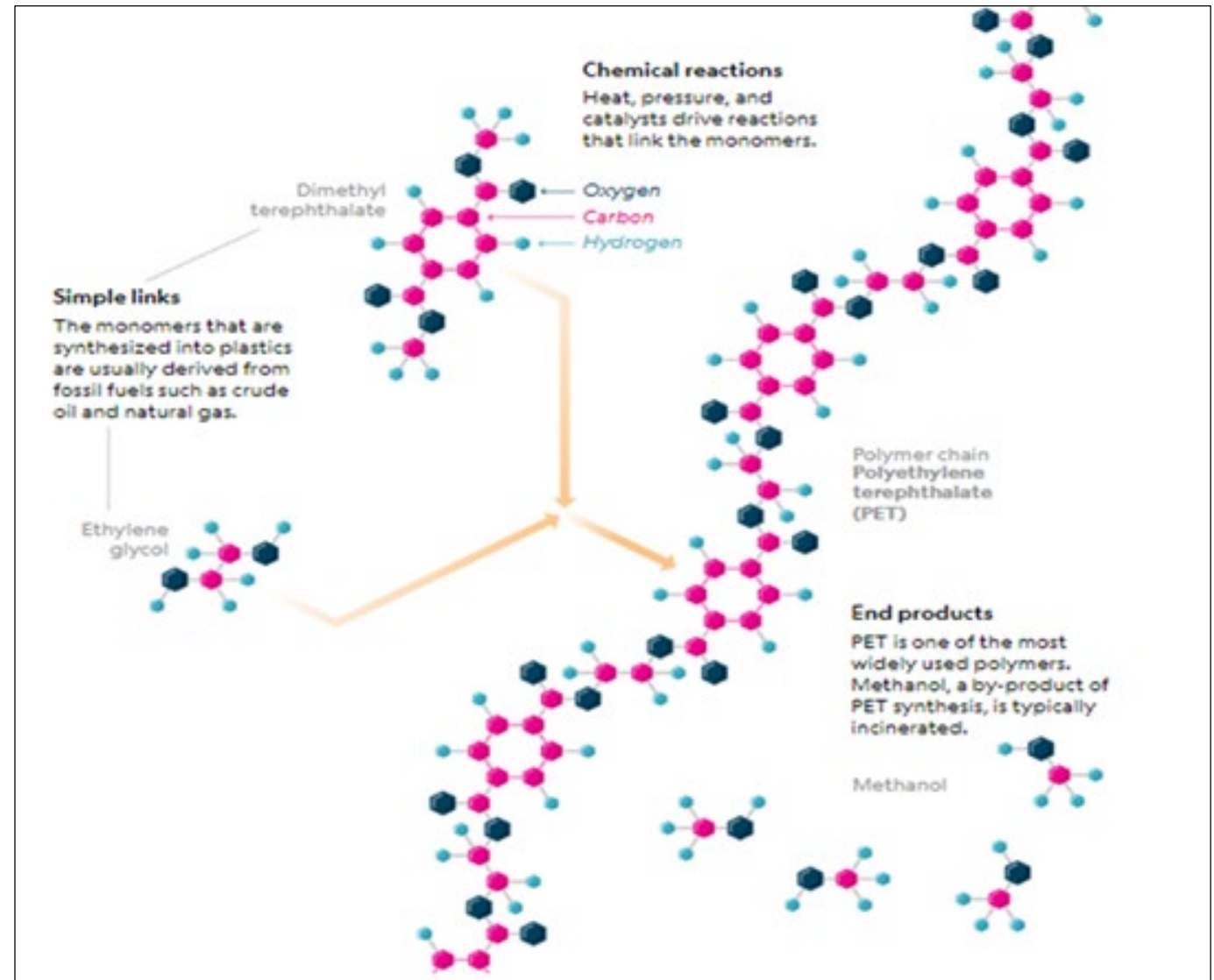
The life story of plastics

- Plastic was invented in the late 19th century, but mass-production only took-off around 1950 and the pace of production shows no signs of slowing;

- Of the total amount of plastics produced from 1950 to 2015, roughly half was produced in just the last 13 years;

- Over the last ten years we have produced more plastic than during the whole of the last century.

- Virtually every piece of plastic that was ever made still exists in some shape or form (with the exception of the small amount that has been incinerated).

Growth in Asia

As the economies in Asia grow, so does demand for consumer products—and plastics. Half the world's plastics are made there, 29 percent in China.

Global plastic production by industry
in millions of tons

Legacy of World War II

Shortages of natural materials during the war led to a search for synthetic alternatives—and to an exponential surge in plastic production that continues today.

1973 oil crisis

2008 recession

400

300

200

100

1950   1960   1970   1980   1990   2000   2010 2015

Total
448 million tons produced in 2015

Other
52 million
includes health care and agriculture
5 years ◄ The average time plastics are used before they're discarded.

Building and construction
72 million
35 years

Industrial machinery
3 million
20 years

Transportation
30 million
13 years

Electrical
19 million
8 years

Textiles
65 million
5 years

Consumer products
46 million
3 years

Packaging
161 million
Less than six months
The largest market for plastics today is for packaging materials. That trash now accounts for nearly half of all plastic waste generated globally; most of it never gets recycled or incinerated.

Plastic as a material

- Plastic is a very durable and versatile material, which has found many uses and applications in everyday life;

- It takes 500-1,000 years for most types of commonly used plastic to degrade;

- It's unclear how long it will take for commonly-found "domestic use" plastic waste to completely biodegrade into its constituent molecules - estimates range from 450 years to never.

- Most plastics don't biodegrade in any meaningful sense, so the plastic waste humans have generated could be with us for hundreds or even thousands of years (UoG, 2017).

Chemical reactions
Heat, pressure, and catalysts drive reactions that link the monomers.

Dimethyl terephthalate

Oxygen
Carbon
Hydrogen

Simple links
The monomers that are synthesized into plastics are usually derived from fossil fuels such as crude oil and natural gas.

Ethylene glycol

Polymer chain
Polyethylene terephthalate (PET)

End products
PET is one of the most widely used polymers. Methanol, a by-product of PET synthesis, is typically incinerated.

Methanol

Plastic in the oceans and the environment

- A substantial amount of all plastic waste produced every year will eventually end up in the world's oceans;

- Jambeck et al. (2015) estimated that between 5.3 million and 14 million tons each year just from coastal regions;

- Contamination of freshwater systems and terrestrial habitats is also increasingly reported (Wagner et al. 2014);

- Plastic waste is now so ubiquitous in the environment that it has been suggested as a geological indicator of the Anthropocene era (Zalasiewicz et al. 2016)
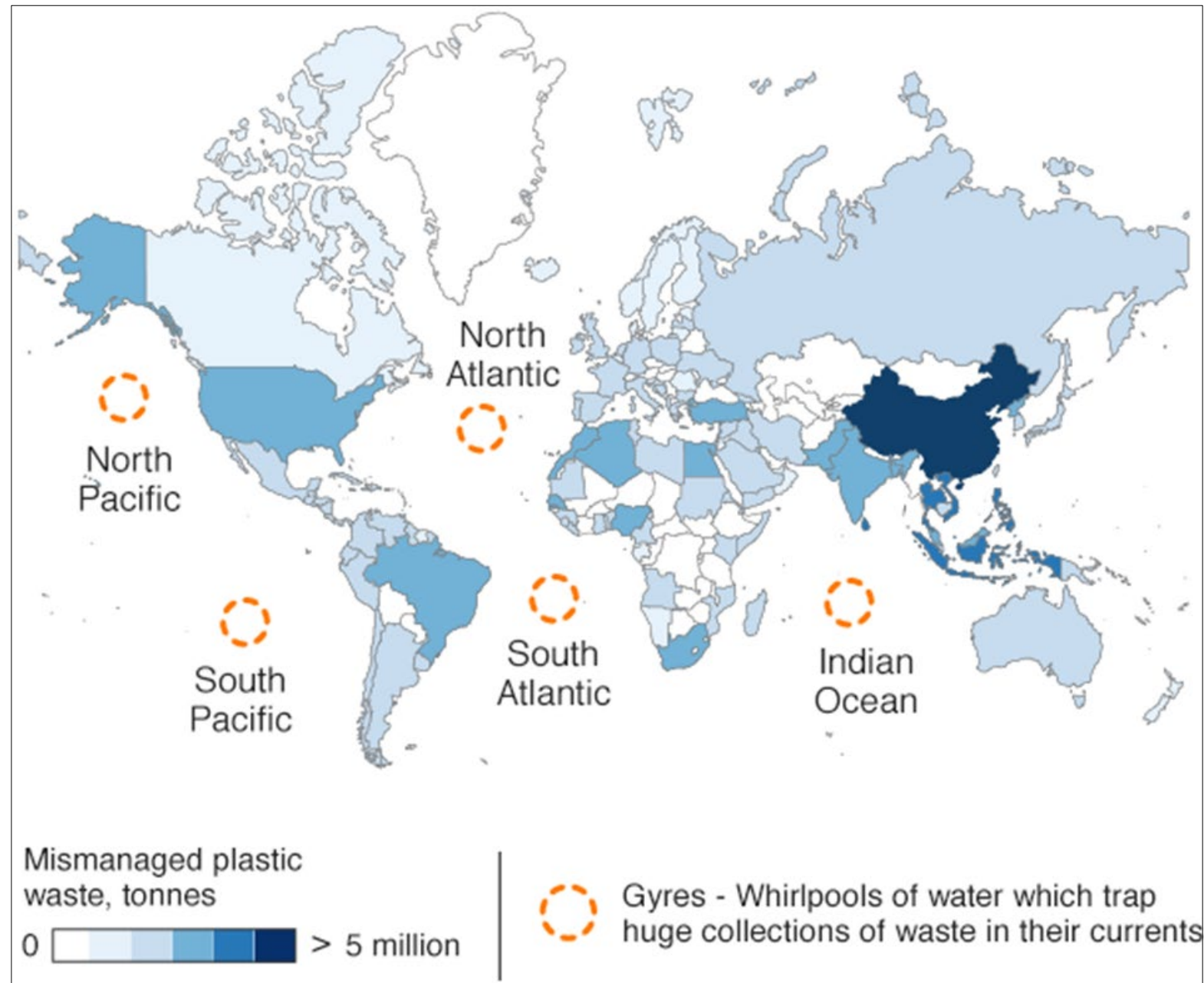
Recent data and evidence on source of ocean plastic pollution:

- Plastic debris in the marine environment is widely documented, but the quantity of plastic entering the ocean from waste generated on land is unknown;

- Jambeck et al. estimated the amount of plastic waste entering the ocean from each country by linking global data on solid waste, population density, and economic status;

- They calculated that 275 million metric tons (MT) of plastic waste was generated in 192 coastal countries in 2010, with 4.8 to 12.7 million MT entering the ocean;

- Population size and the quality of waste management systems largely determine which countries contribute the greatest mass of uncaptured waste available to become plastic marine debris.

Rank	Country	Econ. classif.	Coastal pop. [millions]	Waste gen. rate [kg/ppd]	% plastic waste	% mismanaged waste	Mismanaged plastic waste [MMT/year]	% of total mismanaged plastic waste	Plastic marine debris [MMT/year]
1	China	UMI	262.9	1.10	11	76	8.82	27.7	1.32–3.53
2	Indonesia	LMI	187.2	0.52	11	83	3.22	10.1	0.48–1.29
3	Philippines	LMI	83.4	0.5	15	83	1.88	5.9	0.28–0.75
4	Vietnam	LMI	55.9	0.79	13	88	1.83	5.8	0.28–0.73
5	Sri Lanka	LMI	14.6	5.1	7	84	1.59	5.0	0.24–0.64
6	Thailand	UMI	26.0	1.2	12	75	1.03	3.2	0.15–0.41
7	Egypt	LMI	21.8	1.37	13	69	0.97	3.0	0.15–0.39
8	Malaysia	UMI	22.9	1.52	13	57	0.94	2.9	0.14–0.37
9	Nigeria	LMI	27.5	0.79	13	83	0.85	2.7	0.13–0.34
10	Bangladesh	LI	70.9	0.43	8	89	0.79	2.5	0.12–0.31
11	South Africa	UMI	12.9	2.0	12	56	0.63	2.0	0.09–0.25
12	India	LMI	187.5	0.34	3	87	0.60	1.9	0.09–0.24
13	Algeria	UMI	16.6	1.2	12	60	0.52	1.6	0.08–0.21
14	Turkey	UMI	34.0	1.77	12	18	0.49	1.5	0.07–0.19
15	Pakistan	LMI	14.6	0.79	13	88	0.48	1.5	0.07–0.19
16	Brazil	UMI	74.7	1.03	16	11	0.47	1.5	0.07–0.19
17	Burma	LI	19.0	0.44	17	89	0.46	1.4	0.07–0.18
18*	Morocco	LMI	17.3	1.46	5	68	0.31	1.0	0.05–0.12
19	North Korea	LI	17.3	0.6	9	90	0.30	1.0	0.05–0.12
20	United States	HIC	112.9	2.58	13	2	0.28	0.9	0.04–0.11

*If considered collectively, coastal European Union countries (23 total) would rank eighteenth on the list
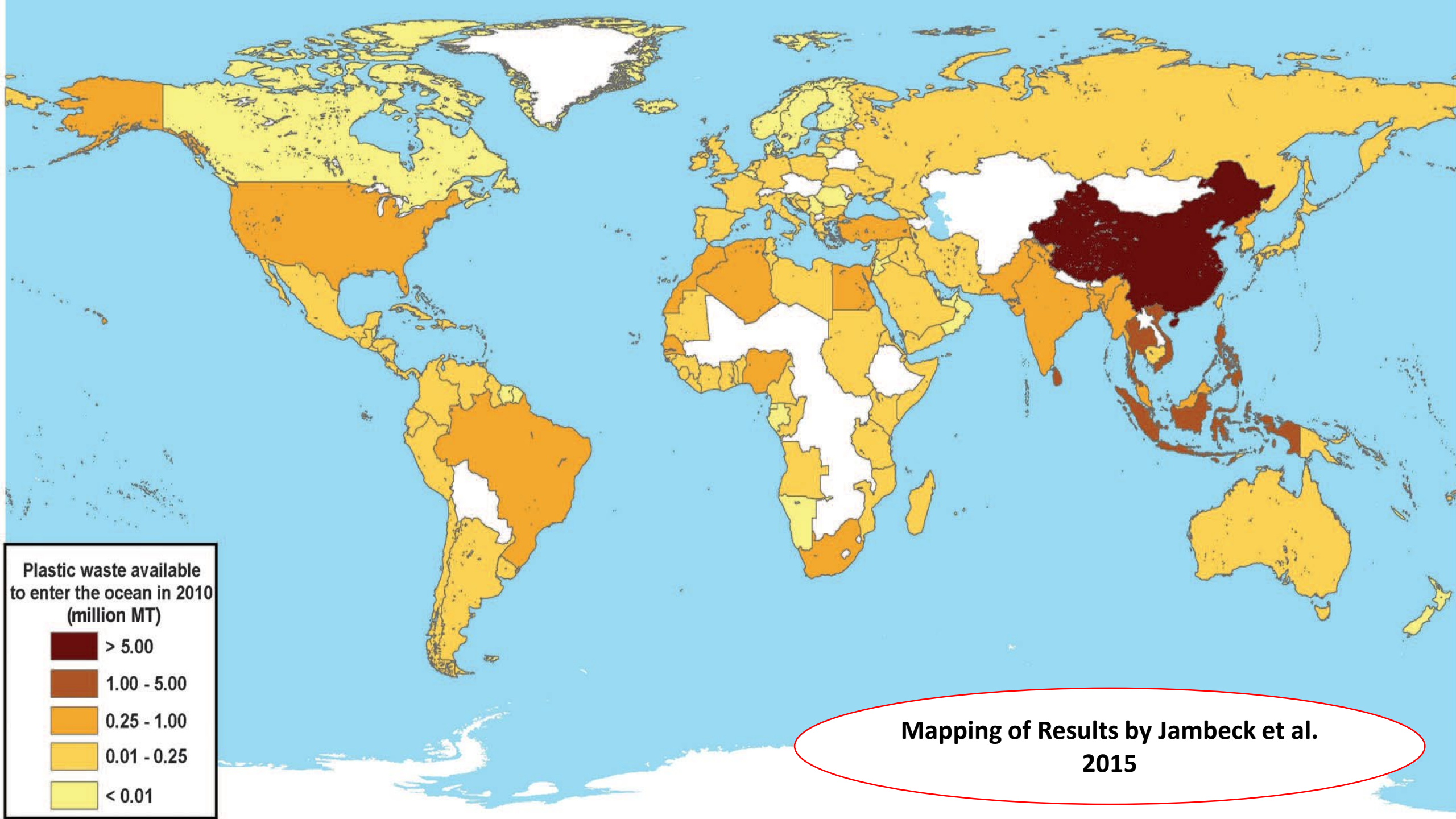
Plastic waste available to enter the ocean in 2010 (million MT)

- > 5.00
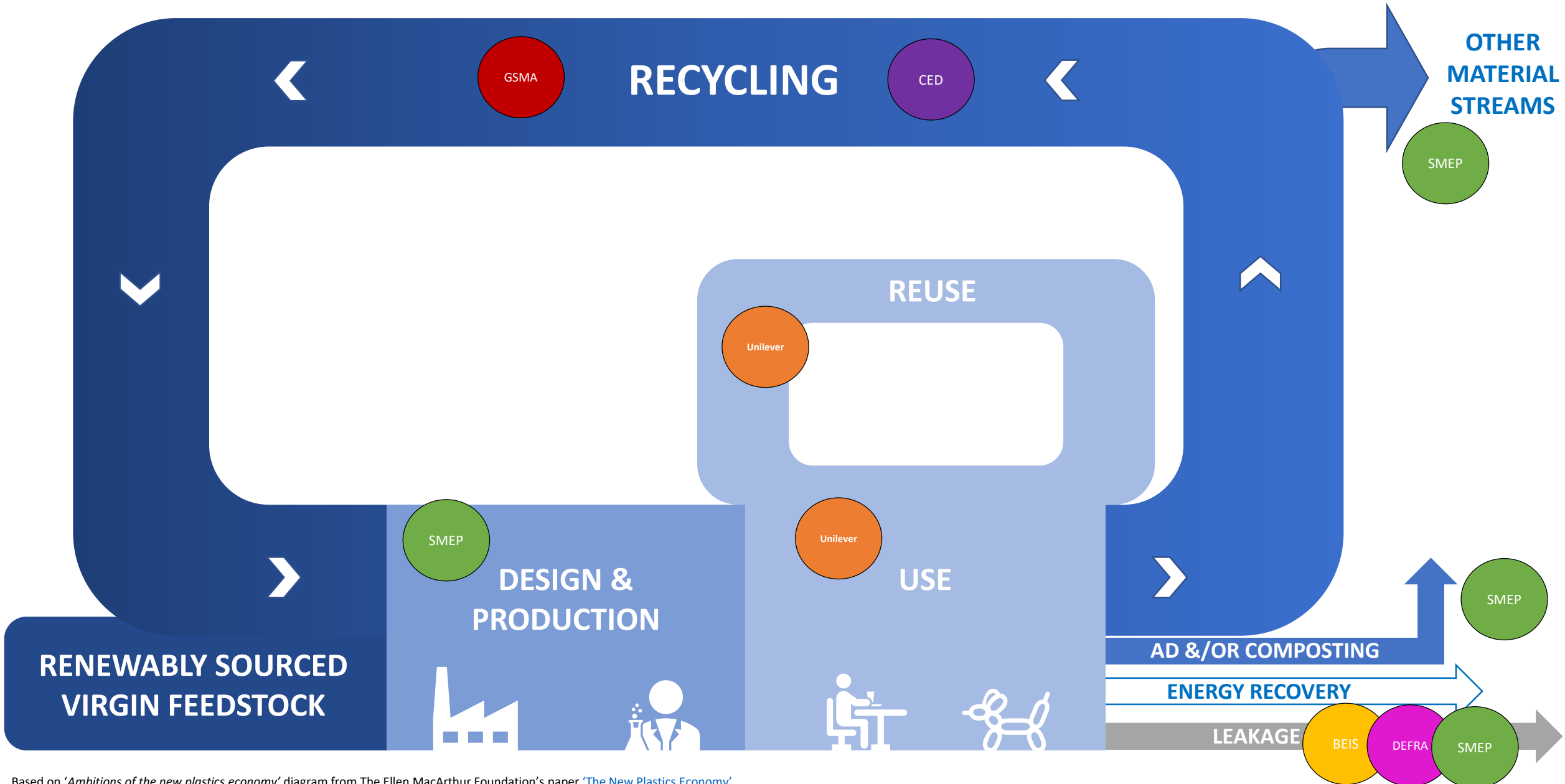- 1.00 - 5.00
- 0.25 - 1.00
- 0.01 - 0.25
- < 0.01

Mapping of Results by Jambeck et al. 2015

Conclusions and reflections from a donors perspective:

- Without waste management infrastructure improvements, the cumulative quantity of plastic waste available to enter the ocean from land is predicted to increase tenfold by 2025;

- Our waste will continue to grow with increased population and increased per capita consumption associated with economic growth, especially in urban areas and developing African countries;

- Long-term solutions will likely include waste reduction and "downstream" waste management strategies such as expanded recovery systems and extended producer responsibility;

- Improving waste management infrastructure in developing countries is paramount and will require substantial resources and time;

- Economic cost of implementation, as well as socio-cultural, environmental, and other factors that affect infrastructure development or behavioral change, would improve the evaluation of mitigation strategies;

- Investment from government agencies in developing countries alone will not be sufficient to tackle the problem in the timespan needed, especially if considering concurring budgetary pressure from Climate change development needs etc.;

- Developing agencies have a key role to play in assisting partner governments in developing countries to tackle the global problem of plastic pollution.

(Source: Jambeck et al. 2015)

Planned UK-HMG interventions on Plastics

RECYCLING

OTHER MATERIAL STREAMS

REUSE

DESIGN & PRODUCTION

USE

RENEWABLY SOURCED VIRGIN FEEDSTOCK

AD &/OR COMPOSTING

ENERGY RECOVERY

LEAKAGE

Based on 'Ambitions of the new plastics economy' diagram from The Ellen MacArthur Foundation's paper 'The New Plastics Economy'

The Sustainable Manufacturing and Environmental Pollution (SMEP) programme

- A £25million research programme funded by DFID-UKaid over a period of 5 FYs;

- Aimed at reducing the levels of pollution generated by manufacturing processes in developing countries;

- DFID-UKaid is partnering with the Trade, Environment and Sustainable Development Branch (TED) of the United Nations Conference on Trade and Development (UNCTAD), which is based in Geneva;

- UNCTAD-TED will provide a range of technical assistance and support services to the programme, as well as ensuring political leverage at the country level and with multinational corporations, whose involvement will be key to the success of the programme. It will also provide some in-kind contribution to the programme.

The SMEP programme (continued)

The programme will aim to achieve its objectives by implementing the following activities:

o **Funding research to develop the evidence to support practical solutions** with a high chance of take up and impact;

o **Developing and testing innovative technology-based solutions** that improve the environmental impacts of manufacturing;

o **Identifying and developing suitable supporting business models and policies** to adopt innovative technology-based solutions.

o Development and testing of **new symbiotic production processes** that reduce environmental waste and establish new sources of wealth and growth.

o Funding R&D activities to address the problem of **plastic ocean pollution**, which was recently highlighted as a key issue in developing countries.

o Co-design/ development of **toolkits** to be used by policy makers and planners.