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# PLASTIC PACKAGING AND THE CIRCULAR ECONOMY- AN ICIS VIEW

By Nigel Davis

# PLASTIC PACKAGING AND THE CIRCULAR ECONOMY

## AN ICIS VIEW

BY NIGEL DAVIS FEBRUARY 2018

The world won't do without plastics but producers, converters, retailers and consumers are being prodded into doing more with less.

Less packaging is the mantra adopted by the European Union, a new plastics strategy from the European Commission talking about ensuring that by 2030 all plastics packaging placed on the EU market can be either re-used or cost-effectively recycled.

As plastic packaging use is more closely scrutinised and more waste is recycled, virgin polymer demand growth is curtailed. And what happens in Europe is likely to spread to other parts of the world where the throwaway plastic waste problem is much greater.

The impact of total plastic packaging recyclability and of more recycling will be significant. It will prompt innovation, certainly,

PLASTICS PACKAGING GROWTH IN EUROPE*			
Europe	2017		17-22
	(million tonnes)	% share of total	AAGR %/y
HDPE	1.1	15	2.2
LDPE	3.2	63	0.8
LLDPE	3.4	68	2.8
PP	3.7	30	3.3
PVC	0.8	13	1.7
PS	0.6	34	-3.1
EPS	0.4	23	-0.3
PET	4.3	-	3.1

\*EU plus East European nations and Turkey. Source ICIS

but also a shift away from some plastics and some grades.

In Europe, things are moving fast. Work is underway to revise the EU's Packaging and Packaging Waste Directive, to harmonise rules to match the target.

Particularly difficult plastic products in the waste stream: oxo-plastics and deliberately produced microplastics, will be restricted in use under the Reach chemicals legislation.

The Commission is urging the European Parliament and the Council to back its proposals which also call for renewed recycling input from industry and consumers.

A private-led investment fund could be used to back new technologies and processes aimed at reducing the environmental impact of primary plastics production, the Commission says.

It has adopted a carrot and stick approach, keen to enshrine the re-use and recycling targets in law but also encouraging national and regional authorities and industry to come up with better ways of cost effectively recycling plastic packaging.

The BBC television series, Blue Planet II, presented by veteran broadcaster Sir David Attenborough, has caught the attention of many across the bloc and farther afield with its stunning images of the ways in which the plastic blight is affecting the world's oceans.

As one major UK food retailer said in January, the consequences of microplastics, produced intentionally or

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**PLASTIC PACKAGING WASTE TREATMENT IN 2016 (EU28+NO/CH)**


from marine litter, entering the human food chain through fish and seafood, could be catastrophic for humanity.

The Commission's proposals and a rising groundswell of public opinion has prompted other large food and drinks retailers to revise their plastic packaging strategy. Food and personal care products giant Unilever has said it is committed to ensure that all its plastics packaging is fully reusable, recyclable or compostable by 2025. It has called on the entire consumer goods industry "to accelerate progress towards the circular economy".

Drinks maker Coca Cola has said it aims to help collect and recycle the equivalent of every bottle or can it sells worldwide by 2030.

The renewed drive to tackle plastic packaging waste will have a significant impact on demand growth to 2030 and beyond, ICIS analysis shows. In Europe it will help reduce the demand for virgin LLDPE in EU 28 nations by 5m tonnes in the 2018 to 2030 period.

There is no denying that plastic packaging waste is a global

issue and the actions being proposed at the EU level are extended in the new strategy. The Commission highlights actions to reduce plastic waste and marine litter in East and southeast Asia and the Mediterranean as well as the EU's support of the Barcelona Convention cooperation on plastic waste prevention in the world's major river basins.

Regional plans can be effective at targeting packaging and agricultural waste as well as discarded fishing gear – a particular issue addressed in the new strategy.

"This strategy proposes concrete actions designed to make the vision for a more circular plastics economy a reality," the Commission says.

"The Commission will focus on making decisive progress within its current mandate, while preparing the ground for longer-term action. It will be essential for other key actors to also play their part."

Plastic recycling across Europe has failed to reach targets, the cost of recycling alongside the price of recycled material playing a large part in the lack of momentum.

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## Global Imports of Plastic Scrap by Country and Year (in metric tons)



Top 20 Importers Plastic Scrap	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
China	4,956,589	5,864,637	6,912,155	7,074,626	7,325,810	8,009,674	8,384,190	8,877,767	7,881,304	8,254,268	7,354,366
Hong Kong	3,499,933	4,421,329	4,145,835	4,503,012	4,752,654	4,795,350	3,962,054	3,200,487	2,506,171	3,080,676	2,864,748
Netherlands	203,699	226,692	221,914	238,843	144,459	295,928	374,308	467,433	531,881	622,941	598,127
Germany	203,111	219,474	239,700	227,723	214,448	296,940	302,344	420,106	423,052	501,628	545,607
USA	467,648	557,367	416,683	412,156	356,098	379,490	342,014	361,294	372,705	417,046	393,392
Belgium	158,836	248,563	281,228	294,000	350,481	285,426	322,250	292,285	259,805	226,729	259,728
Malaysia	76,954	73,785	81,755	38,194	92,323	81,779	142,860	176,779	301,435	225,986	249,941
Canada	209,719	205,177	183,723	159,231	129,077	147,206	152,805	154,370	145,971	185,725	248,497
Austria	41,468	69,995	131,224	148,423	106,394	146,137	210,909	218,640	194,626	250,263	245,451
Taiwan	103,036	102,548	122,775	149,976	119,829	148,599	152,819	149,128	201,317	203,564	221,499
India	96,514	94,137	169,909	97,936	478,491	116,252	131,419	195,988	259,614	251,546	185,746
Sweden	17,063	18,338	79,494	87,251	138,100	300,324	255,449	134,230	213,483	153,842	179,521
Italy	161,917	190,103	199,010	162,786	116,475	138,291	145,795	138,956	134,360	160,176	153,379
Portugal	11,072	13,499	12,050	14,876	13,514	21,625	54,714	45,242	51,078	82,725	134,784
Czechia	24,971	28,489	41,874	54,849	48,074	58,555	93,122	111,373	122,698	128,088	131,523
France	50,483	65,133	69,866	81,241	58,467	98,533	109,061	109,538	111,813	109,691	116,439
Turkey	7,806	3,516	19,114	10,848	7,169	23,260	55,780	56,497	67,396	105,287	104,031
Indonesia	3,655	1,957	313	8,588	3,175	39,906	90,474	106,994	135,993	107,423	97,146
Slovenia	9,379	15,682	20,075	25,719	28,878	39,280	39,851	45,516	59,315	88,606	89,952
Viet Nam	23,000	37,540	80,043	87,123	54,227	61,586	52,699	64,776	66,803	79,170	88,366
Rest of World	589,957	662,265	714,662	773,638	795,233	954,449	1,153,657	1,135,356	1,216,068	1,140,120	1,086,990
Annual World Total	10,916,810	13,120,226	14,143,403	14,651,039	15,333,377	16,438,588	16,528,574	16,462,754	15,256,885	16,375,499	15,349,234

**\*Notes**

- 1) Data tables were derived from the UN Comtrade Database (last downloaded on April 14, 2017)
- 2) Top 20 determined by latest year of complete data

## Global Exports of Plastic Scrap by Country and Year (in metric tons)



Top 20 Exporters Plastic Scrap	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
USA	843,720	1,045,848	1,375,681	1,593,703	2,020,770	2,040,483	2,127,877	2,011,095	1,909,535	2,172,382	2,043,124
Japan	1,058,217	1,296,197	1,517,312	1,513,419	1,487,705	1,638,962	1,631,455	1,673,620	1,681,733	1,670,228	1,606,271
Germany	590,302	748,603	846,084	774,655	1,445,533	1,418,680	1,462,561	1,511,349	1,324,863	1,453,609	1,376,833
United Kingdom	324,535	440,852	548,298	654,393	711,223	838,188	880,577	811,509	648,614	764,404	791,554
Netherlands	359,581	438,753	412,010	357,819	245,322	361,137	381,131	428,666	464,294	431,322	505,903
France	408,751	379,183	385,592	390,634	447,683	477,954	502,826	508,034	454,119	483,026	468,754
Mexico	301,318	347,875	419,676	435,085	372,442	414,021	442,197	522,143	517,067	862,744	449,974
Belgium	342,874	382,820	399,629	369,552	453,559	396,963	414,619	456,860	471,666	437,310	430,720
Spain	87,435	91,944	108,685	112,448	166,850	217,892	192,363	236,880	225,844	333,466	329,937
Thailand	130,445	139,397	183,287	145,309	166,370	205,915	232,170	263,128	317,540	346,912	265,390
Italy	110,418	101,847	113,942	139,913	212,414	263,949	269,601	228,019	191,621	175,859	223,076
Canada	211,634	219,263	199,638	229,263	188,862	190,252	197,638	203,046	170,783	193,037	208,939
Australia	87,846	99,881	103,540	125,183	204,739	156,388	151,209	193,087	155,085	185,705	206,060
Rep. of Korea	234,546	299,078	324,564	285,244	307,717	201,549	161,358	182,975	183,291	192,851	187,609
Malaysia	104,930	96,789	107,316	114,943	123,627	134,326	153,865	197,598	250,809	247,007	182,271
Poland	39,008	50,877	56,911	66,831	97,153	107,541	102,736	101,301	99,431	138,834	166,378
Austria	81,459	96,514	86,677	87,450	106,576	100,262	133,556	170,389	172,440	182,299	149,306
Indonesia	29,111	36,838	58,167	53,203	53,728	116,354	166,430	204,750	231,747	193,842	148,735
Taiwan	158,336	187,864	170,590	149,536	166,445	182,693	164,825	157,914	120,210	146,153	145,125
Czechia	22,327	22,878	31,644	44,473	74,328	85,409	102,361	115,307	128,813	120,879	123,793
Rest of World	1,574,249	1,776,605	1,962,983	2,385,850	2,427,347	3,416,236	2,619,735	1,968,232	2,124,754	2,029,497	1,831,407
Annual World Total	7,101,044	8,299,907	9,412,227	10,028,908	11,480,395	12,965,152	12,491,089	12,145,903	11,844,060	12,760,676	11,841,157

**\*Notes**

- 1) Data tables were derived from the UN Comtrade Database (last downloaded on April 14, 2017)
- 2) Top 20 determined by latest year of complete data

Source: International Scrap Trade Database, Institute of Scrap Recycling Industries, Inc

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And the decision by China to stop importing the world's plastic waste from the start of this year has clearly hit home.

In 2015, China imported more than 10m tonnes of the 11.8m tonnes of plastic scrap exported globally. The biggest exporters were the US, Japan, Germany and the UK.

ICIS data show that 33.1m tonnes of low density polyethylene (LDPE) and linear low density polyethylene (LLDPE) were used globally in flexible packaging in 2016, that is 65.6% of total consumption.

High density polyethylene packaging films and sheets consumption was 9.5m tonne, or 22.8% of total HDPE use. A further 8.3m tonnes (or 19.8% of the total) is injection moulded into cups, crates, tubes, caps and other packaging items.

Close to 30% of the other major thermoplastic, polypropylene (PP), or 14.7m tonnes, was used to produce packaging film and sheets while 5.5m tonnes went into rigid packaging such as cups, trays, containers and closures.

For polyolefins and plastics producers, packaging is clearly the big, if not the dominant, business so it is in their best interests to be up to speed with recycling trends and the pressures building on primary plastics demand.

There is no doubt that polymer producers take the issue seriously and there are numerous programmes running at the corporate and the sector level to look at ways of

improving the industry's approach to the circular economy.

Regulation or legislation will help prompt further innovation and growth rate projections will take into account the impact of recycling at the regional and global level.

But as recycling awareness – and action – increases, larger percentages of primary plastics demand will be removed from the market.

The complexity of the recycling issue revolves around the different types and grades of plastic used in throwaway packaging and goes some way to explain why recycling rates of plastic packaging generally are so low.

Consumers have been offered better performing and more attractive plastic packaging but colour, particularly, presents problems in the waste stream. Consumers also are not encouraged sufficiently to collect and sort waste.

The Commission says that around 25.8m tonnes of plastic waste are generated in Europe every year and that less than 30% of that waste is collected for recycling.

A lot of this trash leaves the EU for third countries.

The table shows ICIS estimates of the types of plastic used in packaging in Europe and illustrates the importance of not only LDPE and LLDPE in the market but also more difficult to recycle polystyrene and expandable polystyrene.

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For industry, the less easily recyclable products are likely to be the ones where the focus lies. The plastics sector's styrene reuse and recycling projects being among the most important in this regards

The fact that a great deal of plastics packaging still goes to landfill, where it degrades so slowly, and is incinerated, shows how the entire plastic chain is effectively seen to be taking the easy option on not addressing the challenges of the circular economy whether that is the case or not.

The European Commission has put it bluntly. Between €70bn and €150 bn of the value of plastic packaging is lost to the economy after a very short "first cycle". In other words, single use plastic packaging is just thrown away. The estimate is that 95% of the value of that packaging is lost.

The Commission says that demand for recycled plastic in Europe represents only about 6% of total plastics demand. The EU plastic recycling sector has suffered from low

prices and market uncertainty.

There are innovators but at the grass roots level this is not a sector for the faint hearted.

Some of the innovations will be made at the petrochemical and plastic producer level and others by the plastic converter. Petrochemical producers are looking at recycling more waste plastic back into polymer and into feedstock.

The Ellen MacArthur Foundation, which has been at the forefront of the drive to tackle plastic waste in the world's oceans, highlighted last year that without innovation and fundamental packaging redesign 30% of plastic packaging will never be reused or recycled.

The chart from its report made jointly with the World Economic Forum shows what savings could be made if packaging design and after-use were addressed more aggressively.

### PLASTIC PACKAGING SEGMENTS THAT NEED FUNDAMENTAL REDESIGN AND INNOVATION

EXAMPLES	SHARE OF PLASTIC PACKAGING MARKET % BY WEIGHT	PRIORITY SOLUTIONS
<b>SMALL-FORMAT</b> Lids, tear-offs, caps, sachets and generally all items smaller than 40 - 70mm	~10%	<b>REDESIGN</b> packaging formats and/or delivery models (and after-use systems)
<b>MULTI-MATERIAL</b> Packaging with inseparable layers of different materials	~13%	<b>INNOVATE</b> in materials and reprocessing technologies
<b>UNCOMMON MATERIALS</b> Uncommon plastic packaging materials like PVC, EPS, PS	~10%	Actively explore to <b>REPLACE</b> as a priority PVC, EPS, PS by known alternatives
<b>NUTRIENT-CONTAMINATED</b> Coffee capsules, organic waste bags, takeaway food packaging	NOT QUANTIFIED	<b>SCALE UP</b> compostable plastics for targeted applications to help recover nutrients of packaging contents

**FUNDAMENTAL REDESIGN AND INNOVATION is needed for >50% of plastic packaging (by no. of items), or >30% of plastic packaging (by weight)\***

\* Total is not the sum of separate categories due to overlap  
 Source: New Plastics Economy initiative analysis (see Appendix in: World Economic Forum and Ellen MacArthur Foundation, The New Plastics Economy-Catalysing action (2017, <http://www.ellenmacarthurfoundation.org/publications>)for details)

The plastics industry trade group, PlasticsEurope, has three collaborative projects covering polyolefin-, vinyl-, and styrene-based plastic packaging. They are looking at packaging design alongside quality standards and non-mechanical processes to convert polymer into feedstock for new raw materials. A styrenics circular solutions initiative is looking into the technologies that will enable the incorporation of post-consumer waste back into the production process. The most promising technologies will be assessed by the end of 2018, PlasticsEurope says.

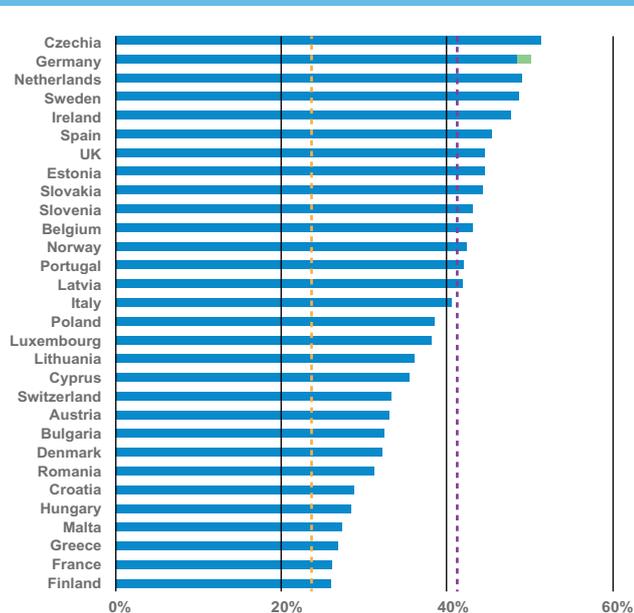
European plastics manufacturers are committed to ensure high rates of reuse and recycling with the ambition to reach 60% for plastic packaging by 2030,” executive director of

PlasticsEurope, Karl-H Foerster, said in January. “This will help achieve our goal of 100% reuse, recycling and recovery of all plastics packaging at European level by 2040”, he added.

The trade group stresses that no plastics should end up in the environment and that further action needs to be taken on landfill.

“Since 2011, the European plastics industry has been calling for zero plastics to landfill,” Foerster said. “Only a legally binding landfill restriction on all recyclable and other recoverable post-consumer waste will put an end to the landfilling of all waste which can be used as a resource.”

### PLASTIC PACKAGING RECYCLING RATE PER COUNTRY IN 2016



■ Mechanical Recycling ■ Feedstock Recycling  
 - - - - - Plastics recycling target acc. to the EU PPWD 22.5%  
 - - - - - EU 28+2 recycling rate of plastic packaging waste:40.8%

Source: PlasticsEurope

### ABOUT THE AUTHOR



**NIGEL DAVIS**  
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Nigel Davis is Insight Editor with ICIS, a course director with ICIS Training and a regular contributor to ICIS news. Nigel has been analysing and writing about the chemical industry for many years, the Insight column providing daily commentary on the sector, its markets and companies.



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