

Calculation of Littering Rate for Glass Beverage Containers in Scotland

Report to Have You Got The Bottle?

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1.0 Key Findings

It is estimated that just under 9,000 glass bottles are littered in Scotland each day.

On the assumption that a DRS would reduce littering of deposit-bearing containers by 80%, then 7,000 fewer glass bottles would be littered every day.

The following section outlines the calculations, and explains in full why the assumptions applied are conservative.

2.0 Calculation

A Zero Waste Scotland [report](#) from 2013 presents the [composition \(by weight\)](#) of litter in Scotland. This identifies the following proportions:

- Plastic bottles – 8.6%
- Packaging glass - 9.1%
- Metal cans – 4.0%

The ZWS report also puts a figure on the annual tonnage of litter dropped on the ground and subsequently cleared by local authorities in Scotland each year – at least 15,000 tonnes. This is a conservative figure as it does not include:

- litter dropped, and then cleared, on other public land (e.g. hospitals, schools and the transport network) or private land (e.g. stadiums and shopping centres);
- litter that is not picked up, and that either (a) accumulates over a long period of time – although, in due course, much of this might eventually be cleared – or (b) ends up being washed into water courses and ultimately to the sea; and
- litter that is correctly discarded in litter bins.

However, if we take 15,000 tonnes as an estimate of litter dropped and cleared each year in Scotland, the following tonnages can be calculated for specific littered items:

- Plastic bottles – 1,290 tonnes
- Packaging glass – 1,365 tonnes
- Metal cans – 600 tonnes

To understand what this means in terms of an item-specific littering rate we need to know what is placed on the market in Scotland annually. Eunomia's 2015 report for Zero Waste Scotland on the [key design features and feasibility of a potential Scottish Deposit Refund Scheme \(DRS\)](#), and the [appendix](#) to the report, provide such figures:

- Plastic bottles – 39,000 tonnes
- Glass bottles – 165,000 tonnes
- Metal cans – 14,100 tonnes

On this basis, the following item specific littering rates, i.e. proportion of all items purchased that are littered, can be calculated:

- Plastic bottles – 3.3%
- Glass bottles – 0.8%
- Metal cans – 4.3%

However, alternative figures were put forward by Valpak for the number of items placed on the market each year. These figures were lower, at:

- Plastic bottles – 36,000 tonnes
- Glass bottles – 127,000 tonnes
- Metal cans – 9,000 tonnes

This, of course, would imply higher littering rates of:

- Plastic bottles – 3.6%
- Glass bottles – 1.1%
- Metal cans – 6.7%

We can further refine our estimates if we note that plastic bottles of two different polymer types are placed on the market. [PET](#) bottles are widely used for water and fizzy drinks and water, while [HDPE](#) is more commonly used for milk and household products like shampoo. While the litter composition data does not distinguish by type of plastic, HDPE bottles are much less likely to be littered given that their contents are predominantly consumed at home.

Figures in the [appendix](#) to Eunomia's DRS report show that approximately 60% by weight of the plastic bottles placed on the market is PET. Using a lower figure of circa 21,500 tonnes (60% of 36,000 tonnes) of PET placed on the market, and assuming that almost all littered plastic bottles are PET, the implied littering rate for PET increases to 6%.

Of course, this is all based on a very conservative estimate of the amount littered each year in Scotland of just 15,000 tonnes. It's likely that the true figure is likely to be at least several thousand tonnes higher, meaning that the actual littering rates would be greater still.

While better data is needed to understand more completely where the actual littering rates lie, for me, the relative ordering for the different item types feels about right:

- Littering of glass, by weight, is relatively low, reflecting the propensity for fewer ‘on the go’ beverages to be served in large, heavy glass containers; rather such containers tend to be used for beverages consumed at home or in pubs or restaurants.
- Plastic bottles are widely used in ‘on the go’ consumption, but they can be refilled, and so may be kept for reuse; or failing that, they can be compressed, and securely closed with a screw cap to prevent any dregs spilling out. That makes them relatively convenient to put in a bag or pocket and take home or to the nearest litter bin.
- Cans, however, have no such potential for a second use, and cannot be resealed. Putting them in a bag to take home is thus a less attractive prospect, and the incentive to just be rid of them is probably greater than for plastic bottles, which fits with the higher apparent rate of littering.

So what does this mean in terms of the *number* of items littered – not placed in litter bins, but genuinely littered- and subsequently picked up. The [appendix](#) to Eunomia’s DRS feasibility report indicates that:

- 744 million PET bottles are placed on the market in Scotland each year. Applying a deliberately conservative assumption of just 3% being littered (less than I calculate above) this would be over 60,000 littered PET bottles per day, every day.
- 148 million ferrous cans and 526 million aluminium cans are placed on the market in Scotland each year. Applying a littering rate of 4% (again a conservative figure, lower than any calculated above) would mean over 70,000 cans littered in Scotland daily.
- 437 million glass bottles are placed on the market in Scotland each year. Applying an assumption that just 0.75% are littered (again lower than the rates calculated above), that would mean just under 9,000 glass bottles littered each day.

While each type of container may have its own specific characteristics that can affect the propensity for the item to be littered, evidence from overseas indicates that such behaviour can be changed dramatically with the introduction of a deposit refund scheme. The promise of a refund attached to the used beverage container brings about a significant shift in perception of the item from something with a negative, to a positive value. A [2005 peer review of a DRS study for Defra](#), which, in general terms, was not supportive of introducing a DRS, highlighted examples from the United States where reductions in beverage container litter in excess of 80% occurred once a DRS was implemented.

Assuming, in line with findings from the US, that a Scottish DRS reduces littering by 80%, then it would mean that 50,000 fewer PET bottles, 60,000 fewer drinks cans, and 7,000 fewer glass bottles would be littered each day.

Again, this is likely to be a conservative estimate, given that evidence reviewed in the course of [research](#) for Keep Britain Tidy indicates that a 90%+ reduction in littering of deposit-bearing containers might reasonably be expected.