Stemming the Tide

Using Circular Economy Principles to Tackle Terrestrial & Marine Litter

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A Global Problem
Global Flows of Plastic Packaging Materials 2013

98% VIRGIN FEEDSTOCK
2% CLOSED-LOOP RECYCLING¹
8% CASCADED RECYCLING²
4% PROCESS LOSSES
14% COLLECTED FOR RECYCLING
14% INCINERATION AND/OR ENERGY RECOVERY
40% LANDFILLED
32% LEAKAGE

78 MILLION TONNES (ANNUAL PRODUCTION)

¹ Closed-loop recycling: Recycling of plastics into the same or similar-quality applications
² Cascaded recycling: Recycling of plastics into other, lower-value applications
Source: Project Mainstream analysis - for details please refer to Appendix A.

Source: Ellen Macarthur Foundation
Impacts of Microplastics

- Ingestion by benthic invertebrates
  - Lugworms, mussels, oysters
  - Reduced feeding and weight loss in lugworms
  - Oysters produce fewer and less healthy offspring

- Ingestion by fish
  - Microplastics found in 37% of fish examined in the English Channel
The real garbage patch
Impacts of Microplastics

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Ingestion
Toxicological Impacts of Marine Plastics

- Plastics may contain chemicals with toxicological effects on fish, mammals and molluscs
  - Phthalates, brominated fire retardants, BPA
- Plastic debris can adsorb persistent organic pollutants (POPs)
  - Concentrations far above background levels
Impacts of Microplastics

- Ingestion by Zooplankton
A Local Problem
Direct Costs of Litter

• Costs to Municipalities
  • Clearance

• England-wide estimate
  • £1 billion for litter clearance per annum
    • Keep Britain Tidy

Photo by Si Griffiths, via Wikimedia Commons
Indirect Costs of Litter

• **Internalised**
  • **Already experienced through market transactions**
    • **E.g. Punctures**
Indirect Costs of Litter

- Externalities
  - Costs not ‘internalised’ in market transactions
    - E.g. the sense of ‘welfare loss’ associated with the visual disamenity of a park being strewn with litter
Internalised Costs

• Crime
  • Urban Disorder and vandalism can have a ‘signalling’ effect
    • Links between litter and crime
    • England – up to c. £350 million per year

• Mental Health & Wellbeing
  • Clear linkages between local environmental quality and wellbeing
    • England – costs of c. £500 million per year
Internalised Costs

- **Property Values**
  - Presence of litter can reduce property value by 2.7%
    - England – if only 1% of housing stock devalued by 2.7% this would be a loss of just under £1 billion

- **Other**
  - Road traffic accidents
  - Punctures
  - Vermin
External Costs – Neighbourhood Litter

- Factors Affecting Local Environmental Quality (Wardman et al., 2011)
  - Chewing gum, litter, graffiti, noise, dog fouling
- Highest ‘Willingness to Pay’ to move from ‘current situation’ to ‘best’
  - Litter - £150-£190 per adult per annum
- For England in total
  - Circa £5 billion per annum
Should we spend more on clean up?

• We could.....

• But:
  • Cost-effectiveness
  • Fairness
    • ‘Citizens’ vs ‘consumers’
Litter Prevention?

Image courtesy of Tim Smith (My Poor Brain)
Levy on Cigarettes

- To fund the cost of clean-up
  - Circa AUD 0.012 per cigarette
  - Incentivising producers to prioritise prevention
  - Behaviour change campaigns
Levy on Cigarettes

• ‘Polluter pays’ principle
  • An argument that placing a ‘clean-up’ levy unfairly penalises those that dispose of their cigarette butts responsibly
• But:
  • Only one-fifth of UK adult population now smoke, so 80% of those who fund the clean up can’t possibly be responsible
Charge on Single-use Takeaway Cups

- Waste prevention and litter prevention
- Cups not generally recyclable
- High volume item
  - Indirect littering
- A charge could also be applied to:
  - Disposable cutlery
  - Single-use carrier bags
Deposit-return Schemes

- Small financial incentive not to litter
  - Effective – >80% reduction in beverage container litter
    - Syrek - reported in a peer review on deposits for Defra (2005)
Beverage Containers - Cans

‘Every Can Counts’ Research on UK Consumption of Cans

- the UK public drink an average of 6.5 cans a week each, rising to 9.3 in the warmer months
- nearly 80% of the country’s population purchase at least one canned drink a week
- 24-44 year olds the ‘most voracious consumers of cans’

Effects of DRS on Marine Litter

- CSIRO’s 2011 Marine Debris Survey
Phasing Out Plastic Straws & Stirrers

• Not essential
• Alternatives are available
  • Paper
  • Metal
Full EPR for Packaging Waste

• Those placing packaging on the market to bear full end-of-life cost
  • Including preventing and managing litter

Photo by Si Griffiths, via Wikimedia Commons
Network of Public Drinking Water Fountains