



Diploma in Packaging Technology

Part One - Impact of Packaging on the Environment

By Bill Dolan FCIWM CENV



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Bill Dolan Bio



Experienced Chartered Environmental and Wastes Resource Manager

Multidisciplinary background gained over many years in the profession

Experience of – Mineral extraction, waste disposal, collection, processing, recycling and waste to energy. Specialities are- Circularity, Climate Change, Environment, Noise, Recycling Markets, Resource, Renewable, Producer Responsibility, Plastic, Sustainability and Water Management.

Worked with seven different organisations/companies in the public/private sectors.

Is an active member of the CIWRM as elected Councillor and as a mentor to help new members as they begin their careers. Former Republic Ireland CIWRM Centre Chairman and a Centre Councillor.

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Student Introduction

- ▶ Students
- ▶ Companies
- ▶ Course Objectives
 1. Environmental Impact
 2. Policy & Legislation
- ▶ Your Expectations? - Learnings – what do you wish to go away with this morning?

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Learning Aims – be able to:

1. Understand & Discuss the factors influencing packaging impact on the environment
2. Explain how packaging and packaging waste environmental impacts can be evaluated
3. Compare methods of handling packaging waste
4. Explain and evaluate the impact of the European Directive of Packaging and Packaging Waste (PPWD) on:
 - Packaging manufacturers
 - Packer / Fillers, and
 - Sellers of packaged goods

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PART 1 – IMPACTS OF PACKAGING & PACKAGING WASTE

- 1) Packaging Environmental Impact
- 2) Developing Environment Friendly Packaging
- 3) Determining its Environmental Impact (LCA)
- 4) Consideration of Product and Packaging Waste
- 5) Packaging in Municipal Waste Streams
- 6) Packaging Waste Management
- 7) Environmental Effects, Cost and Potential Issues

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PART 2 – POLICY & LEGISLATION

1. Policy
2. Legislation
3. Producer Responsibility Organisation
4. Waste Management Industry
5. Future Challenges
6. UK Producer Responsibility

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1) PACKAGING ENVIRONMENTAL IMPACT IN CONTEXT

- Key Points

- ▶ Packaging prevents much further waste by protecting goods in the supply chain
- ▶ About 3% is disposed of to landfill
- ▶ Single dwelling households produce more packaging waste than multi dwellings or families
- ▶ C. 70% of packaging is used to protect food
- ▶ Most households use 100 different packaged items each day
- ▶ Single portion packs are now common and reduce the need to buy fresh food daily

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Packaging Misinformation (1)

- ▶ Recycling is placing waste material in proper bin
Its not recycled until made into a new product
- ▶ Recycling is economical
 - ▶ *For some waste packaging materials – yes, for others no. Carbon saving factors in supply chain unknown. How much a tonne of carbon worth?*
- ▶ All waste packaging is recyclable
 - ▶ *In theory yes, In practice no.*
- ▶ Packaging is a major contributor to landfill waste
 - ▶ *Not presently - c 5% in total*
- ▶ We Should Recycle Everything
 - ▶ *Yes, in theory, but not so in practice.*

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Packaging Misinformation (2)

- ▶ • **“Incineration (Recovery) is environmentally unsound.”**

Incineration is a safe way to dispose of waste and recover some of its energy content. Modern EfW plants are far cleaner than fossil fuel power stations – by law!

- ▶ **“Biodegradable packaging is better for landfill.”**

The waste materials best suited for landfilling are inert and stable. Degradable materials produce methane - a greenhouse gas that has 33 times more negative environmental impact than carbon dioxide.

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2) DEVELOPING ENVIRONMENTALLY RESPONSIBLE PACKAGING

- ▶ An environmentally responsible pack is one that gets the product from production to consumption with minimum use of materials and energy, generating the least amount of waste

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Product Waste



Product waste
must be
considered

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Packaging Waste



Packaging
waste
must be
considered

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Environmentally Responsible Packaging

- Prevents product wastage
- Optimises packaging materials
- Optimises energy use
- Is resource efficient throughout the distribution chain

Achieved by:

- Designing primary, secondary and tertiary packaging as an integrated unit
- Designing to minimise transport on the road
- Designing for recycling when it yields a net gain in resources
- Thinking about litter and how it can be avoided?

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Sustainable Packaging



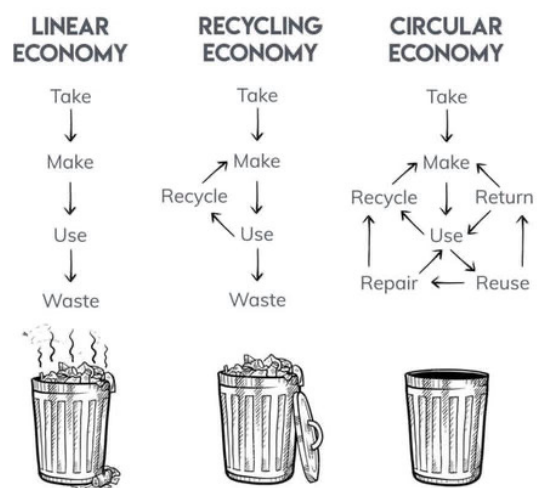
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Supply Chain



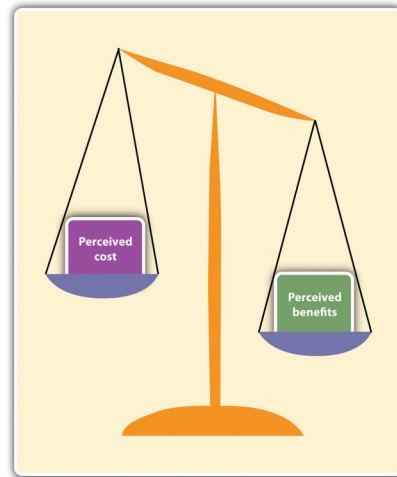
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The battle of the three economy's



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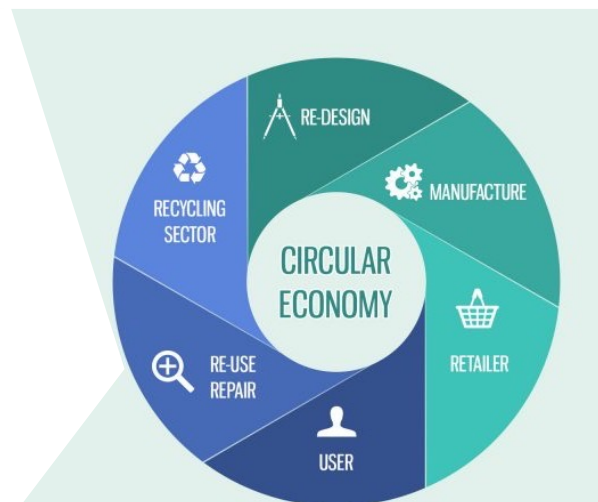
Conflicting Interests



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Extended Producer Responsibility?

- “Environmental policy approach in which a producer’s responsibility for a product is extended to the post-consumer stage of a products life cycle” - OECD.



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3) DETERMINING ITS ENVIRONMENTAL IMPACT

Life Cycle Analysis (LCA) is a technique that qualifies the environmental burdens of a total pack during its lifetime in terms of its consumption of:

- ❖ Raw Materials
- ❖ Energy
- ❖ Air Impact
- ❖ Water Impact
- ❖ Waste Impact

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Life Cycle Assessment - Introduction



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LCA Notes

- ▶ Interprets a Life Cycle Analysis by examining the results against environmental concerns such as:
 - Global Warming
 - Carbon Footprint
 - Material Resource Depletion
 - Circularity – Lifetimes, Reuse & Recyclability
 - Pollution – End of Life Impact from Cradle to Cradle ideally

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LCA Scores Can Differ

- ▶ Results of a Life Cycle Assessment can be interpreted differently, depending on what is considered important.
- ▶ There is seldom one material that 'scores' consistently better than another

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4 CONSIDERATION OF PRODUCT AND PACK WASTE

- ▶ Packaging can only be assessed with reference to its contents, e.g.:
 - 190 gm glass bottle is:

- Excessive for 330 ml fruit juice
- Appropriate for 330 ml beer
- Inadequate for 330 ml sparkling wine

The packaging specification is to be “fit for purpose” as to the content its functions of: -

Protection, Containment, Information, Branding and Marketing, Convenience, Environmental Considerations, Legal and Regulatory Requirements, Ease of Display

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Product

- Product protection to prevent waste and damage throughout the process of distribution
- Minimise the transport footprint e.g. distance travelled and cube utilization.
- End of life cycle for example re-use, recycle, recovery.
- Use of recycle in the packaging and sustainable resource management.
- Resource efficiency within manufacturing and raw materials
- Free of noxious substances

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Pack Wastage

- ▶ • Consider product wastage:
 - A 2-litre milk container has less environmental impact than 4 half-litre containers
 - but product wastage has a much greater impact

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5) PACKAGING IN MUNICIPAL WASTE STREAMS

- Municipal Waste includes these following waste types:
 - ❑ Residual (i.e. black bin) waste e.g. waste that cannot be recycled
 - ❑ Recyclable (i.e. green bin) waste e.g. glass, plastic, paper & board, metals
 - ❑ Organic (i.e. brown bin) waste e.g. food and garden waste
 - ❑ Bulky waste e.g. waste that cannot fit in a wheelie bin such as broken furniture, carpets, toys etc.
 - ❑ Waste Electrical and Electronic Equipment (WEEE)

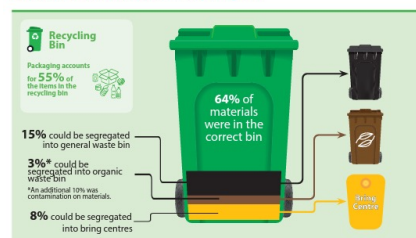
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What's In the Household Recycling Bin?

What is in Ireland's Recycling Bin?



What should not be in the Recycling Bin



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What's In the Commercial Recycling Bin?



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6 Packaging Waste Management

Waste hierarchy



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Prevention

- ▶ Prevent Waste
 - ▶ • Cradle to cradle
 - ▶ • Start of Pipe solutions rather than end of pipe
 - ▶ • Sustainable waste management
 - ▶ • If it can't be reused, recycled, or remanufactured it should not be made

First 'line of attack'

- Reduce raw materials and energy
- Reduction at source best
- Reduce specification by materials and machine development
- Reduce wastage during packaging operations
- Functions of Packaging

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Reuse

- ▶ • Reuse is defined as:
 - ▶ – Any operation by which packaging which has been conceived and designed to accomplish within its life cycle, a minimum number of trips or rotations, is refilled or used for the same purpose for which it was conceived.
 - ▶ – e.g. a refillable milk bottle

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Recycling

- ▶ • Recycling is defined as:
 - ▶ – The reprocessing in a production process of waste materials for the original purpose or for other purposes.
 - – e.g. virgin paper sacks repulped into other papers for use in corrugated cardboard.
 - – e.g. PET bottles reprocessed into polyester yarn for clothing.

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Energy Recovery

- ▶ Energy Recovery defined as:
 - ▶ – The use of combustible packaging waste as a means to generate energy through direct incineration, with or without other waste, but with recovery of the heat which is used for other purposes

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Disposal

- ▶ • Landfill involves:
 - burying solid waste, often in large areas where industrial activity such as mining, or quarrying for road and building materials has ceased.
 - Properly managed landfill sites can be landscaped without contaminating ground water by leachates from the waste material

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Packaging Waste Challenge



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7) ENVIRONMENTAL EFFECTS COSTS AND POTENTIAL ISSUES

Factors affecting environmental decisions - Extraction, manufacture, use and end of life of packaging materials has effects on :-

- ☐ resources
- ☐ energy
- ☐ emissions
- ☐ waste
- ☐ carbon footprint
- ☐ cost

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Packaging Wish List

- ▶ Packaging should be:
 - ☐ Economically affordable
 - ☐ Environmentally acceptable
 - ☐ Socially acceptable
- ▶ Which of these have the most influence on packaging decisions?

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Ideal Management

- ▶ • Cradle to Grave
- Cradle to Cradle
- Renewable Material
- Renewable Energy
- Recycled
- Recovered (including energy recovery)

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Trade Off

- ▶ Offset against the benefits gained: -
 - reduced product damage – reduced food wastage
 - 2/3 of packaging used to protect food
 - Developing countries: 30-50% food wasted
Developed countries: 2-3% food wasted
- (IRL estimated 40% of food waste (excludes fisheries) lost (1.1 million tonnes farm to plate !!))
- = reduced costs

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Impacts

- Depletion of the Earth's resources
- Energy consumption during extraction/production of materials
- Air/water/land pollution during extraction/production of materials
- Transportation issues i.e. fossil fuels/emissions
- Role of packaging in reducing product wastage
- Disposal of used packaging
- Energy/pollution/transport issues associated with reuse, recycling and recovery

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Discussion



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