

AD in Optimised Strategies for Biowaste Collection and Treatment

The Future of Anaerobic Digestion of Organic Waste in Europe

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Presented by:
 Dr Dominic Hogg



Overview

- Rationale for Approach
- Methodological Issues
- Private Costs of Collection and Treatment
- Environmental Costs and Benefits of Collection and Treatment



Rationale for Approach

- Landfill Directive
 - How best to manage household biowastes
- Food Waste as Proportion of Total Waste
 - The largest fraction
- Backdrop of Growing Numbers Providing Free Garden Waste
 - Authorities experiencing increases in collected waste
- How to Optimise Collection and Treatment
 - A role for Anaerobic Digestion?

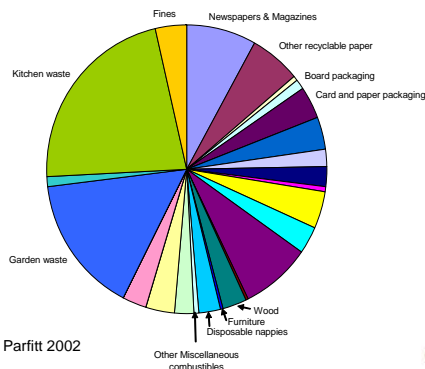


Rationale for Approach

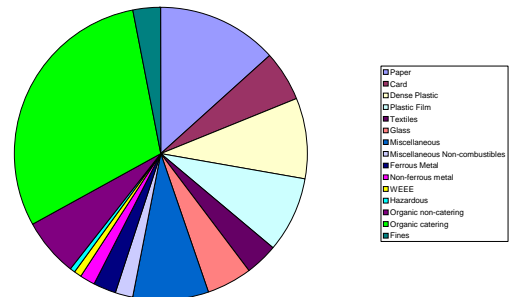
1. Landfill Directive
 - How best to manage household biowastes
2. Food Waste as Proportion of Total Waste
 - The largest fraction
3. Backdrop of Growing Numbers Providing Free Garden Waste
 - Authorities experiencing increases in collected waste
4. How to Optimise Collection and Treatment
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Composition of 'Bin Waste' (UK, 2002)



Composition of Unrecycled 'Bin Waste' (English County Recycling / Composting 40% of Waste)



Garden Waste

1. UK Context

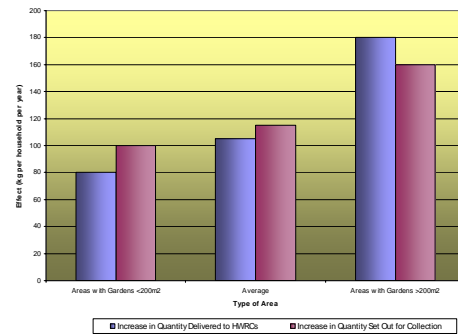
- Can apply a charge for garden waste collections, but not for refuse collection
- Most offer garden waste collections without charge

2. Free Garden Waste Collections

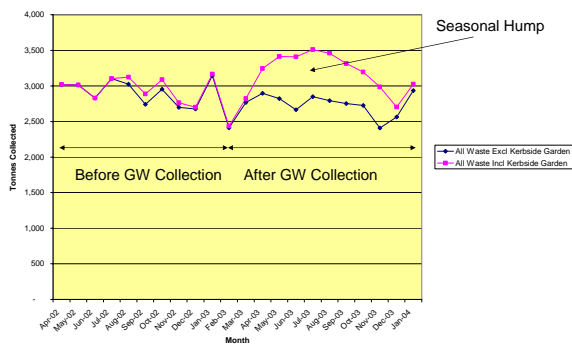
- Affect home composting
- Lead to 'latent' uncollected garden waste being collected...
- And waste growth



Effect of Stopping Home Composting



Growth in Waste



AD in an Optimal Scenario?

1. Most Studies Suggest Environmental Benefits from AD Over Aerobic Composting
2. Most UK Assessments Stated 'AD too expensive'
3. UK Context Post-Animal By-products Regulation
 - Composting of garden waste allowed in open-air
 - Composting of food waste must be in-vessel
4. Hypotheses: If We Keep Garden Waste and Kitchen Waste Collection Separate
 - Treatment costs can be kept down
 - If collection costs are not excessive, AD can be incorporated in a cost effective manner



Key Methodological Issues

1. Quantity of Waste Collected from Households is Affected by the Collection Service
 - Focus NOT on a tonne of waste, but on the household
2. Cost Modelling Takes Account of:
 - Costs of doorstep collection service;
 - Changes in cost of operating containerparks (reduced tonnages where garden waste is collected free)
 - Costs of treatment of collected biowaste and residual
3. Biological Treatment Systems Lead to Emissions Over Extended Period of Time
 - Model emissions as they occur over time and:
 1. Apply unit damage costs; and
 2. Apply discounting to future emissions (declining over time)



Key Methodological Issues

4. Greenhouse Gases
 - All emissions accounted for
 - Biogenic emissions accounted for (no mistakes)
5. Source of Energy Avoided
 - Average UK Generation
 - Note - now, Defra says CCGT



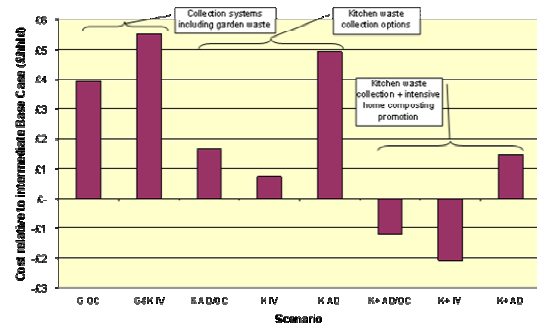
Scenarios Modelled

	Dry recycling	Biowaste	Refuse	Biowaste Treatment
Base case BC	Fortnightly 240l bin, capture norm, 5% reject	None	Weekly 240l	
garden only G OC	Fortnightly 240l bin, capture high, 5% reject	Fortnightly (alternating) 240l	Fortnightly (alternating) 240l	open air windrow (with HWRC-collected garden waste) (OC)
all biowaste G+K IV	Fortnightly 240l bin, capture high, 5% reject	Fortnightly garden and kitchen (alternating) 240l for those with gardens, kerbside bucket for those without.	Fortnightly (alternating) 240l	all doorstep collected to in vessel composting (IV), HWRC collected garden waste to OC.
kitchen only K AD/OC	Fortnightly 240l bin, capture high, 5% reject	Weekly, kitchen caddy & kerbside bucket	Fortnightly (alternating) 240l	food waste to anaerobic digestion (AD), HWRC garden waste to OC
>200 kitchen only (IVC) K IV	Fortnightly 240l bin, capture high, 5% reject	Weekly, kitchen caddy & kerbside bucket	Fortnightly (alternating) 240l	all (incl HWRC-collected garden waste) to IV
>200 kitchen only (AD) K AD	Fortnightly 240l bin, capture high, 5% reject	Weekly, kitchen caddy & kerbside bucket	Fortnightly (alternating) 240l	all (incl HWRC collected garden waste) to AD
>200 kitchen plus K+ AD/OC	Fortnightly 240l bin, capture high, 5% reject	Weekly, kitchen caddy & kerbside bucket. Intensive home composting promotion.	Fortnightly (alternating) 240l	food to AD HWRC garden to OC
>200 kitchen plus (IV) K+ IV	Fortnightly 240l bin, capture high, 5% reject	Weekly, kitchen caddy & kerbside bucket. Intensive home composting promotion.	Fortnightly (alternating) 240l	all (incl HWRC-collected garden waste) to in vessel composting (IV)
>200 kitchen plus (AD) K+ AD	Fortnightly 240l bin, capture high, 5% reject	Weekly, kitchen caddy & kerbside bucket. Intensive home composting promotion.	Fortnightly (alternating) 240l	all (incl HWRC collected garden waste) to AD

Notes: OC = open air windrow; AD = anaerobic digestion; IVC = in-vessel composting, HWRC = household waste recycling centre (containerpark)



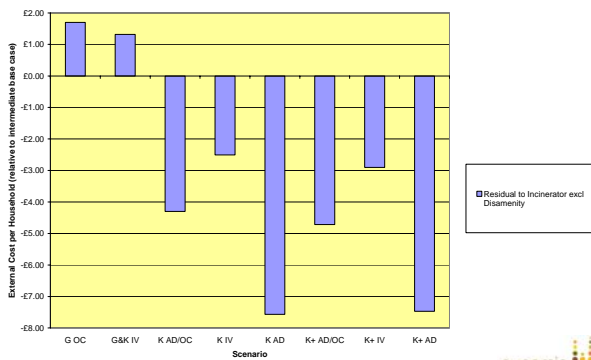
Results – Private Costs (£/hhld)



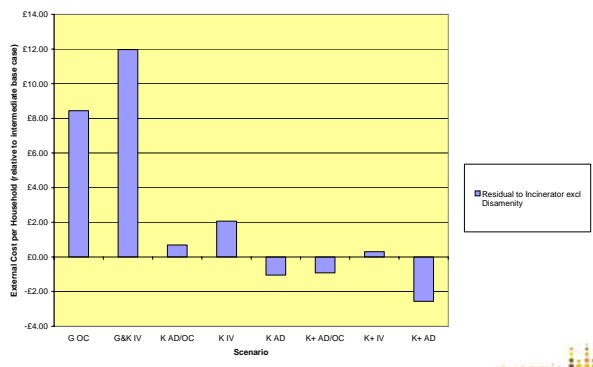
Notes: OAW = open air windrow; AD = anaerobic digestion; IVC = in-vessel composting, HWRC = household waste recycling centre (containerpark)
 Residual Waste = £75 per tonne



Results – Environmental Costs and Benefits (high unit damage costs) (£/hhld w.r.t. base case)



Results – Net Social Costs (£ per hhld)



Conclusions

- It IS Possible to Integrate AD into Management Systems in a Cost-effective Manner
- This is Most Likely Where Kitchen Waste is Targeted for Separate Collection
- Collecting Kitchen Waste with Garden Waste Reduces Effectiveness of Capital Spend
- Net Benefits May be Greatest Where All Material is Digested But Subject to Cost Constraints
- The Net Benefits of Separate Collection Using AD Increase as Residual Waste Treatment / Disposal Costs Increase



Further Information

- Launched alongside Waste Strategy for England 2007
 - *Managing Biowastes from Households in the UK: Applying Life-cycle Thinking in the Framework of Cost-benefit Analysis (WRAP)*
http://www.wrap.org.uk/downloads/Biowaste_CB_A_Final_Report_May_2007.567d597c.pdf
 - *Dealing with Food Waste in the UK (WRAP)*
http://www.wrap.org.uk/downloads/Dealing_with_Food_Waste_-_Final_-_2_March_07.6bd22b7e.pdf

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