

The use of LCA within the Environment Agency

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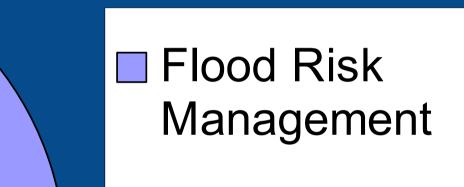


Outline

- What does the Agency do & how does Science fit?
- Questions asked of us in Science
- Examples of LCA use
 - Pressures and challenges of using LCA
 - Importance of Stakeholder Engagement
 - Messages that we give with results



What does the Agency do?



Regulation

Champions of the Environment



hat questions do we answer in Science?

- External Policy Makers
 - How is this policy going to affect the environment?
 - What is the better environmental option?
 - Is the EU position environmentally sound?
 - A pressure group is claiming this. Is it true?
- Internal Policy Makers (HO Policy)
 - Can you provide evidence to support this policy?
 - What will be the effect of this regulation?
 - How should we advise Government?



Examples of LCA in the Agency

- Solvent recovery
- Tyres
- Home composting
- Effects of ELV targets (collaboration with Defra)
- Nappies
- Carrier bags
- WISARD / WRATE



Nappies

- Product LCA
- Disposable and reusable nappies
- Why?
 - Classic LCA
 - Looking at total environmental impacts
 - Disposable nappies seen as major part of municipal waste stream
 - Previous studies carried out before ISO 14040
 - Previous studies could be considered biased



Stakeholder Engagement

- Advisory Board
- Reflecting many angles
 - AHPMA/Proctor and Gamble
 - Women's Environmental Network/Real Nappy Assn
 - DEFRA
 - Local Authority



Fair comparison

- 2.5 years average use per child
- Disposable nappies similar composition
- Reusables diverse range







Behavioural factors

- Number of changes per day
- Age of potty training
- Use on more than one child
- Washing temperature
- Tumble drying
- Ironing



Will there be a definitive answer?

- Unlikely due to complexity of issue
- BUT
 - Classic LCA carried out thoroughly
 - Advisory board
 - Highlight where impacts occur
 - Allow informed decision making
 - Steer improvements
- Results will be published shortly



Carrier Bags

- Very similar issues to nappies
 - Emotive
 - Political
 - Diverse product range
 - Visible litter
 - Makes for a good news story
 - Behavioural issues will affect results
 - Similar stakeholder engagement
- Similar methods used
- Unlikely to report results before end of year





e and Resources Assessment Tool for the Environ lified life cycle software for waste management









Why LCA for waste?

- Considers the whole system, across life cycle
- Minimises environmental burden-shifting
- Impacts of waste operations are balanced against benefit of any materials/energy replaced
- Shows that all waste management options have costs and benefits
- Provides science-based information for developing consensus



How does LCA help improve waste systems or technologies?

- Mitigate climate change and other impacts
- Future proof against rising energy and materials costs
 - manage activities better by eliminate inefficiencies/carbon hotspots in system
 - innovative carbon and resource-efficient waste technologies likely to lead the market

Resource-efficient waste systems likely to be the most economically viable over long contracts



What is WRATE?

- Waste and Resources Assessment Tool for the Environment
 - LCA-based decision support tool for waste management
 - For municipal waste (and similar wastes)
 - Designed for waste managers and LCA practitioners (standard and expert versions)
 - 150 waste processes
 - Calculates carbon footprint <u>and</u> provides check on other environmental issues

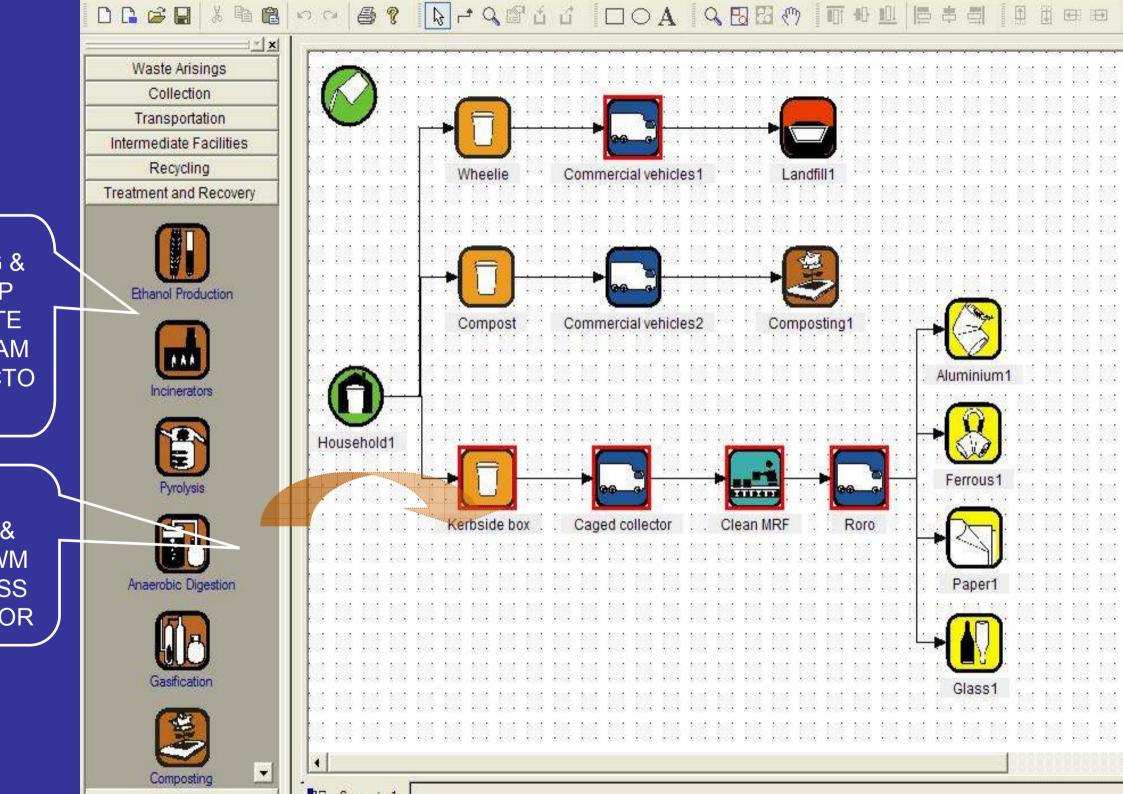


Why WRATE?

- Waste strategy 2007: WRATE recommended life cycle tool for
 - informing decisions on waste infrastructure options and;
 - estimating global warming emissions of local waste strategies
- Tool for toolbox for SEA/SA
 - DEFRA practice guidance for Municipal Waste Strategies
 - ODPM companion guide for

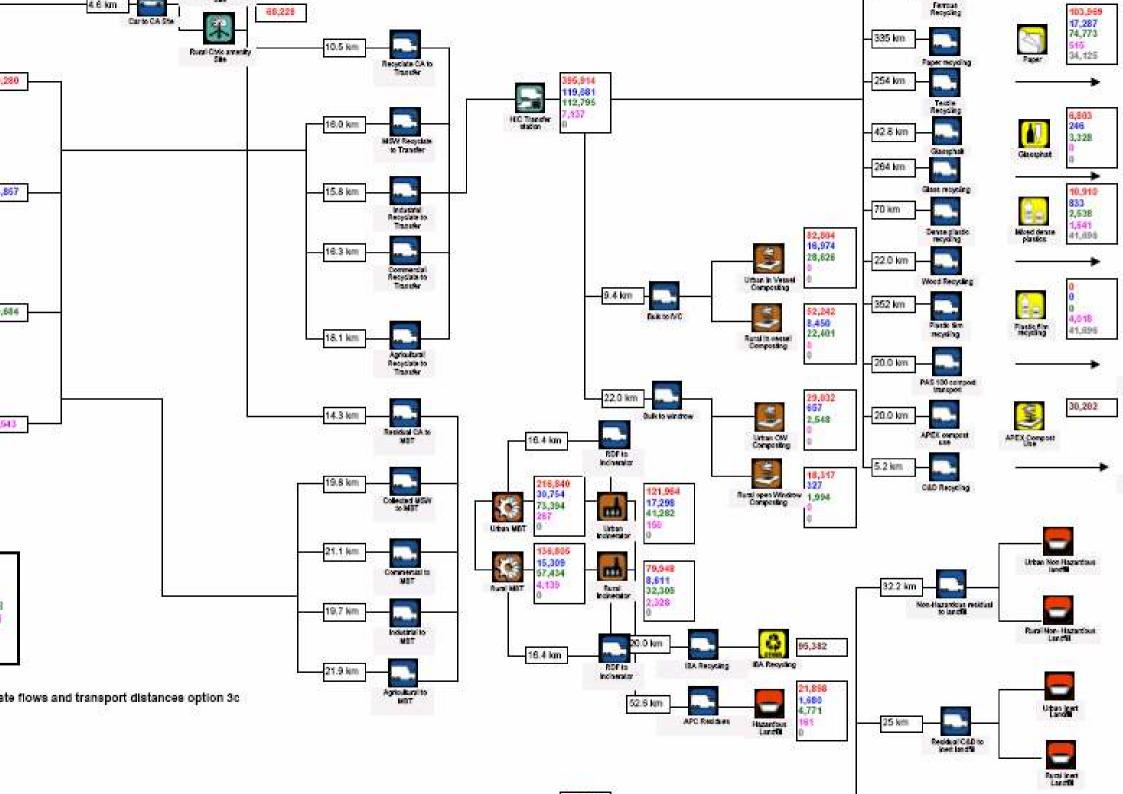
Waste Strategy for England 2007





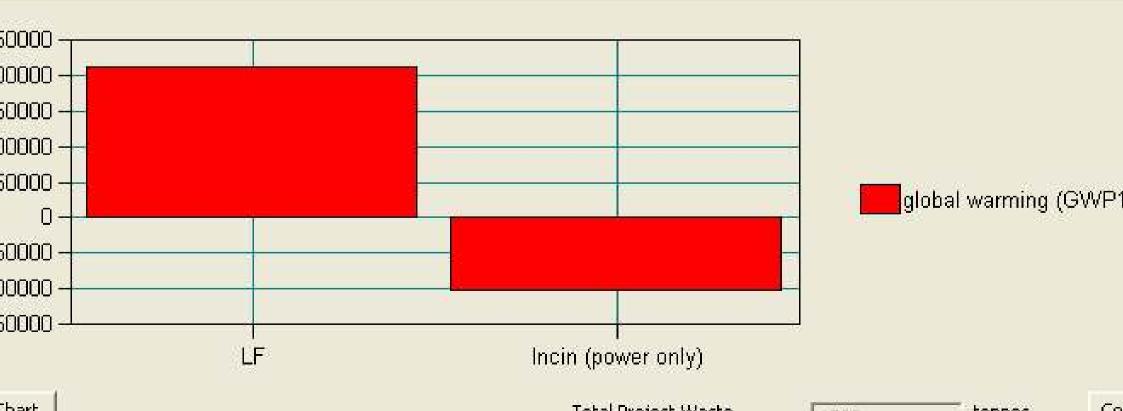
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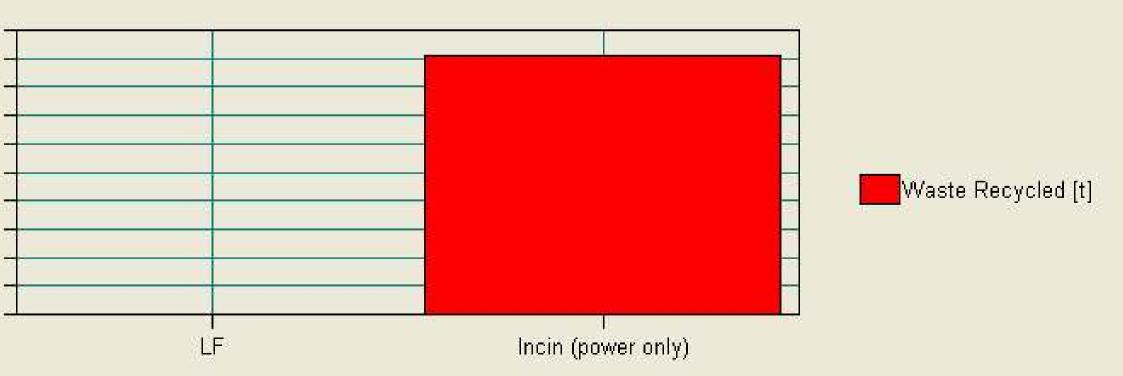


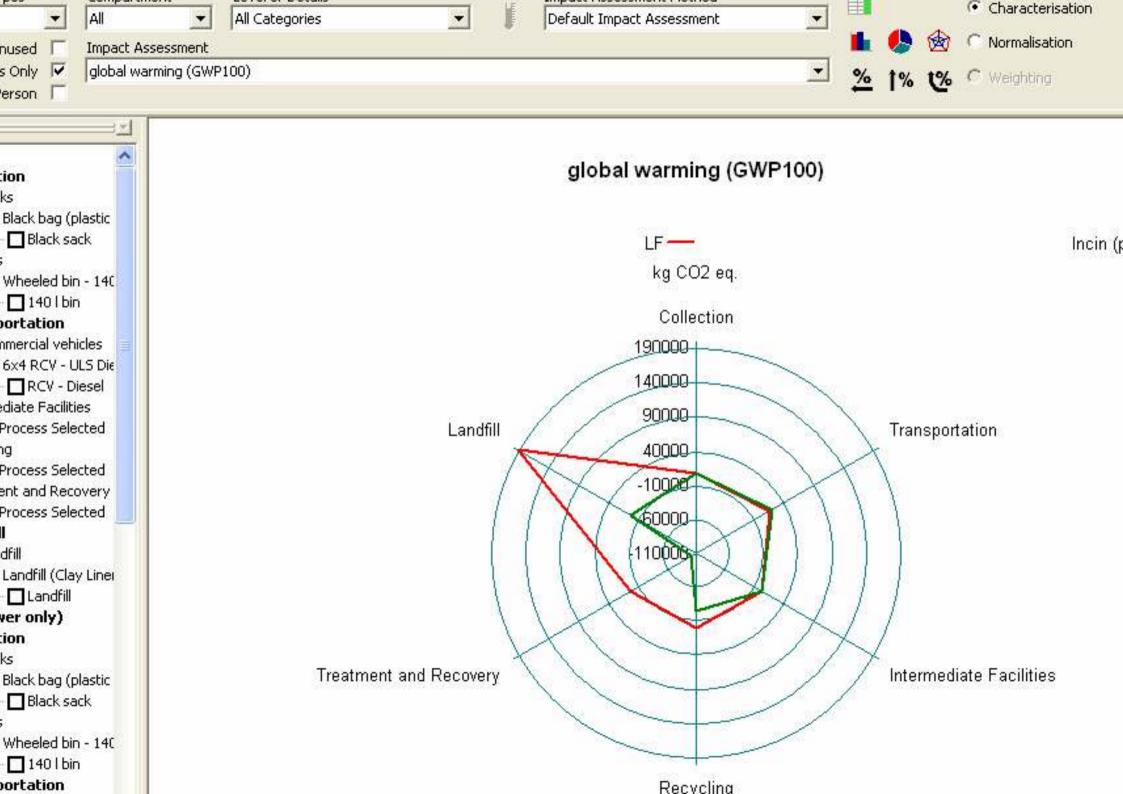


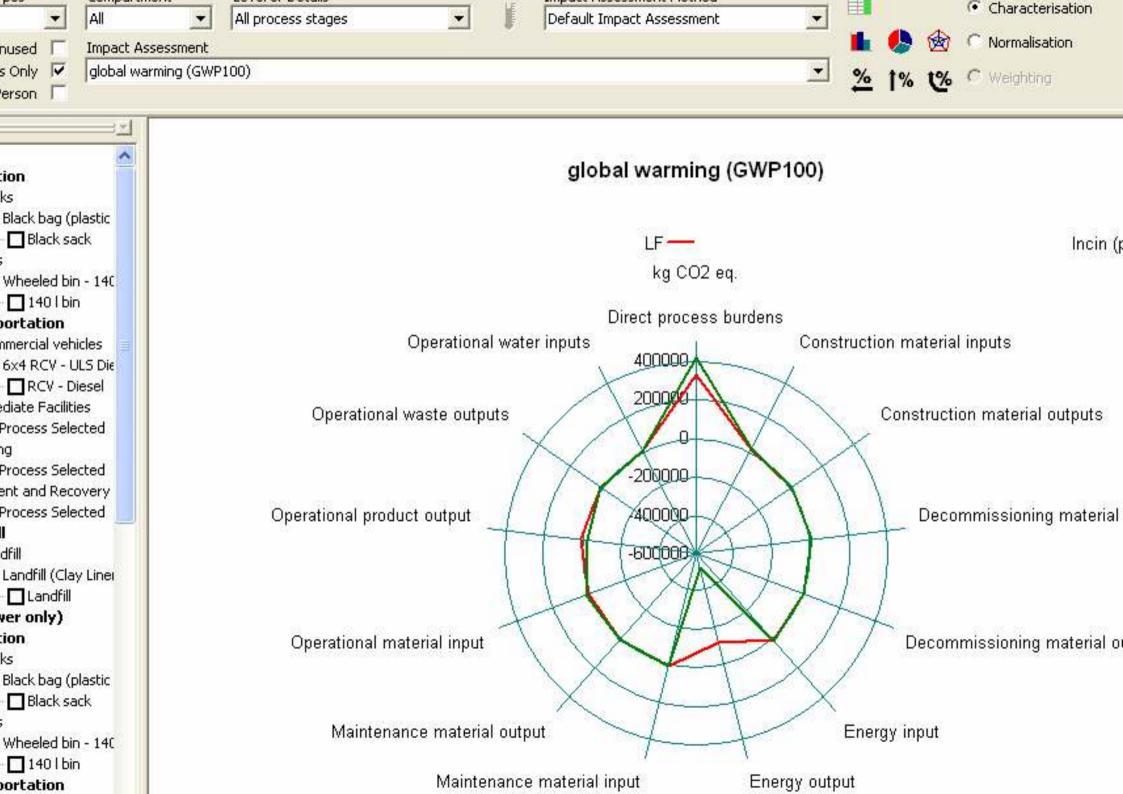
Impact Assessments	Show Graph	Unit	LF	Incin (power only)
resource depletion		kg antimony eq.	-709	-3977
ater aquatic ecotoxicity (FAETP inf.)		kg 1,4-dichlorobenzene eq.	1326	-15807
tion (AP)		kg SO2 eq.	104	-182
cation (EP1992)		kg PO4 eq.	321	45.5
varming (GVVP100)		kg CO2 eq.	211995	-102400
oxicity (HTP inf.)		kg 1,4-dichlorobenzene eq.	3757	-34432



ect Headline Indicators	Show Graph	LF	Incin (power only)
adeable Waste Landfilled [t]		729	0
Recovered [MJ]		547180	2284689
ke (ha)		0.004	0.000999
andfilled [t]		1000	38.9
lecovered [t]			1000
Recycled [t]			18:2







	Construction	Maintenance	Decommissioning	
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ocation	Energy		Materials	Close

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oval of contaminants. This comprises a reactor/cyclone system where lime slurry is sprayed in to remove acid gases and carbon is injected to remo ioxins. A bag filter plant to remove particulates, lime & carbon follows this. These are removed from the filters by mechanical conveyors to a silo & the disposal off-site. The cleaned flue gases finally vent via a 70m high stack. A separate stack serves each incinerator line. There are also several th the boiler plant. The incineration off-gases are continuously monitored for hydrogen chloride, sulphur dioxide, carbon monoxide, oxides of nitrogen, vo particulates, oxygen & water. Spot samples of incinerators off-gases are monitored for dioxins, hydrofluoric acid, carbon dioxide & metals.

ation of the steam from the turbine exhaust is achieved using cooling water abstracted from the River Tees. The steam condensate is returned to the poiler, feedwater, make-up & treatment system. Liquid effluent from the boiler feedwater treatment plant is discharged to the public sewer in Havertor s from the buildings & areas of hardstanding around the site, together with the liquid effluent from the boiler feedwater treatment plant, pass via an oil wate plic sewer. Any other process water arising is collected in a storage tank & recycled.

Schematic [ISO 1.1.6.3]



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alance	3									
										Flue gas
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k a Browness		Units			-					Mass of CO2
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Activated carbon										Carbon content us
	Quantity	Units								
Mass	42.29									Total organic carb
Stated carbon content	98	for fail to be a feature of the second								
Carbon content used	98	%			Balance					
		97.9 (96)					Units			Bottom ash
Total organic carbon	41.44	tpy			Total input	64355.21				
30		9487X - 24			Total output	62797.5	tpy			Mass
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olatile organic o	loader	Air		25.31	Estimated	Non-meth	nane volatile organic i	c =([USER_V	ASTE_F	RACTIONS	S_TOTAL]/	5000 litres of o
, fossil	loader	Air		13236.45	Estimated	Carbon d	lioxide (CO2) / air / k <u>o</u>	; =([USER_V	ASTE_F	RACTIONS	S_TOTAL]/	[
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	Process	Air		3.6	Measured	Arsenic .	/air/kg	=([USER_T	OTAL.AF	RSENIC_A	S]/[TYPICA	Taken from sin
	Process	Air		2.9	Measured	Chromiun	n /air /kg	=([USER_T	OTAL.CH	ROMIUM_	CR]/[TYPIC	Taken from sin
	Process	Air		3.6	Measured	Cobalt / a	air/kg	=([USER_V	ASTE_F	RACTIONS	S_TOTAL]/	[Taken from sin
	Process	Air		4.2	Measured	Copper /	air/kg	=([USER_T	OTAL.CO	OPPER_CU]/[TYPICAL	. Taken from sin
n)	Process	Air		70.6	Measured	Mangane	se /air/kg	=([USER_T	OTAL.M/	ANGANES	E_MN]/(TYI	^o Taken from sin
	Process	Air		3.6	Measured	Vanadiur	n /air /kg	=([USER_W	ASTE_F	RACTIONS	S_TOTAL]/	[Taken from sin
	Process	Air		3.2	Measured	Tin / air /	kg	=([USER_W	ASTE_F	RACTIONS	S_TOTALJ	[Taken from sin
	Process	Air		2.9	Measured	Lead / aii	/kg		1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -		승규가 이상하는 것을 다 가슴을	Taken from sin
- Biogenic	Process	Air		36641168	Measured	Carbon d	lioxide, biogenic / air .	/ =([USER_T	OTAL.CA	ARBON BI		Taken from 25
, fossil	Burner Star				Estimated		lioxide (CO2) / air / ko	The second s		2012년 2017년 1월 17일 18일	2	
(502)	looder	Air					vida (air (ka	1000 (1000 (1000 (1000))	: 200 - 200			5000 litree of a



Key sensitive data for new processes

- Considerable intra-technology variation
- Data required
 - Waste feedstock composition
 - Main operational inputs electricity, fuel used, water, materials etc.
 - Materials recovered and final destination
 - Process wastes and destination
 - Emissions to air (e.g. CO2, SOx, NOx, metals)
 - Emissions to water (NO3, PO4, metals)



Where has WRATE been used?

- Assessing current & proposed municipal waste management schemes
- Benchmarking waste technologies
- In outline business case for PFI procurement
- Government policy development



Distribution of software

Annual licence

Academic licence is available for teaching purposes

- Continually updating the software
 - New processes
 - Improved functionality
 - Background databases as they become available

Contact details



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