

# DEALING WITH DIFFICULT DEMOLITION WASTES

A guide

Katherine Adams, Gilli Hobbs and Christopher Yapp



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BRE Trust and BRE publications are available from [www.brebookshop.com](http://www.brebookshop.com)

or  
IHS BRE Press  
Willoughby Road  
Bracknell RG12 8FB  
Tel: 01344 328038  
Fax: 01344 328005  
Email: [brepress@ihs.com](mailto:brepress@ihs.com)

Requests to copy any part of this publication should be made to the publisher:

IHS BRE Press  
Garston, Watford WD25 9XX  
Tel: 01923 664761  
Email: [brepress@ihs.com](mailto:brepress@ihs.com)

Printed on paper sourced from responsibly managed forests

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Photographs for front cover and section title pages, courtesy of Peter White, BRE.

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## ACKNOWLEDGEMENTS

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We would like to thank everyone in the resource efficiency team at BRE who worked on this project, and other colleagues at BRE who also assisted. We would particularly like to thank Howard Button from the National Federation of Demolition Contractors (NFDC) for his help, guidance and contribution, along with many other members of the NFDC who provided their expert advice and opinion.

Finally, we would like to thank the BRE Trust for funding the project and enabling us to create new knowledge in the crucial area of maintaining and improving levels of reuse, recycling and recovery of products and materials generated through demolition.

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# GLOSSARY

ABE	approved battery exporter	ICFA	Insulating Concrete Formwork Association
ABTO	approved batteries treatment operator	ICSD	ionisation chamber smoke detector
BATMOD	model that allows flexible assessment of financial and environmental costs of collection and recycling scenarios for batteries	kBq	kilobecquerel
BBMA	British Battery Manufacturers Association	LCA	life cycle assessment
BIS	Department for Business, Innovation and Skills	$\mu\text{Ci}$	microcurie
BRE	Building Research Establishment	MDF	medium-density fibreboard
BRUFMA	British Rigid Urethane Foam Manufacturers Association	$\mu\text{g}$	microgram
C&D	construction and demolition	MMC	modern methods of construction
CDG	Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009	$\mu\text{Sv}$	microsievert
CDM	Construction (Design and Management) Regulations	NFDC	National Federation of Demolition Contractors
CFA	Contract Flooring Association	NRPB	National Radiological Protection Board
CFC	chlorofluorocarbon	ODS	ozone-depleting substances
CLG	Department for Communities and Local Government	OSB	oriented strand board
CO <sub>2</sub> e	carbon dioxide equivalent	PCM	phase-change material
CRUK	Carpet Recycling UK	PIF	permanently insulated formwork
Defra	Department for Environment, Food and Rural Affairs	PIR	polyisocyanurate rigid foam
DTI	Department of Trade and Industry	PU	polyurethane
EA	Environment Agency	PUR	polyurethane rigid foam
ECHA	European Chemical Agency	PV	photovoltaic
EFW	energy from waste	RA	recycled aggregate
EPIC	Engineered Panels in Construction	RCA	recycled concrete aggregate
EPS	expanded polystyrene	REACH	Registration, Evaluation, Authorisation and restriction of Chemicals
EWC	European Waste Code	SEDA	Scottish Ecological Design Association
FRP	fibre-reinforced polymers	SIP	structural insulated panels
GRP	glass-reinforced plastic	SLI	starting, lighting and ignition
GWh	gigawatt-hour	SVHC	substances of very high concern
HCFC	hydrochlorofluorocarbon	SWMP	site waste management plan
HDF	high-density fibreboard	UKSIPS	UK Structural Insulated Panel Association
HSE	Health and Safety Executive	VIP	vacuum insulation panels
ICF	insulating concrete formwork	WEEE	waste electrical and electronic equipment
		WID	Waste Incineration Directive
		WRAP	Waste & Resources Action Programme
		WTN	waste transfer note
		WTS	waste transfer station
		XPS	extruded polystyrene foam



# 1 INTRODUCTION

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Waste from construction, demolition and excavation represents the largest waste stream in the UK, at an estimated 77.4 million tonnes in 2010<sup>[1]</sup>. Of this, at least 17 million tonnes is inert waste from demolition<sup>[2]</sup>, such as concrete, bricks and soils. Virtually all of this material is currently reused or recycled, either on the same site in the follow-on construction, or shipped off site for reuse and recycling elsewhere. Similarly, other demolition waste types, such as solid timber, tend to be reused or recycled. All of this leads to high diversion from landfill rates for demolition waste, typically over 90%. However, there is growing concern in the demolition sector that it may not be possible to improve, or maintain, these high recycling rates into the future, owing to the increasing prevalence of difficult demolition waste.

Difficult wastes (ie wastes that are difficult to recover) are becoming more widespread during major refurbishment and demolition of buildings in the UK. Each year the National Federation of Demolition Contractors (NFDC)\* carries out a survey of its members, and the amount of waste going to landfill has increased in recent years, as a result of the changing composition of demolition waste.

Current products in use that have reached the end of their life and may be classed as difficult wastes can include batteries, solvents, insulation products containing ozone-depleting substances, waste electrical and electronic equipment (WEEE), smoke alarms, certain flooring products, and asphalt-based roofing products; others may also be apparent in the waste stream. They are termed 'difficult' as they may be problematic to recover, which could be due to their material composition, techniques of demolition/strip-out, contamination, or their low value, and as a result they are likely to end up in landfill. Some may also have relatively high environmental impact, because of their hazardous qualities, high embodied energy or global warming potential, and so an inability to recover these products at the end of their life increases their overall effect on the environment.

Products that may be considered difficult wastes in the future may emerge from modern methods of construction (MMC). The use of traditional brick-and-block construction is still predominant in the UK, but housebuilders are under increasing pressure to ensure that they make significant progress in achieving the target set by the government for zero-carbon homes by 2016 and to meet future housing demand. This objective for housebuilders would suggest an increase in the number of homes being built using MMC in the future. There is little knowledge in the housebuilding sector regarding the future recyclability of the materials incorporated in buildings using MMC. It is predicted that when these houses reach the end of their life, which is defined as 60 years using whole-life costing accounting, it is likely that some of these materials will not be easy to recycle. Other future difficult wastes may result from systems used in intelligent buildings, and from the development of innovative products within the construction sector.

This report details the findings of a research project funded by the BRE Trust, entitled *Difficult demolition wastes – now and in the future*. This project was undertaken by the resource efficiency team at BRE with assistance from the NFDC.

The overall aim of this project was to provide cost-effective and practical recovery guidance for difficult demolition wastes. This included the following:

- Provide an understanding of difficult wastes entering the demolition and refurbishment waste stream, both now and potentially in the future, in terms of type, amount, issues and current recovery routes.
- Prioritise difficult wastes for further action by using agreed criteria considering:
  - environmental impact
  - amount being landfilled
  - cost
  - usage
  - recovery routes.

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\* More information on the National Federation of Demolition Contractors (NFDC) can be found at:  
<http://www.demolition-nfdc.com/>

- Trial improved reuse, recycling or recovery of the prioritised difficult waste. This was through practical trials, and also through interviews with demolition contractors to determine what would be technically and economically feasible.
- Each trial to look at key issues: identification of potential difficult wastes before refurbishment/demolition commences; disassembly, demolition and segregation techniques and the practicalities involved with this, and various recovery routes/end markets and associated technologies.

- Develop recommendations for the practical and cost-effective recovery of a number of defined difficult wastes.

This report summarises the legislative drivers that may influence demolition and waste, the prioritisation exercise undertaken to identify a group of key waste types to look at in more detail, trials to consider the opportunities to improve the reuse, recycling and recovery of these waste types, key principles of design for deconstruction, and recommendations on where future research and improvements could be focused.



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## DEALING WITH DIFFICULT DEMOLITION WASTES: A GUIDE

This report gives practical guidance for improving the recovery of certain types of waste arising from demolition that are difficult to reuse, recycle or recover, such as carpet underlay, insulated concrete formwork, industrial batteries, structural insulated panels (SIPs) and smoke alarms. The Appendices include short summaries of recycling and recovery issues for a wider range of potentially difficult waste types.

The guidance will be useful to the demolition sector, designers in the respective product supply chains who are facilitating reuse at end of life, waste and recycling policy makers and their advisors, construction clients and contractors who have targets to divert increasing amounts of waste from landfill.

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IHS BRE Press, Willoughby Road  
Bracknell, Berkshire RG12 8FB  
[www.brebookshop.com](http://www.brebookshop.com)  
**FB54**

ISBN 978-1-84806-273-3



9 781848 062733