



Material change for  
a better environment



## Assessing the costs and benefits of reducing waste in construction trade packages

### Board insulation trade package (~80mm rigid urethane or extruded polystyrene board)



	Value	Percentage of £100k spend
<b>Cost saving potential</b>	<b>£10,618</b>	<b>10.62%</b>
<b>Additional costs to achieve these savings</b>	<b>£1,060</b>	<b>1.06%</b>
<b>TOTAL POTENTIAL COST SAVING</b>	<b>£9,558</b>	<b>9.56%</b>

#### Introduction

Reducing, reusing and recycling waste can help to reduce costs on construction projects. By asking for good practice from an early stage in the design and planning process, clients and contractors can secure these savings and demonstrate corporate responsibility. Such action lies at the heart of corporate commitments in support of the sector target for halving waste to landfill.

This case study identifies, at design stage, the costs and benefits achievable through waste reduction and recovery in a board insulation trade package (based on 70-80mm rigid urethane or extruded polystyrene). The analysis quantifies savings starting at RIBA stages C/D i.e. once the overall design has been selected. Therefore it does not include further savings from more fundamental design changes at an earlier stage.

This case study is based on a trade package consisting of either rigid urethane board or extruded polystyrene board (70-80mm). Results are presented on a per £100k spend basis.

#### Design potential

Significant savings can be made by targeting good practice wastage rates for the components offering the biggest savings in the value of materials wasted.

*per £100k spend	Value of materials wasted*	Cost of waste disposal*	Total cost of waste*	Total cost of waste as % of construction value
Baseline practice	£10,050	£6,310	£16,360	16.36%
Good practice (all components)	£3,350	£2,392	£5,742	5.74%
<b>Improvement over baseline</b>	<b>£6,700</b>	<b>£3,918</b>	<b>£10,618</b>	<b>10.62%</b>

In the first instance, these cost savings will be gained by whoever buys the materials – often the trade contractor. Clients and principal contractors can secure a share through the procurement process. For



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example, they should work with the trade contractor to ensure the design, logistics strategy and approach to site waste management will be delivered in a way that enables the trade contractor to set a lower target wastage rate / wastage allowance in materials purchasing, and reduce their estimate of costs accordingly in their tender price for the trade package. By coordinating waste reduction actions at different levels of the supply chain (designer, principal contractor and trade contractor), the potential savings can be maximised – creating a win-win opportunity.

In addition to financial benefits, actions to be more resource-efficient also deliver the following changes in environmental performance:

*per £100k spend	Total waste arisings (t)*	Waste sent to landfill (t)*	Recovery rate	Carbon (t) <sup>1</sup> *	Recycled content
Baseline	6	3	50%	6	1.0%
Good practice	4	2	60%	2	4.0%
<b>Improvement over baseline</b>	<b>2 (33%)</b>	<b>1 (33%)</b>	<b>10%</b>	<b>4 (67%)</b>	<b>3.0%</b>

### Understanding the costs and benefits

WRAP's Net Waste Tool has been used to quantify the extent of the cost savings possible. Waste reduction and recovery actions needed to deliver these targeted savings were then identified, and their implementation costs estimated. Costs and benefits are shown in the Tables below.

<b>Achieving cost reductions (BENEFITS)</b> *per £100k spend	<b>Baseline*</b>	<b>Good practice*</b>	<b>Improvement*</b>
<b>Value of materials wasted</b> Construction materials are a valuable resource, yet it is common to see high levels of waste through damage on site, off-cuts, over-ordering of materials and the need for rework. Reducing this waste saves money. Where a trade contractor supplies materials and labour for a lump sum fee, they are likely to retain savings from waste reduction unless the client or contractor takes specific actions through the procurement process.	<b>£10,050</b>	<b>£3,350</b>	<b>£6,700</b> <i>(6.7% of package value)</i>
<b>Cost of waste disposal</b> Every skip or container of waste carries a cost. Whilst segregated metals are often removed at little or even zero charge, the majority of wastes carry substantial costs – and these are set to rise with the annual increase in Landfill Tax. However, waste disposal costs aren't fixed. Substantial savings are achievable simply by reducing the quantity of waste generated. In addition, the segregation of wastes and finding destinations other than landfill can help further.	<b>£6,310</b>	<b>£2,392</b>	<b>£3,918</b> <i>(3.92% of package value)</i> <i>(saved through reduced waste arisings)</i>
	<b>Combined savings</b>		<b>£10,618</b>

These savings will only be achieved by taking specific management actions to change behaviour during design and site practice.

<sup>1</sup> Embodied carbon of wasted materials plus carbon impact of disposal route



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## The benefits

### A. Reduction in value of materials wasted (per £100k spend)

Potential saving: £6,700

For this simple trade package, reducing wastage of the insulation board provides the greatest cost reduction potential. The values below show the potential saving if wastage rates are improved from a Baseline to a Good practice<sup>2</sup> level.

*per £100k spend	Baseline wastage rate (%)	Good practice wastage rate (%)	Potential saving*
<b>70–80mm rigid urethane or extruded polystyrene board</b>	<b>15</b>	<b>5</b>	<b>£6,700</b>

### B. Reduction in cost of waste disposal (per £100k spend)

Potential saving: £3,918

A reduction in waste cuts the cost of waste disposal by £3,918 as fewer skips are required. Opportunities to segregate are limited as most of the wasted materials in this trade package belong in the 'mixed waste' category, unless manufacturer take-back can be arranged.

## The opportunities

There are several potential actions to reduce waste that could be considered (listed below). Some actions relate to the trade package as a whole, while others are specific to the installation of board insulation. Actions need to be taken by the design team and principal contractor as well as the trade contractor if waste reduction and cost savings are to be maximised.

#### Potential actions to reduce wastage

Standardise specifications for this material

Use standardised or pre-cut lengths

Specify reusable or reduced packaging

Store off-cuts for reuse

Provide dedicated storage areas with protection from weather and accidental damage

Establish an approach to quality control to avoid wastage and rework

Establish a dedicated cutting station for board materials

Provide operatives with training on material management, handling and waste reduction

Negotiate a 'take back' arrangement with the supplier

Minimise the stock held on site through supplier call-off arrangements

## The costs

To realise the potential saving in the value of materials wasted, it would be essential to consider which actions would be viable and which would have a significant impact on wastage. The cost of achieving good practice wastage will depend upon the actions pursued. Most actions require a combination of effort and cost; however some actions may only require effort and forward-thinking (e.g. storing off-cuts for reuse). The Table below quantifies costs to the trade contractor on the basis of time inputs (e.g. training).

<sup>2</sup> These wastage rates are based upon primary research carried out by Arup (on behalf of WRAP) with main contractors and sub contractors. Data were gathered on the likely level of waste at Baseline practice (the waste one would expect in normal working conditions) and at Good practice (the reduced level of waste if additional measures are put in place to prevent damage and install efficiently).



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Investing to save (COSTS) <sup>3</sup>	Costs
<b>Quality control</b> – Time spent developing an approach to quality control	<b>£400</b>
<b>Site training</b> – Time to provide training, and site operatives’ time to receive training (5nr ½hr briefings for 10 operatives per session)	<b>£660</b>
<b>Combined costs</b>	<b>£1,060</b>

Whoever purchases the materials will likely have responsibility for the management of these materials, including waste prevention. Trade contractors would therefore incur the cost of site waste training and developing an approach to quality control. It is assumed the principal contractor would be responsible for the site waste management plan, the logistics strategy, the provision of shelter for materials, the cost of waste disposal, and the cost of waste segregation.

### Conclusion

The potential reduction in the total cost of waste (materials and disposal) is £10,618 (per £100k spend), which more than justifies the cost of waste prevention (£1,060 per £100k spend). These savings would benefit the trade contractor alone, unless the trade contractor reduces their estimate of costs accordingly in their tender price for the trade package, passing (some or all of) the savings up the supply chain. To ensure that maximum benefit from good waste practices is realised (and shared), it is important for the client/design team, the contractor and the trade contractor to work together to ensure that *the potential for waste reduction is built into wastage allowances for materials purchasing at the tender stage, and that they each take the appropriate actions to reduce waste.* Therefore:

- clients need to instruct designers to look for waste reduction opportunities, plus set threshold waste reduction and recovery targets;
- designers need to look for opportunities to design out waste (such as simplification of the specification);
- contractors need to develop a quality SWMP and a materials logistics plan;
- trade contractors need to ensure that materials are not over ordered, and that the materials brought to site are used as efficiently as possible; and
- the waste management contractor must ensure that all wastes received are recycled wherever possible.

### Methodology

*This cost benefit analysis has been conducted using data taken from WRAP’s Net Waste Tool. The Tool is freely accessible on the web at [www.wrap.org.uk/nwtool](http://www.wrap.org.uk/nwtool), and helps project teams to forecast the waste that would be expected on different projects. The Tool works by setting up basic cost plan information to which baseline and good practice industry wastage rates are applied. The analysis identifies which components and specifications offer the greatest opportunities for waste reduction, and proposes a least cost segregation strategy. The Tool forecasts the overall quantities and costs of waste at baseline, good and user-targeted levels of performance, including the value of wasted materials and the cost of waste disposal.*

<sup>3</sup> These costs are based upon estimated durations, and have been reviewed with selected contractors. Costs that would be covered by the overall project overhead (e.g. Site Waste Management Plan) are not included in this case study.