

CASE STUDY: Construction Waste Minimisation in Housing

SECTOR : Waste

COUNTRY: UK

BACKGROUND

The construction industry has a major impact on the environment, both in terms of the resources it consumes and the waste it produces. The construction industry is responsible for producing a whole variety of different wastes, the amount and type of which depends on factors such as the stage of construction, type of construction work and practices on site.

Over 90% of non-energy minerals extracted in Great Britain are used to supply the construction industry with materials. Yet every year more than 70 million tones of construction and demolition waste has been produced in England and Wales^{1 2 3}.

INDICATORS

The aim of this study is to promote awareness in the small and medium house construction companies regarding environmental issues, best practice and use of recycled and reclaimed materials. A key concern was to promote on-site awareness and initiatives to minimise waste, and to this end various training tools and checklists of actions were developed. The project particular emphasised following factors of building project:

- Site management
- Design issues
- Contractual matters
- Partnerships between building project teams

Waste minimisation means reducing the amount and environmental impact of waste generated, which can be achieved by reducing the quantity of materials used (and therefore potential for wastage) or by reusing existing materials. In addition energy and water use reduction was included in our targets. Ideally, prevention of waste is the target, but once it has been created recycling is the method of managing the waste. Prevention of the waste means the effective use of natural resources; energy needed to manufacture new materials as well as reducing pollution.



Figure 1 Crushing rubble for reuse



Figure 2 Segregation of waste on site after introducing waste minimisations techniques



Figure 3 Reclaimed paving bricks for reuse

EVALUATION

This study concentrated on how construction and demolition waste can be minimized on site. It also identifies the behavior of waste production on various stages of the construction of housing.

This investigation is conducted by studying more than 10 house construction sites involving timber and traditional building construction. Study also investigates the waste streams during the various stages of construction. However, there are three aim of this study:

- Developing waste minimization initiatives: Site practices could minimize waste and improve the use of waste materials
- Developing best practice: a structured approach could be developed through minimize waste and improving short and long terms environmental impact.
- Waste arising data collection: It was also assumed that identification of waste streams and volume of waste on different stages would determine the

factors, which influence the waste production.

Waste minimisations and best practice

- 8 out of 10 construction companies implemented or incorporated many of proposed activities to minimise waste. However segregation of waste, material handling and improved storage methods was the most common initiatives were adopted by companies.
- It was observed there was quite a prominent reluctance towards sending materials for recycling and reclaiming as because there is lack of market flow for recycled material.
- Study shows that there is no prominent relationship between company policies or certification to waste minimisation on site. This is because many SMEs feel where as waste minimisation on site can provide immediate financial savings that having overall company policies gives them no real visible benefits.

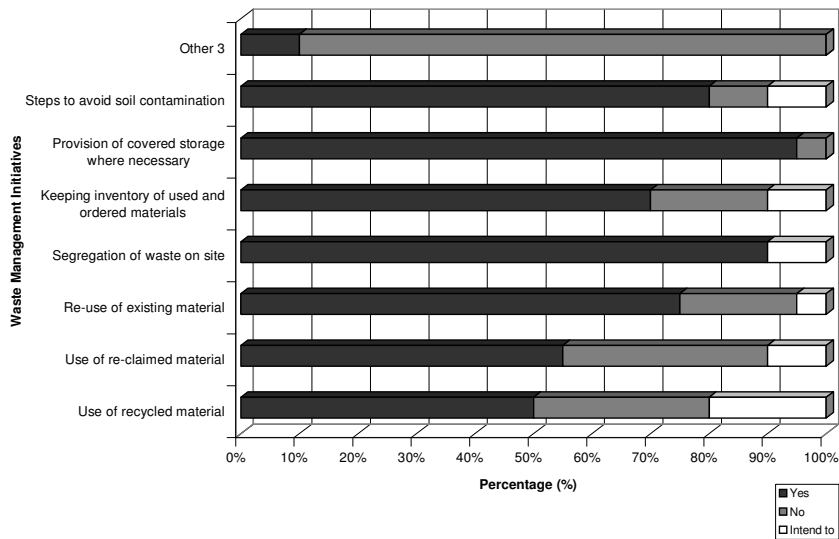


Figure 4 Waste minimisation initiatives adopted by various house builders

Waste arising

- Waste streams vary greatly between different construction phases. However, in many cases overlapping of the construction phases was observed which effect the type of the waste arise on the specific stage of the project.
- It was observed that at roofing stage waste stream is being produced is packaging and card board waste- it should be noted that it is norm to working on fittings while work on going on the roofing to speed up the

construction. However most packaging waste been produced by packaging of the roofing tiles etc. Second highest waste stream at roofing stage was insulation material. Rubble was most prominent waste stream at plastering, painting stages and finishing stages.

- During waste arising data collection survey it was observed the during the most of waste arises on the structure and fitting stages of construction.

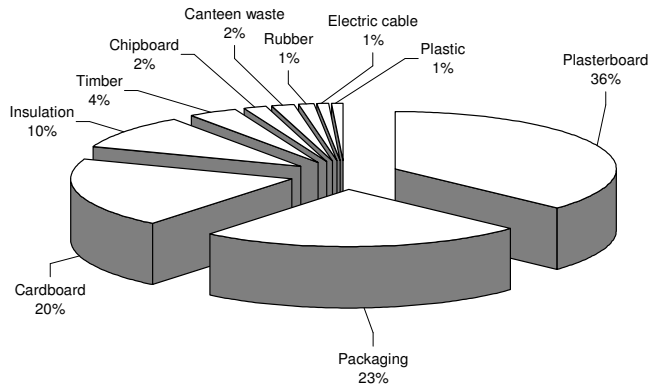


Figure 5 Waste streams at various stages of house construction

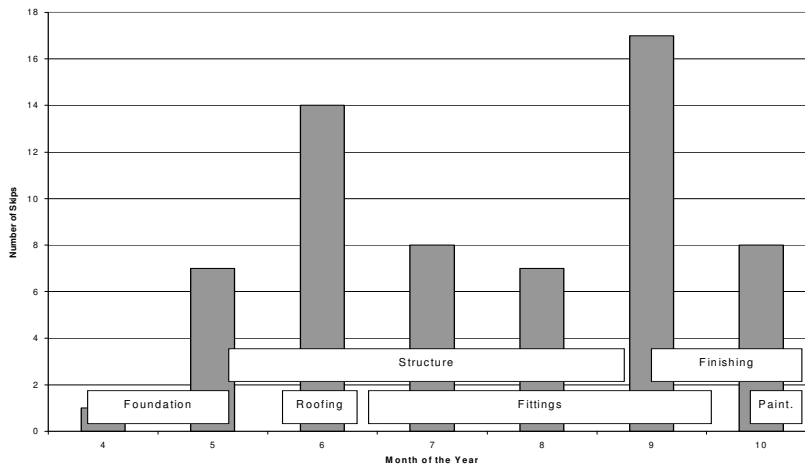


Figure 6 Number of skips used per month throughout the construction

BENCHMARK DATA

There are no agreed bench mark data available. However on going study at Centre for Research at the built Environment is looking at the bench marking for waste minimisation.

DRIVERS

Waste strategy 2000 aims to encourage greater efficiency in resources used based on the principles of the waste hierarchy, which promotes sustainable waste management and the market for secondary materials. The landfill tax, introduced in 1996, is influencing waste

management practices by encouraging greater diversion of waste from landfill. Increases in the rate of tax were announced in 1999. There are environmental impacts associated with aggregate extraction. The Government has introduced Aggregates Levy to reflect environmental costs of aggregates quarrying and encourage demand for a supply of alternative materials. Climate changes responses a major global environmental challenge. A climate Change levy on business use of energy is also been introduced in 2001. This would particular influence on manufactures of materials for use in construction.

LESSONS LEARNT

The results of the study show that waste can be minimising comparatively easily if waste minimisation is considered as part of the contract. On-site segregation of waste and reusing of material were the most commonly adopted methods to minimise waste. Results also show that there is a *poor* relationship between environmental certification and actual waste minimisation activities in SMEs companies. Furthermore, minimising waste is considered as an ad hoc activity not part of the core activity of the construction. During implementation of the project it was found that personnel are not utilised efficiently with regard to minimise waste on site.

Two main stages of building project were identified as needing review to encourage waste minimisation:

- Contract and contractual agreement stages: Client, contractor and architect play important roles in reducing waste through incorporating waste minimisation activities by means of briefing and use of specifically-oriented contract tender clauses.
- Construction stage: a structured methodology has been produced which

can be incorporated at the construction stages to minimise waste.

Results show that particular waste streams vary greatly between different construction phases and according to construction method used. However, the main causes of waste were identified as follows:

- Damage by mishandling, weather and inadequate storage
- Vandalism and rework
- Lack of recycling facilities within the studied region.
- Over ordering

The following factors were identified as influencing waste minimisation activities:

- Role of the site manager/contractor
- Lack of partnership along the supply chain
- Casual attitude to jobs undertaken by some sub-contractor.
- Poor information flows between all parties to the contact
- Lack of Market for recycling and reused materials
- Lack of interest of recycling by skip hire companies due to various reasons.
- Design and form of the building

APPLICATIONS

The applications of developed approach of waste minimisation strategies and techniques for housing are being incorporated and tested for other types of Government building projects.

TRANSFERABILITY

The international environmental standards e.g. ISO 14001 or EMAS requires companies to investigate and effectively manage their waste to minimise its impact on the environment. This project demonstrates a transferable method, which can be, incorporated as an integral

part of ISO 14001 or other international standards. However, the local conditions of business /sector also be considered during adopting the best practice methods.

IMPACT ON SUSTAINABILITY AREAS

Economics: The potential large savings can be made by incorporating best practice in waste management. Project provided B2B links and support to regional business in terms of supplier and contractors.

Social: Potential to create skilled employment, Improved knowledge-based business providing job safeguarding through cost savings and staff training related to waste management.

Environmental: Effective use of natural resources and reduce waste to landfill.

Institutional: This project provides the groundwork for development a broad based cross-disciplinary researches projects.

PROJECT CONTACT

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