House deconstruction

Information booklet

NSW GOVERNMENT
Environment, Climate Change & Water

House deconstruction means taking a building apart and recovering materials for re-use and recycling[2]. Deconstruction provides many opportunities to re-use or recycle construction materials and save money and our environment.

Introduction

In New South Wales, approximately 28 per cent[1] (or 2,035,500 tonnes) of the materials disposed to landfill is construction and demolition waste. Much of this waste can be avoided by on-site reuse, re-sale or reprocessing of materials.

Government and industry are committed to reducing the amount of waste entering our landfills. Steadily increasing waste disposal costs and more environmentally-aware consumers provide strong incentives for re-using and recycling construction and demolition waste.

These fact sheets have been developed to provide you with a general overview of the benefits and viability of house deconstruction. They contain case studies, a breakdown of the stages of deconstruction, time and cost comparisons and where to source additional information.

Deconstruction or demolition?

The choice between planning for a full deconstruction, selective deconstruction or full demolition involves consideration of the following factors:

- time and cost
- site security and available space
- occupational health and safety
- company reputation
- environmental benefits.

Each fact sheet is designed to help you to work through these considerations.

Deconstruction benefits

The benefits of deconstruction include:

- income from the sale of salvaged materials
- reduced disposal and transport costs
- business marketing opportunities to environmentally-aware customers
- lower cost of building materials for the community
- the reduced consumption of new resources
- conserving landfill space and extending the life of landfills.

House deconstruction case studies

The fact sheets in this package are based on case studies on the deconstruction of four different building types. While deconstruction occurred in 2001, the fact sheets reflect 2010 prices and costs.

The case studies are designed to review and compare the benefits and costs of the different methodologies that can be employed to demolish or 'deconstruct' a building. Table 1 provides details on the approaches addressed in this information booklet.

1 *NSW Waste Avoidance and Resource Recovery Strategy 2007*, Department of Environment and Climate Change NSW (note that figures are from the 2006-07 financial year)

2 *A Guide to Deconstruction* (2003), University of Florida Centre for Construction and Environment

Table 1: Different methods of house deconstruction

Demolition	Selective deconstruction	Complete deconstruction
No re-use or recycling	Only recovering materials for reuse or recycling when removal is economically viable	A structure is systematically and carefully dismantled to maximise the amount of material recovered for re-use or recycling

The case studies were of four building types:

1. asbestos fibro houses
2. a weatherboard house
3. a brick veneer house
4. a full brick house.

The fact sheets focus on different aspects of the deconstruction process, which are outlined in Table 2.

Table 2: List of fact sheets with key stages of deconstruction

Deconstruction stage	Description and main materials recovered
1. Stripping out	Fixtures and fittings such as doors, windows, cabinets, air conditioners, heaters, pipes, light fittings, sinks, basins, etc are dismantled and removed
2. Roof surface removal	Terracotta tiles, concrete tiles, sheet steel roofing are removed
3. Plasterboard removal	Plasterboard is removed
4. Roof beams and timber removal	Lumber, timber and floorboards are removed
5. Removal of bricks and concrete	Bricks dismantled and concrete removed

Typical composition of houses

Table 3 provides details on the typical composition of the different house types. This information is useful when planning the tools, equipment and space you will need to manage the house deconstruction.

Table 3: Typical composition of each house type (tonnes)

Material	House type			
	Asbestos fibro (t)	Weatherboard (t)	Brick veneer (t)	Full brick (t)
Asbestos sheeting	1.8	-	-	-
Fittings	1	1	1.5	1.5
Roof tiles	5	5	12	8
Plasterboard	2	2	2.5	1
Timber	5.3	7.2	9.6	6.9
Concrete, bricks, footings	20	50	120	180
Total	**35**	**65**	**146**	**197**

What materials are suitable for re-use or recycling?

Most materials used in house construction are suitable for re-use or recycling. Table 4 provides details on the products that have the maximum potential for re-use or recycling.

Table 4: Higher value materials typically recovered in house deconstruction

Material	Comments
Bricks and concrete	Almost all bricks and concrete – the heaviest building materials – can be recycled, making significant savings on landfill fees.
Terracotta tiles	Depending on their condition terracotta tiles can be either sold for re-use or collected for free for recycling. Like bricks and concrete, landfill fees for disposal of heavy tiles can be easily avoided.
Wood products (lumber, timber and floorboards)	Up to 75% of wood products can be re-used or recycled.
Good quality fixtures and fittings	Easily accessible items of value can be resold.

When the case studies were performed, metal recovery was minimal. Currently the market for scrap steel is significant and the use of metals in both the frames of houses and as a roof surface means there is potential to recover and sell metal products to market as part of a deconstruction project. All steel products are able to be either reused or recycled.

Time comparisons

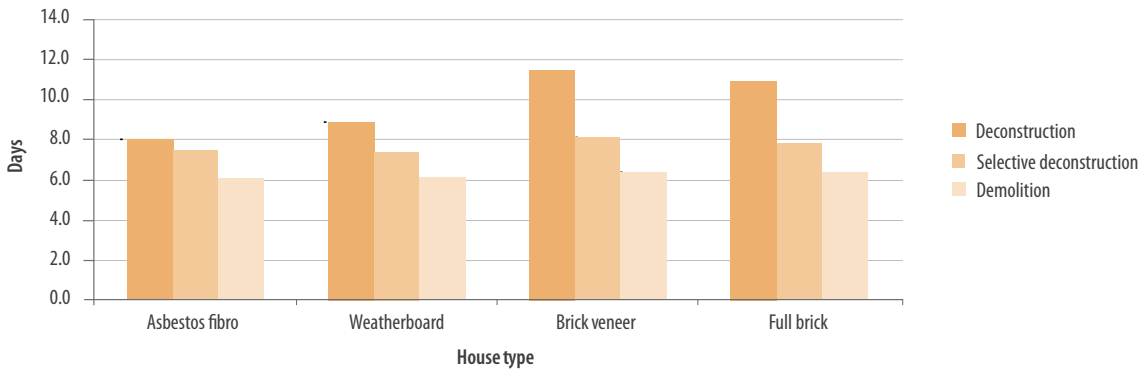
The process of house deconstruction is generally more labour intensive than conventional demolition methods as materials may need to be handled carefully so they are suitable for re-sale. Specialised equipment, such as a brick elevator and pallet truck may also be required.

Factors impacting deconstruction time include: building type, age, materials used and site access. Older houses tend to use less 'wet' trade work (e.g. glues, plastering, concrete) than modern houses, making deconstruction for re-use more efficient.

If a deconstruction project has tight time constraints, selective deconstruction, or deconstruction for recycling may be appropriate. Recycling requires materials to be removed and separated (normally in bins) before they are sent to a reprocessing facility. Materials that are to be crushed or recycled do not need to be handled as carefully as they would need to be for re-use. Recycling may still take longer than straight demolition.

Figure 1 provides details on the time (total labour and active machinery hours) needed to disassemble each building type. On average, selective deconstruction takes 20-25 per cent longer than demolition and full deconstruction takes 55-60 per cent longer than demolition. Please note that the project duration can be completed faster than the times noted in Figure 1 by employing more staff.

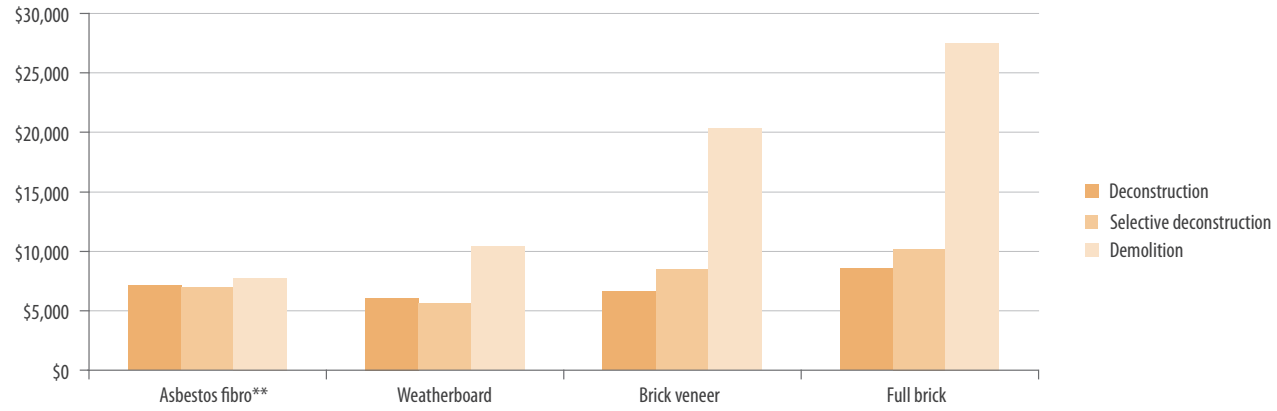
Figure 1: Total time needed to complete house deconstruction on different buildings



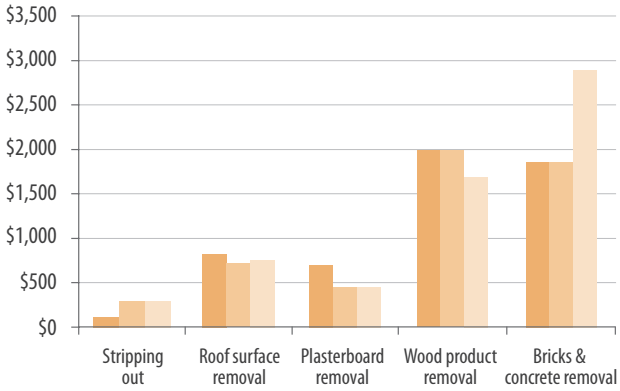
Cost comparisons

Many variables affect the total cost of a deconstruction project. The costs detailed in the following tables are based on typical costs for the demolition, reuse and recycling industries (2008 figures). The figures are based on the times taken for the demolition case studies and in all cases demolition was the most expensive option due to significant disposal costs. Your own research will be needed to identify local services and costs that suit your situation.

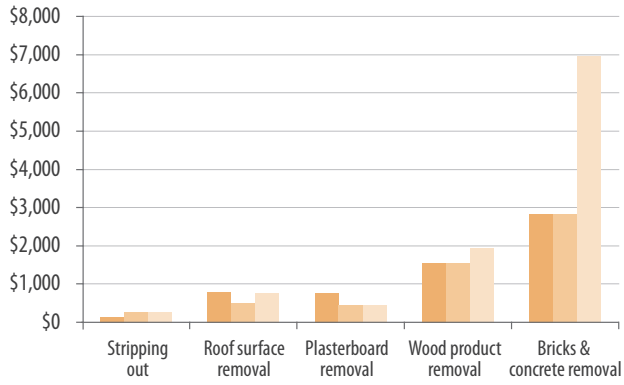
Costs of deconstruction across the four building types examined



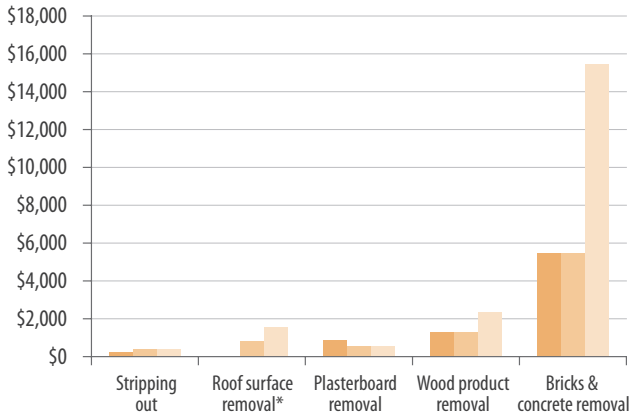
Asbestos fibro



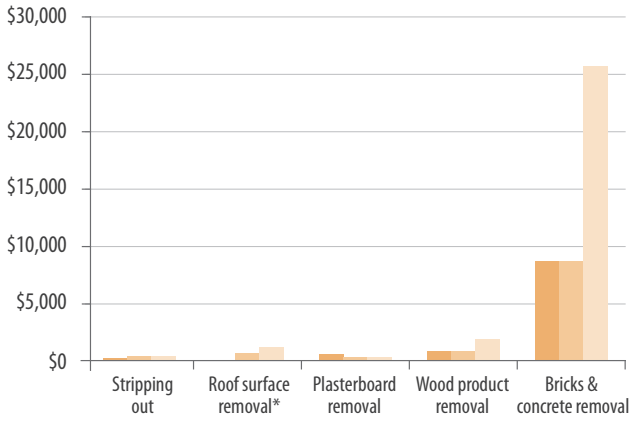
Weatherboard



Brick veneer



Full brick



* For roof surface removal, by full deconstruction, income generated in this stage exceeded the costs incurred.

** Note that demolition costs of the asbestos fibro house do not include the cost of removal and disposal of the asbestos material.

Please note that all totals included in Table 4 do not include transportation costs as these vary considerably based on the distance of a property from both landfill and sale or recycling markets.

The total costs associated with the demolition of an asbestos fibro house will be higher than stated in the table as the cost to remove, transport and dispose of the asbestos panels have not been presented. Please be aware that a suitably licenced contractor and disposal facility will need to be utilised and specialist fees will apply. These costs apply to all methods.

Income was generated from the sale of roof tiles in the case studies and the condition and volume of the tiles in the brick veneer house and full brick house meant that the income generated was greater than the labour costs incurred to recover the tiles.

Environmental benefits

Environmental responsibility continues to become a mainstream issue and is of concern to the construction and demolition industry through regulation, rising costs and pressure from within the industry and the general public.

By employing deconstruction methods, it is possible to avoid negative environmental impacts associated with landfill and the waste of valuable resources. House deconstruction reduces the amount of material extraction needed and reduces the amount of raw material manufacture. Avoidance of these impacts protects air quality, reduces water pollution, reduces energy use, and reduces habitat loss. Reusing and recycling recovered materials also generates fewer greenhouse gases than resource extraction and the manufacture of building products from new materials.

Deconstruction can also have social benefits through creating jobs and making durable and low cost materials available to the community for use in renovation and construction.

Where to go for more information

Department of Environment, Climate Change and Water NSW – www.environment.nsw.gov.au
Centre for Design at RMIT (AUS) – www.onsite.rmit.edu.au
Sustainability Victoria Business and Industry (AUS) – www.sustainability.vic.gov.au
WasteWise Construction Program – Department of Environment, Water, Heritage and the Arts (AUS) – www.environment.gov.au
Deconstruction Institute (USA) – www.deconstructioninstitute.com
Powell Centre for Construction and Environment (USA) – www.cce.ufl.edu
Maryland Department of Natural Resources (USA) – www.dnr.state.md.us
Buy Recycled Business Alliance – www.brba.com.au

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Heritage Building Centre
ReGyp
WSN Environmental Solutions Australia
SafetyEquipment.net.au
Get Fast Waste Bins
Roof Tile Recyclers
Construction Connect
Hire-it
Bayside Hire
Camden Hire
Simply Recycled
Riverside Second-hand Building Supplies
Glenfield Waste Disposal
Recycled Classic Floors
Sam's Seconds
Whelan the Wrecker
ecobricks

By being environmentally responsible, not only are you doing the right thing, but you have the ability to improve your image and reputation.

Up to 90 per cent (by weight) of demolition waste is recyclable.

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