Waste Minimisation

Up to 40 per cent of the waste generated by Australians is building waste. Minimising and recycling this waste can have significant social, economic and environmental benefits.

The three R's of waste minimisation: reduce, re-use, recycle.

Reduce consumption of resources by building smaller houses that are better designed for your needs. This is the most effective way to conserve precious resources for use by future generations and reduce waste. It also lowers costs.

Re-use existing buildings and materials and reduce demand for resources, lower waste volumes and save money.

Recycle resources that are left over or have reached the end of their useful life. This will reduce demand for new materials and lower the volume of waste going to landfill.

Don't demolish – deconstruct – give old buildings new lives.

Sending building materials to landfill is like throwing money away.

Use renewable resources like timber from sustainably managed forests. This creates a sustainable economy and helps conserve non-renewable resources.

Use materials with high recycled content to create a market for recycled resources. It will raise the price paid by recyclers for recovered resources and increase the viability of recycling.

LANDFILL

Our traditional means of waste disposal to landfill is uneconomic. Costs to communities for operating and maintaining landfill sites are high and availability of suitable land is limited.

Re-use options for landfill sites are extremely limited due to potential health hazards. Remedial action is often prohibitively expensive.

Emissions and leachate from landfill sites can be highly toxic due to concentrations of heavy metals and toxic chemicals. These toxins find their way into the water table and/or waterways, often with disastrous consequences.

40 per cent of all waste that goes to landfill is building waste.

We must reduce waste volumes going to landfill and remove toxic content from materials before disposal. Support your local council or local waste management's 'reduce, re-use and recycle' initiatives. User pays tipping fees make recycling more profitable.

WHAT IS BUILDING WASTE?

WASTE DESCRIPTION	WASTE QUANTITY WEIGHT % OF TOTAL
Paper / cardboard	1
Garden / vegetation	3
Wood / timber	10
Textiles / rags	1
Hard plastic	1
Ferrous	2
Soil rubble (<150mm)	34
Soil rubble (>150mm)	2
Concrete-based masonry	16
Clay-based [eg. bricks, tiles]	16
Plasterboard	2
Other / unknown	11
Total	100

Extrapolated from NSW EPA Waste Census Data 1997

LIFECYCLE AND WASTE

Life Cycle Assessment of waste streams indicates that significant energy savings can be achieved at little or no cost by considered construction and demolition waste management and planned recycling.

Materials with high embodied energy (eg. metals, especially aluminium) or with high environmental cost in extraction can have their lifecycle impact reduced by end use recycling. The environmental impact of most materials can be substantially reduced with each re-use.

RECYCLING – WHO TO CONTACT

> Local councils.

> Regional Waste Authorities.

> Local waste station or landfill operator.

> Waste recycling contractors.

> Construct Connect Australia facilitates the sale and purchase of salvaged and recycled materials for members. www.arrnetwork.com.au.

WHAT CAN BE RECYCLED?

Most materials can be recycled. The following list demonstrates some re-use options. There are many more and the list is growing rapidly.

Steel – Electric arc furnaces (EAF) produce reinforcing bar, mesh and sections from 100 per cent steel scrap. Conventional blast furnaces can incorporate up to 30 per cent steel scrap. Recycling steel reduces embodied energy by 72 per cent.

Aluminium – Aluminium is 100 per cent recyclable, recycling aluminium reduces embodied energy by 95 per cent.

Gypsum Plasterboard – CSR recycles plasterboard and other companies are considering doing so. Plasterboard disposed of in landfill produces poisonous hydrogen sulphide and has a foul odour.

Timber can be re-processed into horticultural mulch. A particle board manufacturer in Australia is developing a recycling facility that requires little or no pre-treatment of the waste.

Concrete – Un-set concrete can be 'washed' out at the plant to remove cement. Sand and stone can be re-used. Set concrete can be crushed and recycled as aggregate for new concrete or road base and fill.

Most glass can be recycled. Construction glass must be separated from other glass such as drink bottles. Glass may be cut and re-used or recycled as aggregate for concrete. Some patterned glass incorporates all types of recycled building glass. Recycling glass reduces embodied energy by 20 per cent.

Carpet in good condition can be sold and re-used. It can also be recycled into secondary carpets. Some carpet can be recycled as weed barrier or a covering and food for worm farms.

Bricks and tiles can be re-used where appropriate or crushed on site for backfill, aggregate and gravel with portable crushing plants.

Plastics – Many plastics can be granulated and re-used to make new plastic products and include:

> High Density Poly Ethylene (HDP): rubbish bins, buckets and traffic cones.

> Low Density Poly Ethylene (LDP): shrink wrap and bubble wrap.

> Polystyrene containers, insulation, PVC pipes, fittings, and vinyl flooring.

MAKING IT HAPPEN

To be cost effective, waste minimisation strategies must be agreed to and implemented by all parties involved in building the home at the design, construction and operation stages.

A team approach by the owner, builder and designer is the most effective way to reduce waste.

Research has shown that opportunities for cost effective inclusion of sustainable features decline exponentially throughout the design process. Up to 90 per cent of critical decisions are made during the design stage. This includes waste minimisation.

There are many good household recycling and waste minimisation guides available. Consult your local Council. This fact sheet focuses on the design and construction stages.

THE DESIGN STAGE

Designers are responsible for introducing and planning waste minimisation strategies from the earliest stages of design through to completion. This includes deciding what to build, whether to demolish, what materials to use and how they might be recycled.

The initial consultation

> Lasting decisions about whether to renovate or demolish are often made at this stage.

> Consider waste streams and life cycle benefits.

A commitment to reducing waste at the initial consultation is more likely to endure throughout the project.

Concept design

> Choose construction to minimise cut and fill.

> Plan for end use and deconstruction.

> Select building systems with low waste rates.

> Identify recycled materials that can be used.

> Source recycled materials.

Early decisions have a major impact on waste stream quantity and quality.

Design development

> Dimension to suit standard modular construction sizes and minimize waste.

> Select materials with known minimum waste rates; manufacturer waste recycling schemes and recycled content or other life cycle benefits.

> Engage like minded design professionals (eg. engineer, interior designer).

> State and agree key waste goals prior to engagement (team building).

Working drawings and detailing

> Design operational waste handling facilities.

> Select efficient appliances.

> Plan for waste separation and sorting on-site during construction.

> Design final dimensions to suit available sheet and materials sizes.

> Prepare accurate shop drawings and nominate waste wise fabricators.

Off-site fabrication can reduce waste, facilitate separation of waste streams and improve recovery rates.

Specification

> Materials with known minimum wastage rates (eg. plywood, finger-jointed timber).

> Materials with known recycled content (eg. paper and polyester insulation.

> Durable materials and finishes.

> Waste handling and recycling contractors.

> Waste streams to be recycled.

Contract documentation

> Prepare a waste management plan so all tenderers factor best practice into their price.

> Agree which party or parties receive financial benefits of recycling.

> Provide economic incentives for recycling.

> Include waste minimisation and recycling performance clauses in the contract.

Tendering period

> Promote economic benefits of waste minimisation and recycling to tenderers.

> Familiarise tenderers with recycling, waste management and minimisation strategies.

> Answer questions and allay concerns (costs).

> Engender a spirit of cooperation to achieve waste minimisation objectives (team building).

Supervision

> Monitor recycling rates and on-site sorting and storage of various waste streams.

> Verify contractor performance or certification.

THE CONSTRUCTION STAGE

Site operations generally

> Plan locations for depositing and stacking of materials prior to delivery.

> Provide recycling skips and ensure waste stream sorting compliance by all trades.

> Form a compound to contain plastic film, cardboard, glue and paint tins.

> Use reputable waste service providers.

> Negotiate recycling paybacks with local resource recovery firms.

> Use waste aware sub-contractors.

> Use written contracts with all trades including clauses requiring waste minimisation practice.

> Require trades to dispose of their own waste.

> Back charge for sorting of waste streams not sorted by each sub-contractor.

> Colour code or label waste skips and protect them from contamination, rain and wind.

> Provide regular waste bins for food scraps and household waste during construction.

> Lock special skips at night and weekends to prevent rubbish dumping in recycling bins.

Materials storage and handling

> Minimise time between delivery and installation and the risk of damage or theft.

> Does packaging adequately protect goods? Is there too much? Can you eliminate some?

> Ask suppliers to collect/recycle packaging.

> Have fragile materials and fixtures delivered and installed close to completion date.

> Use prefabricated framing and trusses to reduce time on site before installation.

> Check quantity, condition and quality on delivery. Report discrepancies immediately.

> Reject inferior goods or materials if their quality will result in additional waste.

> Refuse oversupply as compensation for inferior quality or condition.

> Report careless delivery staff to the supplier.

Concreting

> Use concrete with recycled aggregate in all viable applications.

> Use reinforcement made from recycled steel.

> Form up accurately and fine tune estimating to minimise waste. Up to ten per cent is often wasted.

> Return surplus to the plant for recycling.

> Buy from plants that wash out cement to allow recycling of sand and aggregate.

> Break remnants into small pieces before final set to allow later use as backfill or recycling.

> Always form up a small area of path or low grade slab ready to accept remnants.

Carpentry and joinery

> Use engineered timber products that make efficient use of materials where possible.

> Use sustainably sourced timber.

> Encourage your supplier to find sustainable sources.

> Prepare accurate cutting lists before ordering.

> Give joiners a copy of the cutting list.

> Ensure that carpenters have a complete cutting list to allow efficient timber use.

> Use joinery profiles that can be easily and invisibly joined to reduce off-cuts.

> Use off-cuts wherever possible.

Measure it twice – cut it once.

Bricklaying

> Have bricks dropped around perimeter to save damage in transporting to place of use.

> Use mortar to produce masonry of appropriate strength and durability as required by AS3700. Mortars with lower cement content are usually softer thus helping in recycling as well as saving on cement.

Electrical services

> Use sub-boards and plan wiring to reduce wiring distances, quantities, waste and cost.

> Recycle off-cuts. Strip insulation from copper.

> Consider pulse switching and intelligent controls to reduce cabling and energy use.

> Use cable products that are highly recyclable and contain no or minimal heavy materials.

Plastering

> Buy plasterboard from suppliers who recycle.

> Sort off-cuts and store on site for return to recycler. Keep off-cuts clean and dry.

> Carry useful sized off-cuts to the next job.

Glazing

> Separate construction glass from other glass such as drink bottles.

> Most glass can be melted down and recycled but requires sorting.

> Glass can also be recycled as aggregate.

WASTE MANAGEMENT PLANS

Many local councils require waste management plans prior to granting of development consent.

They usually require the builder or designer to estimate the total waste stream volumes from both demolition and construction and nominate means of disposal including recycling contractor, recycling waste station or landfill site.

The site plan is often required to show waste storage facilities on site during construction and a schedule for delivery or pickup.

Time and cost of waste plan preparation is usually recouped through reductions in waste disposal costs or dividends from sale of salvaged resources. If this is not possible (low tipping fee areas), a fee should be charged for the service to ensure that plans are properly prepared.

ADDITIONAL READING

Contact your State / Territory government or local council for further information on waste minimisation programs.
www.gov.au

BEDP *Environment Design Guide*
GEN 21 Waste Minimisation and Resource Recovery.
GEN 29 Waste Minimisation and Building Design Professionals.
TEC 1 Waste Minimisation – Source Relocation.
PRO 22 Waste Minimisation – Source Relocation.

Building Designers Association of Victoria (1998), *Designing in Waste Minimisation.*

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The best practice checklist for construction was adapted from: Reddrop and Ryan, 1997.