

waste minimisation

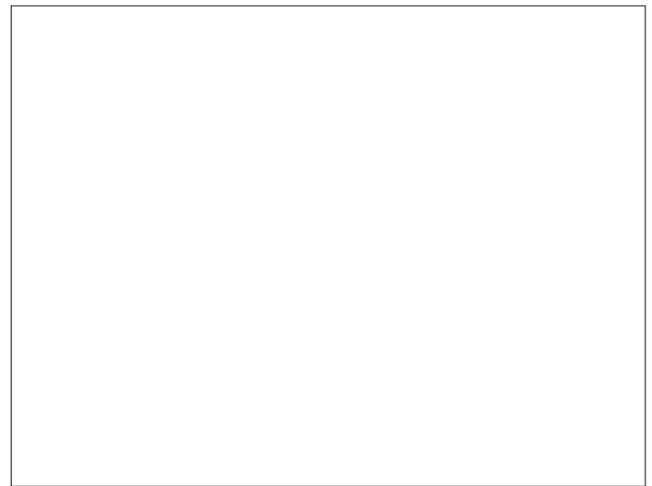
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WHAT IS BUILDING WASTE?

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 (<150 mm)	34
Soil rubble (>150 mm)	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 THINKING AND WASTE

Life Cycle Assessment (LCA) of C&D waste streams indicates that significant energy savings can be achieved at little or no cost by considered C&D 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

Your local Council.

Your Regional Waste Authority.

Your local waste station or landfill operator.

Waste recycling contractors (many waste boards have regional directories of recyclers).

The Australian Reusable Recovery Network (ARRN) facilitates the sale and purchase of salvaged and recycled materials for members. It operates in NSW, QLD and the ACT and is planned for other states.

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 percent steel scrap. Conventional blast furnaces can incorporate up to 30 percent steel scrap. Recycling steel reduces embodied energy by 72 percent.

Aluminium is 100 percent recyclable. Recycling aluminium reduces embodied energy by 95 percent.

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 percent.

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, UPVC pipes, fittings and 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 implement waste reduction.

Research has shown that opportunities for cost effective inclusion of sustainable features decline exponentially throughout the design process. Up to 90 percent of critical decisions are made before tender 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 LCA 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 LCA 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

Specify:

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.

Nominate:

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 10 percent 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 appropriate mortar strength. Softer mortar saves cement and helps in recycling.



ELECTRICAL SERVICES

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

Recycle off-cuts. Strip insulation from copper.

Use PVC free insulated cable – it lowers leachate toxicity.

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

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 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 KEY REFERENCES

"Waste Minimisation in Housing: Guidelines for Designers."
Harkenness T; Prasad. D. 2001. UNSW

"Designing In Waste Minimisation"
Building Designers Association of Victoria 1998.

Excellent case studies and detailed information can be found at RMIT's: <http://onsite.rmit.edu.au/>

NSW Waste Boards: <http://www.wasteboards.nsw.gov.au>

EcoRecycle Victoria.
Freecall Infoline: 1800 35 32 33 or
<http://www.ecorecycle.vic.gov.au>

One Stop Timber Shop. The Wilderness Society Tel: 1300 76 77 88
<http://www.timbershop.wilderness.org.au>

Housing Construction Waste, Reddrop and Ryan,. Centre for Design RMIT & Department of Industry, Science and Tourism. January 1997)