

Purpose

This Health Technical Advice (HTA) provides general guidance on the use of recycled materials in the design and construction of healthcare assets.

This HTA should be read in conjunction with the [Guidelines for Sustainability in Health Care Capital Works](https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf) <<https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf>> (the “Guidelines”).

Context

The linear economy, sometimes referred to as the take-make-waste economy, is a system where virgin resources are extracted to manufacture products and materials that eventually end up as waste in landfill. This approach degrades natural systems and is a driver of environmental challenges, including climate change and loss of biodiversity.

To address these environmental challenges, Victoria is transitioning to a circular economy that is based on the reuse and regeneration of materials.

The design and construction of healthcare assets can positively contribute to this transition through a holistic approach that considers the whole asset life cycle. There are several useful resources relating to circular economy in the built environment provided in the resources section below.

This HTA specifically focusses on one element of the circular economy – the use of recycled materials. Using recycled materials in the design and construction of healthcare assets has numerous benefits.

Reduced waste to landfill

From 2000 to 2018, waste generation in Victoria doubled from 7.4 million to 14.4 million tonnes per year. Although recovery rates are reasonably high for some materials such as 90% for metals and 23% for plastics, large quantities of potentially reusable and recyclable materials are sent to landfill, waste stockpiling, and illegal dumping which poses environmental and public health risks¹.

Reduced raw material extraction

The high demand for construction materials is depleting finite natural deposits. These materials generally need to be mined, milled, or quarried, and processed, which disrupts ecosystems and requires significant energy input.

¹ [Victoria's infrastructure strategy 2021-2051, p. 91](https://assets.infrastructurevictoria.com.au/assets/Resources/1.-Victorias-infrastructure-strategy-2021-2051-Vol-1-web.pdf) <<https://assets.infrastructurevictoria.com.au/assets/Resources/1.-Victorias-infrastructure-strategy-2021-2051-Vol-1-web.pdf>>

Reduced embodied carbon

Embodied carbon describes the carbon emissions associated with a material over its life cycle. The life cycle of building construction materials includes the following stages:

- Product (raw material extraction and manufacturing)
- Construction (transport to site and construction processes)
- Use (maintenance, repair, replacement over the building life)
- End-of-life (deconstruction and disposal).

The embodied carbon of common construction materials are significant contributors to global carbon emissions, such as concrete and steel, which are responsible for approximately 8% and 7% of annual global carbon emissions respectively.

Traditionally the healthcare sector has been focused on reducing operational carbon emissions, which is still a priority, and has a clear pathway to net zero carbon through energy efficiency, [building electrification](https://www.vhba.vic.gov.au/new-public-health-infrastructure-to-be-all-electric) <<https://www.vhba.vic.gov.au/new-public-health-infrastructure-to-be-all-electric>>, and supply of [100% renewable energy to all Victorian Government operations from 2025](https://www.energy.vic.gov.au/renewable-energy/victorian-renewable-energy-and-storage-targets/victorian-renewable-energy-target-auction-vret2) <<https://www.energy.vic.gov.au/renewable-energy/victorian-renewable-energy-and-storage-targets/victorian-renewable-energy-target-auction-vret2>>. This pathway for operational decarbonisation has brought embodied carbon to the forefront as the major residual component of an asset's life cycle carbon profile.

Using products with recycled content often has a co-benefit of reducing embodied carbon due to a reduction in product stage (raw material extraction and manufacturing) carbon emissions.

Supporting the Victorian economy

There are numerous Victorian businesses including social enterprises that have developed innovative building construction products and materials that use recycled content and that are relevant to the healthcare sector. Victorian manufactured products containing Victorian recycled content are the preferred selection for projects.

Policy

The use of recycled materials in the design and construction of healthcare assets aligns with several National and Victorian Government policies.

National policies

The [2018 Australian National Waste Policy](https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-2018.pdf) <<https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-2018.pdf>> identified avoidance of waste, improved resource recovery, and increased use of recycled material and products as critical in Australia's shift toward a circular economy.

The [2019 National Waste Policy Action Plan](https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-action-plan-2019.pdf) <<https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-action-plan-2019.pdf>> sets targets and actions for implementing the National Waste Policy. The plan includes national targets to ban the export of waste, to reach 80% average resource recovery rate from all waste streams by 2030, and to significantly increase governments and industry's use of recycled content.

In 2020, the Australian government introduced the [Recycling and Waste Reduction Act 2020](https://www.transparency.gov.au/publications/agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment-annual-report-2021-22/annual-reports-on-the-operation-of-legislation/recycling-and-waste-reduction-act-2020) <<https://www.transparency.gov.au/publications/agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment-annual-report-2021-22/annual-reports-on-the-operation-of-legislation/recycling-and-waste-reduction-act-2020>>, regulating the export of recyclable waste of glass, plastic, and tyres.

Victorian policies

[Victoria's Net Zero by 2035 Emissions Reduction Target](https://www.climatechange.vic.gov.au/media-releases/victorias-net-zero-by-2050-emissions-reduction-target) <https://www.climatechange.vic.gov.au/media-releases/victorias-net-zero-by-2050-emissions-reduction-target> outlines Victoria's new target for net zero and key emissions reduction policies. Aligned to the target, the Victorian Government released the State's Circular Economy Policy, [Recycling Victoria: A New Economy](https://www.vic.gov.au/victorias-plan-circular-economy) <https://www.vic.gov.au/victorias-plan-circular-economy>. In response, public projects have implemented various policies such as the [Recycled First Policy](https://bigbuild.vic.gov.au/about/ecologiq/recycled-first-policy) <https://bigbuild.vic.gov.au/about/ecologiq/recycled-first-policy> mandating recycled supply into major transport infrastructure projects.

The Victorian Infrastructure Delivery Authority (VIDA) [Transport Infrastructure Decarbonisation Strategy](https://bigbuild.vic.gov.au/__data/assets/pdf_file/0008/868409/VIDA-Transport-Infrastructure-Decarbonisation-Strategy.pdf) <https://bigbuild.vic.gov.au/__data/assets/pdf_file/0008/868409/VIDA-Transport-Infrastructure-Decarbonisation-Strategy.pdf> supports Victoria's transition to reduce carbon emissions and the government's target for net zero. The strategy sets a commitment to decarbonise transport projects in line with the [Climate Change Act](https://www.climatechange.vic.gov.au/legislation/climate-change-act-2017) <https://www.climatechange.vic.gov.au/legislation/climate-change-act-2017> and net zero targets. The strategy has a focus on reducing upfront carbon through the greater use of recycled materials.

The [Victorian Government's Social Procurement Framework](https://www.buyingfor.vic.gov.au/social-procurement-framework) <https://www.buyingfor.vic.gov.au/social-procurement-framework> outlines sustainable procurement objectives. These promote environmental sustainability in the use of resources and addressing climate change including requirements the use of recycled content in construction materials.

Opportunities

The [Guidelines for Sustainability in Health Care Capital Works](https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf) <https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf> (the "Guidelines") include 'business-as-usual' (BAU) requirements that recycled content is used in non-structural concrete, steel, asphalt, landscaping, drainage, plumbing, carpets, and selected external furniture and fixtures. The Guidelines do not set a specific target for minimum recycled content.

There has been continued developments in the availability and extent of recycled materials that have occurred since the Guideline was released. Table 1 outlines examples of further recycled material opportunities that project teams may consider in the design and construction of healthcare assets, as well as suggested minimum recycled content levels that are being adopted across the building industry.

Table 1: Recycled materials for health care projects

Application	Recycled content inclusions and targets	Responsibility
Existing business as usual (BAU) requirements (Guidelines v2.0)		
Concrete	Non-structural (e.g., kerbs, footpaths, paving, etc.) <ul style="list-style-type: none"> Minimum 15% recycled or substitute materials (fly ash, silica fume, ground granulated blast furnace slag, crushed recycled aggregate, etc.) 	Civil
Steel	Structural <ul style="list-style-type: none"> Post-consumer recycled content Reused steel elements (e.g. beams and columns from a demolished warehouse) Reinforcement <ul style="list-style-type: none"> Post-consumer recycled content 	Structures / Civil

Application	Recycled content inclusions and targets	Responsibility
External works	Asphalt <ul style="list-style-type: none"> • Post-consumer recycled content Carparks <ul style="list-style-type: none"> • Recycled plastic wheel stops • Recycled plastic bollards and speed humps 	Civil
Landscaping	Decking <ul style="list-style-type: none"> • Reclaimed timber decking • Recycled plastic decking Fixed Furniture <ul style="list-style-type: none"> • Recycled plastic / timber furniture 	Landscape Architect
Internal	Carpet <ul style="list-style-type: none"> • Preference carpet squares with a recycled content 	Architect
Services	Drainage and Plumbing <ul style="list-style-type: none"> • Concrete pipe with cement replacement • Recycled plastic pipework 	Civil / Services
Furniture, Fixtures & Equipment (FF&E)	<ul style="list-style-type: none"> • Furniture and workstations from vacated and/or demolished premises to be re-used or donated to third party uses 	Architect / Health Agency / FF&E
Exceeding BAU requirements <i>Over and above cost from BAU may be included in project 2.5% sustainability budget</i>		
Demolition materials	Reuse Investigate opportunities for direct reuse of demolition materials on site (e.g. intact bricks, timber, etc.)	Architect / Landscape / Builder
Concrete	Structural <ul style="list-style-type: none"> • 30%+ Portland cement replacement Non-structural <ul style="list-style-type: none"> • 50%+ Portland cement replacement • Geopolymer concrete • Recycled steel / plastic fibre reinforcement • Recycled plastic mesh reinforcement • Innovative aggregate (current examples include recycled glass sand, carpet fibres and coffee cups) Void formers <ul style="list-style-type: none"> • Recycled plastic Reinforcement bar seats <ul style="list-style-type: none"> • Recycled plastic 	Structural / Civil

Application	Recycled content inclusions and targets	Responsibility
External works	<p>Asphalt</p> <ul style="list-style-type: none"> • 25%+ recycled content • Crumb rubber, plastic, reclaimed asphalt pavement (RAP), recycled toner cartridges, car tyres etc. <p>Subbase and fill</p> <ul style="list-style-type: none"> • Used crushed concrete, bricks, etc. <p>Drainage Layer</p> <ul style="list-style-type: none"> • Crushed concrete, bricks, etc. • Crushed glass <p>Road markings</p> <ul style="list-style-type: none"> • Recycled glass sand 	Civil
Building Envelope	<p>Cladding</p> <ul style="list-style-type: none"> • Reclaimed bricks • Systems with recycled plastic / steel <p>Windows / Curtain Walls</p> <ul style="list-style-type: none"> • High recycled aluminium content <p>Thermal and Acoustic</p> <ul style="list-style-type: none"> • 80%+ recycled content • Recycled plastic • Recycled glass 	Architect
Internal	<p>Partition Framing</p> <ul style="list-style-type: none"> • 80% Recycled Content <p>Plasterboard</p> <ul style="list-style-type: none"> • 10%+ recycled content <p>Ceiling tiles</p> <ul style="list-style-type: none"> • 40%+ recycled content • Recycled felt <p>Carpet</p> <ul style="list-style-type: none"> • 70%+ recycled content • Recycled carpet, PET bottles, carpet, fishing nets <p>Vinyl</p> <ul style="list-style-type: none"> • 80%+ recycled content <p>Linoleum</p> <ul style="list-style-type: none"> • 25%+ recycled content <p>Tiles</p> <ul style="list-style-type: none"> • Recycled glass sand / textiles 	Architect

Application	Recycled content inclusions and targets	Responsibility
Services	<p>Drainage Pits</p> <ul style="list-style-type: none"> • Cement replacement • Recycled plastic aggregate • Recycled plastic reinforcement • Recycled glass sand aggregate <p>Building Services</p> <ul style="list-style-type: none"> • Recycled plastic pipework • Ductwork with high recycled steel content 	Civil / Services

Implementation

The following section provides advice on implementing recycled materials in healthcare projects.

Schematic Design

At this stage the sustainability report should include a section outlining the benefits of utilising recycled materials as part of a broader approach to circular economy in building design and construction.

The design team should review this HTA during the schematic design phase and identify key opportunities for incorporation of recycled materials in the project. If appropriate at this early stage, include allocation of the 2.5% sustainability budget for these opportunities.

Detailed Design

At this stage the sustainability report should include specific recycled material opportunities for the project, information on impact (where calculated), and cost estimates so that the 2.5% sustainability budget can be allocated. The sustainability budget allocation must be agreed with the project team and health agency and presented in the sustainability report.

Construction material circularity can be calculated by using an industry established method such as the [Green Building Council of Australia Circular Economy Fact Sheet](https://www.gbca.org.au/get/resources/1865/5281E35BB6EBC277E73DF040A5B2CC4F) <https://www.gbca.org.au/get/resources/1865/5281E35BB6EBC277E73DF040A5B2CC4F>. In addition, and where data is available, embodied carbon savings may be estimated. This may consist of a high-level assessment based on material quantities provided by the Quantity Surveyor and embodied carbon material data. Industry databases such as the [EPiC Database](https://msd.unimelb.edu.au/research/projects/current/environmental-performance-in-construction) <https://msd.unimelb.edu.au/research/projects/current/environmental-performance-in-construction> may be used for high-level embodied carbon estimations.

Some construction products have Environmental Product Declarations (EPDs), which are independently verified documents that communicate the life-cycle environmental impact of a product. These are the 'gold standard' for embodied carbon data – refer [EPD Australasia](https://epd-australasia.com/) <https://epd-australasia.com/>.

Supply chain engagement during detailed design is important, as recycled building materials is a rapidly emerging area. Further recycled materials resources are provided in the following section as a starting point for design teams.

All materials with recycled content must meet relevant codes, standards, and quality requirements. Internal finishes with recycled content must meet VOC limits as outlined in the Guidelines and requirements for a clinical environment where relevant (e.g. easily cleanable).

Tender Documentation

Tender drawings, schedules, and specifications in the relevant discipline packages should nominate selected materials or recycled content targets to ensure they are captured within the Contractor and Sub-contractor scopes.

Contract preliminaries to include reference to project recycled material targets set for the project during the design stage and a requirement for tracking through the construction phase with a final report provided at practical completion.

Construction

Recycled materials tracking against project targets to be submitted at part of monthly reporting and at practical completion.

Recycled materials tracking and lessons learned should be included in post occupancy analysis so that knowledge can be shared for future projects.

Resources

National policy

[2018 Australian National Waste Policy](https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-2018.pdf) <https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-2018.pdf>

[2019 National Waste Policy Action Plan](https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-action-plan-2019.pdf) <https://www.agriculture.gov.au/sites/default/files/documents/national-waste-policy-action-plan-2019.pdf>

[Recycling and Waste Reduction Act 2020](https://www.transparency.gov.au/publications/agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment-annual-report-2021-22/annual-reports-on-the-operation-of-legislation/recycling-and-waste-reduction-act-2020) <https://www.transparency.gov.au/publications/agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment/department-of-agriculture-water-and-the-environment-annual-report-2021-22/annual-reports-on-the-operation-of-legislation/recycling-and-waste-reduction-act-2020>

Victorian policy

[Climate Change Act](https://www.climatechange.vic.gov.au/legislation/climate-change-act-2017) <https://www.climatechange.vic.gov.au/legislation/climate-change-act-2017>

[Victoria's Net Zero by 2035 Emissions Reduction Target](https://www.climatechange.vic.gov.au/media-releases/victorias-net-zero-by-2050-emissions-reduction-target) <https://www.climatechange.vic.gov.au/media-releases/victorias-net-zero-by-2050-emissions-reduction-target>

[Recycling Victoria: A New Economy](https://www.vic.gov.au/victorias-plan-circular-economy) <https://www.vic.gov.au/victorias-plan-circular-economy>

[Recycled First Policy](https://bigbuild.vic.gov.au/about/ecologiQ/recycled-first-policy) <https://bigbuild.vic.gov.au/about/ecologiQ/recycled-first-policy>

[Buying for Victoria Social Procurement Framework](https://www.buyingfor.vic.gov.au/social-procurement-framework) <https://www.buyingfor.vic.gov.au/social-procurement-framework>

[Transport Infrastructure Decarbonisation Strategy](https://bigbuild.vic.gov.au/__data/assets/pdf_file/0008/868409/VIDA-Transport-Infrastructure-Decarbonisation-Strategy.pdf) <https://bigbuild.vic.gov.au/__data/assets/pdf_file/0008/868409/VIDA-Transport-Infrastructure-Decarbonisation-Strategy.pdf>

VHBA guidelines

[Guidelines for Sustainability in Health Care Capital Works](https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf) <https://www.vhba.vic.gov.au/sites/default/files/2021-10/Sustainability-guidelines-for-capital-works-VHBA-Revised-October-2021.pdf>

Circular economy in the built environment

[Green Building Council of Australia Circular Economy Discussion Paper](https://gbca-web.s3.amazonaws.com/media/documents/a-circular-economy-discussion-paper---final.pdf) <https://gbca-web.s3.amazonaws.com/media/documents/a-circular-economy-discussion-paper---final.pdf>

[Green Building Council of Australia Circular Economy Fact Sheet](https://www.gbca.org.au/get/resources/1865/5281E35BB6EBC277E73DF040A5B2CC4F) <https://www.gbca.org.au/get/resources/1865/5281E35BB6EBC277E73DF040A5B2CC4F>

[Circular Design Guidelines for the built environment](https://www.energy.nsw.gov.au/sites/default/files/2023-02/NZP_Circular_Design_Guide_2023_0.pdf) <https://www.energy.nsw.gov.au/sites/default/files/2023-02/NZP_Circular_Design_Guide_2023_0.pdf>

[Circular Economy in the Built Environment](https://www.arup.com/insights/circular-economy-in-the-built-environment/) <https://www.arup.com/insights/circular-economy-in-the-built-environment/>

[Circular Economy Business Innovation Centre](https://www.cebic.vic.gov.au/learn/explore-by-industry/circular-design-in-the-built-environment) <https://www.cebic.vic.gov.au/learn/explore-by-industry/circular-design-in-the-built-environment>

Recycled materials

[ecologiQ](https://bigbuild.vic.gov.au/about/ecologiQ) <https://bigbuild.vic.gov.au/about/ecologiQ>

[Sustainability Victoria - Buy Recycled Directory](https://directories.sustainability.vic.gov.au/buy-recycled) <https://directories.sustainability.vic.gov.au/buy-recycled>

[VicRoads Technical Note 107 – Use of Recycled Materials in Road Pavements](https://www.vicroads.vic.gov.au/-/media/files/technical-documents-new/technical-notes/technical-note-tn-107---use-of-recycled-materials-in-road-pavements-july-2023.ashx)

<<https://www.vicroads.vic.gov.au/-/media/files/technical-documents-new/technical-notes/technical-note-tn-107---use-of-recycled-materials-in-road-pavements-july-2023.ashx>>

[Sustainability Victoria Standards and Specifications](https://www.sustainability.vic.gov.au/circular-economy-and-recycling/for-councils-and-other-waste-recycling-operators/buy-recycled-service/standards-and-specifications) <<https://www.sustainability.vic.gov.au/circular-economy-and-recycling/for-councils-and-other-waste-recycling-operators/buy-recycled-service/standards-and-specifications>>

[Infrastructure Sustainability Council iSupply Directory](https://www.iscouncil.org/isupply/) <<https://www.iscouncil.org/isupply/>>

Embodied carbon data

[EPiC database](https://msd.unimelb.edu.au/research/projects/current/environmental-performance-in-construction) <<https://msd.unimelb.edu.au/research/projects/current/environmental-performance-in-construction>>

[EPD Australasia](https://epd-australasia.com/) <<https://epd-australasia.com/>>

Contacts

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