



**Sustainability in
the Australian and
New Zealand Gypsum
Board Industry**

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1. Introduction

Sustaining our way of life in terms of our social, economic, and environmental framework is of growing concern in all aspects of society. The building and construction industry is a significant user of resources, as well as a source of emissions from their processing and use. Gypsum board, or plaster board, is an important component, used almost universally in all residential and commercial construction in Australia and New Zealand.

The Gypsum Board Manufacturers of Australasia (GBMA) are committed to sustainability principles, and to its sustainable manufacture and use. Gypsum board is a low impact, sustainable product manufactured from a natural mineral product with large reserves. This document provides information on gypsum board Life Cycle Assessment (LCA), allowing its sustainability credentials and impact to be assessed and compared with alternatives. Through this document, the GBMA is committed to the open provision of information to allow a rational assessment of its product, and encourages other industries to do the same.



2. GBMA – Organisational Profile

Identity

The Gypsum Board Manufacturers of Australasia (GBMA) is an association of all gypsum board manufacturers in Australia and New Zealand.

The organisation was established as a forum to discuss issues of common interest affecting the gypsum board industry, to be the central point of contact with the industry, and to act as a vehicle to present an industry view on relevant matters.

Participating Organisations

The organisations comprising the GBMA are:

- BGC Plasterboard
- Boral Plasterboard
- CSR Gyprock
- Lafarge Plasterboard
- Winstone Wallboards - GIB (NZ).

Structure

The GBMA board comprises the chief executives of the above organisations, meeting periodically. Board meetings are attended by an independent legal minute taker to ensure compliance with the Australian Competition and Consumer Commission (ACCC) regulations.

In turn, individual board members volunteer to sponsor sub-committees drawn from member employees, addressing issues as determined by the board. Sub-committees for the following have been established:

- Sustainability
- Safety
- Transport
- Training

Sustainability is the main focus of this document. Details of other activities are described in the Appendix 2.



3. GBMA – Sustainability Vision

Awareness of sustainability and the need for environmentally friendly products and manufacturing is increasing in business and the community.

Sustainable manufacture and contribution to the sustainability of the building industry is a priority for the gypsum board manufacturers in Australia and New Zealand.

The GBMA aims for a future in which the built environment makes a significantly lower impact on non-renewable resources, energy sources, water and waste. The vision is to create sustainable solutions for a better, safer, healthier and more secure environment. The GBMA see a direct link between improving sustainable performance and business performance.

Industry Profile

Gypsum board manufacturing in Australasia services the building and construction industry and produces in the order of one hundred and seventy million square metres of gypsum board per annum. This goes towards lining the one hundred and fifty thousand new Australian housing starts, and twenty thousand New Zealand housing starts, every year. Raw materials are sourced from various natural resources across the region.

Gypsum

Gypsum is an abundant naturally occurring non-toxic mineral, which is the basis of all plaster products, and is used in all cement products in the building industry. It is also widely used for numerous day to day items such as medicines, dental and surgical plaster.

Gypsum is chemically stable, and non toxic to people working with the product adhering to safe work practices, and non-toxic to people living with the product. Please refer to the relevant manufacturer's Material Safety Data Sheets (MSDS).

Markets Served

The gypsum board manufacturers serve the commercial, residential and institutional construction industry, as well as the home renovation market and commercial fitout market in Australia and New Zealand.

Key Stakeholders

There are a wide range of stakeholders in the markets served by the gypsum board industry. Some of these are listed below:

- architects
- building designers
- draftspersons
- builders
- plastering contractors
- raw materials suppliers
- transportation contractors
- steel and timber stud manufacturing industry
- end users
- home and building owners and occupiers.



4. Sustainability

Integration

The GBMA supports the integration of Sustainable Development into member company policy and practice, in the areas of procurement, production, and application of members products.

Measurement

Measurement and reporting are key objectives of the GBMA, an approach considered best practice leadership.

The GBMA supports the application of LCA and Life Cycle Costs (LCC) as the bases for product development, manufacturing, design and construction decision-making.

Reduction

The GBMA seeks to reduce the environmental impact of gypsum board manufacturing in the built environment in Australia and New Zealand. Reduction of environmental impact will be achieved throughout the gypsum board lifecycle by reducing energy consumption, water usage, materials consumption, air pollution and waste production.

Capability Development

The GBMA seeks to

- support the growth of Sustainable Development within the industry and amongst stakeholders
- collaborate with government, customers and other stakeholders in the practice of Sustainable Development
- disseminate technical information, research and best practice on the achievement of Sustainable Development
- support, develop and promote Sustainable Development into industry training and skill enhancement
- provide resources for integrating Sustainable Development into industry practices.

Management

The GBMA supports Sustainable Development of buildings. It supports the construction of buildings that are:

- affordable and environmentally friendly
- healthy, safe and comfortable.



Marketing

Sustainability has always been important, but it is now an essential consideration for maintaining market leadership. Implementing sustainability measures at every opportunity, in addition to any legislated requirements, is considered best practice.

Timing

The GBMA is committed to an ongoing strategy of continuous improvement in Sustainable Development over many years in conjunction with customers, industry partners and concerned organizations, in order to achieve Sustainable Development goals.

Promotion

The GBMA seeks to share good practice in Sustainable Development by promoting the successes of employees and customers in achieving Sustainability goals. The GBMA will promote research, and communicate data, which facilitate decision making.

Rating Schemes

The GBMA encourages support for Sustainable Rating Schemes, standards and regulations which require evidence-based proof of compliance with clearly specified goals relating to energy, water, waste, toxic elements, indoor air quality, thermal comfort, acoustics, natural lighting, sustainable materials and CO₂ emissions. These Schemes will provide proof of compliance validated by independent third parties.

Building Products Innovation Council

The GBMA is a member of the Building Products Innovation Council (BPIC), and is participating in a broader study investigating environmental assessment tools for the building industry.

BPIC is seeking to establish a Life Cycle Inventory database which will aid in developing a nationally consistent methodology to measure environmental impact. It will also allow for materials to be compared on a like for like basis and to ultimately be incorporated into building rating tools.

The GBMA has commissioned an LCA of the Australasian gypsum board industry, summarised below. It is acting as the flagship for the BPIC program.

The LCA carried out by the GBMA is consistent with developing a nationally consistent methodology to measure environmental impact and the GBMA supports BPIC's intention to develop a methodology to be used in the building industry.



5. Life Cycle Assessment

Introduction

An independent consultant recognised in the field was used to conduct the GBMA LCA.

The procedure used for the LCA followed international protocols, and used a generic model as validation. The results presented were peer reviewed.

The LCA provides an overview for the GBMA member organisations by averaging data across the organisations surveyed, and as such involves some simplification of some processes.

Data collection was by questionnaire circulated to the member companies, with generic data from established models only used where no GBMA generic data was available.

The LCA process involved the following steps:

- Review of existing relevant LCA studies
- reporting on use and applications of LCA studies
- collection of GBMA specific data
- validation of GBMA specific data
- reporting.

LCA details

The LCA covers the following life cycle stages:

- gypsum mining
- transport to manufacturing site
- plasterboard production
- distribution
- end of life scenario.

The emphasis was on transport distances, energy consumption and fuel types, and resource (raw materials) consumption.



6. LCA results

The total primary energy consumed for the gypsum board cradle-to-gate life cycle is 5.66 MJ per kg of gypsum board produced. The embodied water from processing is 0.84 l/kg of gypsum board produced. Gypsum board is non-toxic to building occupants.

Detailed results are tabulated below.

Life cycle of average GBMA plasterboard	Primary Energy [MJ]	AP [kg SO ₂ -Equiv.]	EP [kg Phosphate-Equiv.]	GWP 100 [kg CO ₂ -Equiv.]	ODP [kg R11-Equiv.]	POCP [kg Ethene-Equiv.]
1 Gypsum Mining	0.04	1.85E-05	1.68E-06	0.0036	1.34E-12	1.68E-06
2 Gypsum Transport	0.14	2.61E-04	2.69E-05	0.0108	1.68E-11	1.60E-05
3 Plaster Mill	1.90	3.15E-04	2.61E-05	0.1406	2.02E-09	2.35E-05
4 Wallboard Production	3.58	5.83E-04	7.39E-05	0.2465	1.09E-08	7.65E-05
5 Distribution	0.37	1.34E-04	2.27E-05	0.0226	4.29E-11	1.09E-05
6 End of Life	0.31	1.18E-04	2.02E-05	0.0179	1.01E-10	2.10E-05
Total	6.34	1.43E-03	1.71E-04	0.4421	1.31E-08	1.50E-04
	Notes: AP: Acidification potential – SO ₂ , NO _x emissions EP: Eutrophication potential – increase in biomass production GWP 100: Global warming potential 100 years – CO ₂ , CH ₂ emissions ODP: Ozone depletion potential – CFC emissions POCP: Photochemical ozone creation potential – VOC + NO _x = O ₃					

Table 1: Life cycle impacts of average GBMA gypsum board, per kg of gypsum board produced.

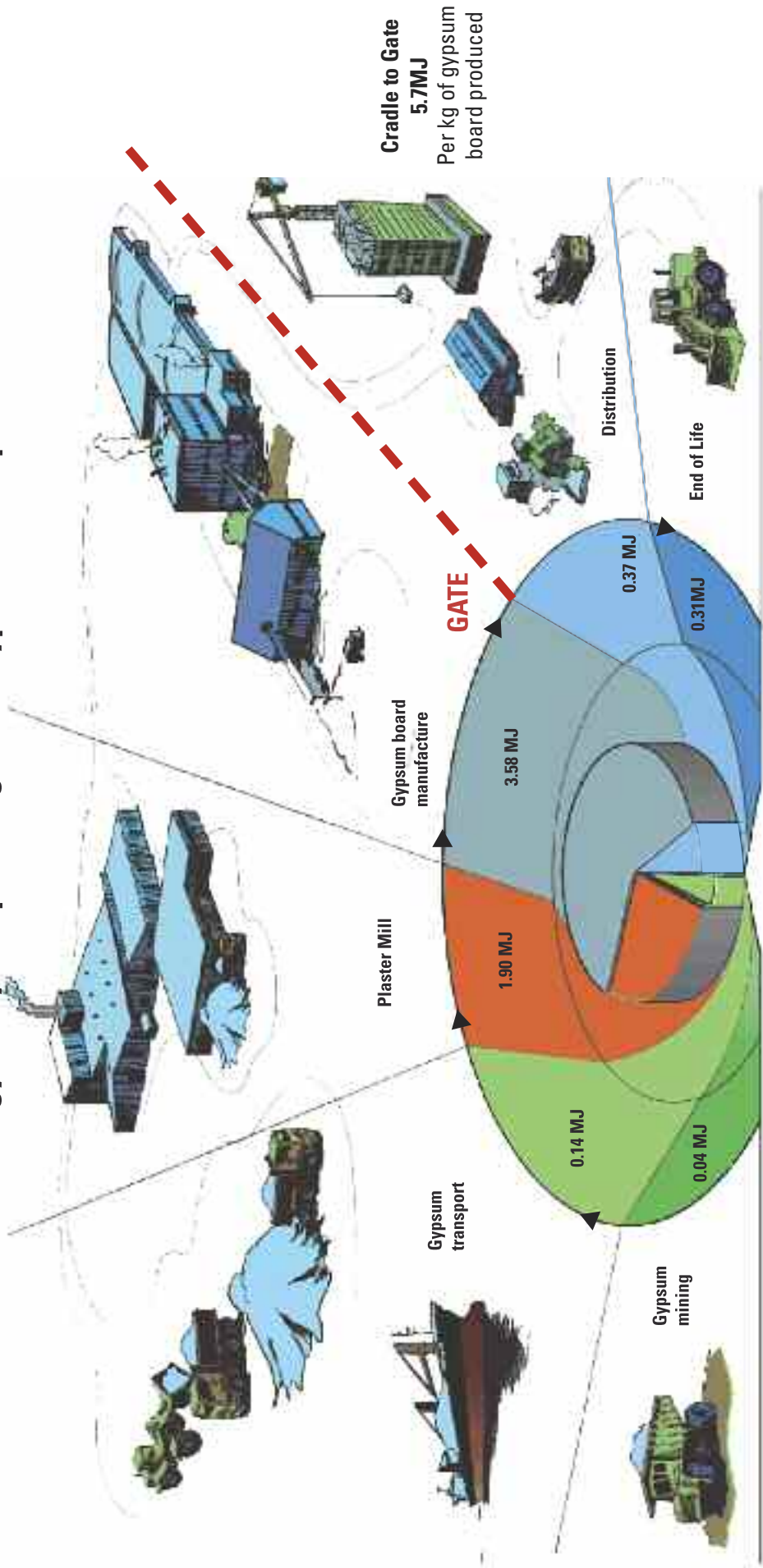
An overall combined embodied energy figure is a common mode of expressing and comparing the Life Cycle Impact of a product. The following table summarises the Embodied Energy for gypsum board arising from the LCA:

Embodied Energy for Gypsum Board		
	MJ per kg	MJ per m ²
Cradle to Gate	5.66	38.2
Cradle to Grave	6.34	42.8
<i>Note: on average, 176m² of Gypsum board weighing 6.76kg/m² is produced per tonne of plaster.</i>		

Table 2: Embodied energy, cradle to gate and cradle to grave.

Appendix 1:

Gypsum Board Manufacturers of Australasia
 LCA Embodied Energy Analysis - per kilogram of Gypsum board produced



CRADLE

GRAVE

Cradle to Gate
 5.7MJ
 Per kg of gypsum board produced

Total Embodied Energy 6.34 MJ
 per kg of Gypsum board produced
 Cradle to Grave

Appendix 2: Other GBMA Activities

1. Safety

Aims

To consistently work through industry-wide safety concerns to agree on common ground in order to improve Health & Safety in the gypsum board industry.

Progress is benchmarked through the sharing between employees & contractors of incident and safety related data and learning experiences.

Activities

An annual industry wide forklift challenge is conducted to celebrate excellence in forklift driving.

An industry manual handling program has been developed and disseminated.

2. Transport

GBMA Transport Group Mission Statement: "To collaboratively authorise, implement and continuously improve a Code of Practice that promotes safe, efficient, effective and legal transportation of Gypsum Wallboard products in our Australian and New Zealand communities".

Aims

To improve the methods used to move gypsum board across the country both in terms of safety and environmental impact.

Activities

A Code of Practice for Transport has been developed, that all GBMA members will abide by.

3. Training

Aims

To develop a national competency based training scheme that meets COAG requirements, in order to address a skills shortage and produce an adequately trained body of workers to ensure safe and satisfactory installation of gypsum board in Australia/New Zealand.

Outcomes

- Competency based with Pathways – electives enabling choice of skill set options
- Flexibility – Commercial or Residential streaming
- National Recognition – necessary for portability and licensing
- Funding availability
- Portability – Enables training and assessment in all regions, including remote areas.





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