

# SUMMARY

## **GLASS REPROCESSING FOR LOCAL MARKETS – A COST BENEFIT ANALYSIS CONDUCTED BY SHIRE OF AUGUSTA-MARGARET RIVER**

### ***Shire of Augusta-Margaret River: Towards Zero Waste project***

The Shire of Augusta-Margaret River (the Shire) region is a world renowned wine producing region and a popular holiday destination. An estimated 500,000 people visit the region annually, increasing the volume and complexity of the regions waste stream.

In 2007 the Shire undertook an analysis of its waste which identified a potential local glass resource of 908 tonnes per annum and a regional potential of 2600 tonnes per annum which could be diverted from landfill. Financial analysis showed that local reprocessing of glass and the potential reuse of recycled crushed glass (RCG) in civil construction applications locally would dramatically reduce landfill costs and significantly increase recycling rates.

As a result, the Shire received \$73,000<sup>i</sup> from the Australian Packaging Covenant to establish a GM-2 System glass reprocessor to crush glass containers collected from local kerbside and drop-off collections. The processor has been operational since October 2009 at the Davis Road Disposal Site as part of a new integrated resource recovery and recycling facility for processing co-mingled recyclables.

### ***First construction of regional glass road in Margaret River Western Australia***

Funded through a partnership between the Packaging Stewardship Forum (PSF) of the Australian Food and Grocery Council and the Shire of Augusta-Margaret River, two 1200 square metre sections of road pavement using RCG in the concrete surface will be constructed within the Shire. These two sections of road will use a total of 100 tonnes of RCG. This will be the first regional site in Western Australia to demonstrate that glass containers recovered from local collections provide an alternative to using virgin materials in road construction.

The Shire is also using RCG in drainage pipe embedment, road base and decorative pathways and has received enquiries from local businesses who are interested in the product<sup>ii</sup>.

### ***Financial Modelling: Glass reprocessing and reuse in local applications***

In 2007, prior to the Shire's new glass reprocessing infrastructure being installed, the average cost of recovery for approximately 200 tonnes of glass per annum was estimated at \$57 per tonne. In the infrastructure's first year of operation (2009) it was intended that 1000 tonnes of glass would be processed through the glass crusher at an estimated average cost of \$33 per tonne.

A financial analysis of the cost of dealing with glass containers before the glass crusher at 2007 prices and volumes was updated in 2010 to reflect the revised situation.

Please see estimated expenditure pre glass reprocessing infrastructure (2007) and post (2010):

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**Table 1: Estimated Expenditure – Pre Glass Reprocessing Infrastructure 2007**

ITEM	Low (200t / annum) \$/ tonne	High (500t / annum) \$/ tonne	Average Annual Cost \$/tonne
Capital (buildings, plant, equipment)	\$26.15	\$17.68	\$21.92
Operating (maintenance/labour)	\$38.10	\$33.08	\$35.59
<b>TOTAL EXPENDITURE</b>	<b>\$64.25</b>	<b>\$50.76</b>	<b>\$57.52</b>
ESTIMATED NET COST	Low (200t / annum)	High (500t / annum)	Average Annual Cost
Expenditure Glass Recovery	(\$12,850)	(\$25,380)	(\$19,112)
Income from processing charge/glass sales	\$8000	\$20,000	\$14,000
Net Revenue	(\$4,850)	(\$5,380)	(\$5,112)
Estimated Cost / Tonne	\$24.25	\$10.76	\$17.51
Landfill cost Saving	\$9400*	\$23,500*	\$16450≠
<b>NET REVENUE/SAVINGS</b>	<b>\$4550</b>	<b>\$18,120</b>	<b>\$11,335</b>

\*Rate assumption \$47/tonne based on no recovered glass returned to landfill

≠ Restated to reflect average diversion of 350t/annum

**Table 2: Estimated Expenditure – Post Glass Reprocessing Infrastructure 2010**

ITEM	Low 1000t/annum \$/ tonne	High 2000t/annum \$/ tonne	Average Annual Cost \$/tonne
Capital (buildings, plant, equipment incl glass processor)	\$23.16	\$12.91	\$18.04
Operating (maintenance/labour)	\$18	\$12.01	\$15.01
<b>TOTAL EXPENDITURE</b>	<b>\$41.16</b>	<b>\$24.92</b>	<b>\$33.04</b>
ESTIMATED NET COST	Low 1000t/annum	High 2000t/annum	Average Annual Cost
Expenditure Glass Recovery	(\$41,160)	(\$49,820)	(\$45,490)
Income from processing charge/glass sales	\$10,000	\$20,000	\$15,000
Net Revenue	(\$31,160)	(\$29,820)	(\$30,490)
Estimated Cost / Tonne	\$31.16	\$14.91	\$23.04
Landfill cost Saving	\$47,000*	\$94,000*	\$70,500
<b>NET REVENUE/SAVINGS</b>	<b>\$15,840</b>	<b>\$64,180</b>	<b>\$40,010</b>

\*Rate assumption \$47/tonne based on no recovered glass returned to landfill

The modeling assumes that the cost of landfill at \$47 per tonne has remained constant however the revenue rate from glass sales has reduced from \$40 per tonne in 2007 to \$10 per tonne. This variation is expected to reduce as new markets for the recycled crushed glass product develop.

By offsetting the costs of processing an average 1500 tonnes of glass per annum against the cost of putting the container glass in landfill there is a net saving of \$40,010. However the glass reprocessing operations are projected to be cost neutral by June 2010 by increasing reprocessing fees and income for glass sales increasing to a minimum of \$30 per tonne.

## Project achievements: Local Government and Industry working together

- Demonstrated the effectiveness of public-private partnerships where industry works with local government to develop solutions which are cost effective and better for the environment.

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- Increased the amount of glass recycled from 200 tonnes per annum before the glass reprocessing infrastructure to an average 1500 tonnes per annum with the new infrastructure. This is the equivalent of recycling an additional 2.5 million wine bottles.
- Reduced the glass mountain that had built up pending a solution.
- Provided the surrounding Shires, industry and hospitality outlets with a regional solution for glass reprocessing.
- Produced RCG to a standard which now meets nationally and independently verified specifications for use.
- Developed markets for recycled crushed glass including use in civil engineering and the construction industry.

## ***Promoting National Specifications for use of recycled crushed glass in construction***

The Packaging Stewardship Forum (PSF) of the Australian Food and Grocery Council commissioned ARRB Group to develop specifications for the manufacture and supply of recycled crushed glass in various civil construction applications for the Australian market. The project has been peer reviewed by GHD's geotechnical division to verify the accuracy of the data and the references within the report. The study has been informed by international standards and percentage mix of glass with aggregate.

Environmental contaminant testing has also been included in the specification. The requirements will vary state by state, but the specification is based upon *The recovered glass sand exemption 2010* of the NSW Department of Environment, Climate Change and Water in relation to type and frequency of testing (see details at: <http://www.environment.nsw.gov.au/resources/waste/ex10glasssand.pdf>).

These national specifications have been developed by the PSF for use by local and state authorities and others responsible for the procurement of materials and the construction of paving and roads. For the first time, Australia now has standard specifications for the use of recycled crushed glass in asphalt, concrete, road base and pipe embedment.

## ***Markets for recycled crushed glass***

Recycled crushed glass product can be used in a variety of construction applications. These include:-

- as sub-base aggregate for use in footpaths, road base, kerbing and asphalt;
- as a partial replacement for sand in concrete and asphalt road surfaces;
- as a partial replacement for sand in golf course bunkers
- as engineering fill or blended with natural or crushed sands for use as pipe or block paving bedding.

*For further information and to obtain a copy of the specifications please contact Chris Jeffreys, PSF Program Manager Glass Recovery & Recycling, on [chris.jeffreys@afgc.org.au](mailto:chris.jeffreys@afgc.org.au) or 0403 486 454.*

<sup>i</sup> Shire of Augusta Margaret River Forward Capital Works Program 2010-11 to 2014-15

<sup>ii</sup> Glass Reprocessing for Local Markets. Final Project Evaluation Report 31/5/2010