Wednesday 31st Oct 2018

State of Waste

Current trends and opportunities in the Waste and Recycling industry

Presented by Mike Ritchie

11:40 AM - 12:15 PM
25 min presentation + 10 min Q&A

EMERGING PROFESSIONALS
Hear from a range of rising professionals who will talk about how they got to where they are, what they do in a day, and their advice for starting a career in the environment industry.

WEDNESDAY 31 OCTOBER 2018
EIANZ STUDENTS AND EARLY CAREERS CONGRESS
The Coal Loader Centre for Sustainability | 2 Balls Head Drive, Waverton NSW 2060
National Waste Generation
compound annual growth rate of 6.2%
1996/97

Generation: 22.7 Mt

Recovery: 1.5 Mt

21.2 Mt Landfill

2014/15

Generation: 53 Mt

Recovery: 32 Mt

61%

21 Mt Landfill

Source: ABS, 2007-2014
More waste, more recycling

Source: ABS, 2007-2015

Year

Waste generation
Waste disposal
Waste recycling
Energy recovery

Million tonnes

Source: ABS, 2007-2015
Landfill Levies

Financial Year

Levy $/t

$140.20/t

NSW Levy
Vic Levy
SA Levy
WA Levy
Qld Levy

MRA Consulting Group
Landfill Pricing

The chart illustrates the landfill pricing for various cities: Sydney, Canberra, Adelaide, Melbourne, Brisbane, Perth, Darwin, and Hobart. Sydney has the highest landfill price at around $350 per tonne, while the other cities have significantly lower prices, with Hobart and Darwin having the lowest at around $100 per tonne.
Economics of Waste

- Cost per tonne ($) vs. Green $ Value
- Large Tonnage

- Diversion rate from landfill

- plastic bags
- butts
- CD’s
- returned food
- textiles
- batteries
- fluoro tubes

- metals
- cardboard
- hard plastics
- soft plastics
- wood
- mattresses
- glass
- concrete
- returned food waste, manure
- organics

MRA Consulting Group
Focus on mixed waste streams

- Plastic bags: 36,700 t
- Tyres: 161,000 t
- Computers: 49,000 t
- Printer Cartridges: 2058 t
- Mixed C+D
- Mixed C+I
- Mixed MSW
- Organics
- CDL: 790,000 t
- TV: 27,500 t
- Paint: 5,000 t
- Oil: 244,750 t
- Cigarette butts: 7,200 t

Total: 23 MT

Landfill: 21.7 MT
Key trends – Organics out of landfill

23 MT Waste

1.3 MT
- Plastic bags
- Tyres
- Computers
- Printer Cartridges
- TV
- CDL
- Household paint
- Oil
- Cigarette butts

10.5 MT Organics
- Methane
- Climate change
Can you achieve the state targets with 3 bins? – YES (but only with Food in the green bin)
Kerbside organics collection services in NSW (by 2016)

- Food and Garden Organics
- Garden Organics
- No Organics Bin Service

NSW EPA (Environmental Protection Authority)
FOGO

**Bin Systems**
- 67 councils GO NSW
- 11 councils FOGO NSW
- 25 councils implementing FOGO NSW

- 30 metro Melbourne FOGO
- Approx 8 rural VIC

- 12 metro Adelaide FOGO
- 4 metro Perth FOGO
### Key trends – Govt grants for infrastructure

**Waste Less, Recycle More 2017–21 Extension**
A $337 million grants and funding initiative

#### Waste and Recycling Infrastructure Package

<table>
<thead>
<tr>
<th>fund</th>
<th>Grantees</th>
<th>Amount ($)</th>
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<tbody>
<tr>
<td>Organics Infrastructure Fund and Program</td>
<td>Organic infrastructure (large and small) grants</td>
<td>$14 million</td>
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<td></td>
<td>Weighbridges</td>
<td>$0.5 million</td>
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<tr>
<td></td>
<td>Recycling program</td>
<td>$22.5 million</td>
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<td>Business recycling program</td>
<td>$168 million</td>
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<td>Heads of Asbestos Coordination Authorities programs</td>
<td>$4 million</td>
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<tr>
<td></td>
<td>Business advisory services and rebates, including Bin Trim grants</td>
<td>$12.5 million</td>
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<td></td>
<td>Industrial ecology business support</td>
<td>$5 million</td>
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<td></td>
<td>Other business support initiatives</td>
<td>$5 million</td>
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#### Local Government Waste & Resource Recovery Program

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<th>Grants</th>
<th>Amount ($)</th>
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<tr>
<td>Better Waste and Recycling Fund</td>
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<td>$39 million</td>
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<tr>
<td>Illegal Dumping Prevention and Enforcement Fund</td>
<td>Illegal dumping, clean up, prevention and engagement programs</td>
<td>$4 million</td>
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<tr>
<td>Organics Infrastructure Fund and Program</td>
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<td>$35.5 million</td>
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<td>Waste and Recycling Infrastructure Fund</td>
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<td>Systems for household problem wastes</td>
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<td>$57 million</td>
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<td>Recycling Innovation Fund</td>
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<tr>
<td>Business Recycling Program</td>
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<td>$22.5 million</td>
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**For more information on the initiative and how to apply for grants through the NSW Environment Protection Authority visit [www.epa.nsw.gov.au](http://www.epa.nsw.gov.au)**
Infrastructure - C+I Sorting facilities

1. Camellia, Sydney – 20,000 t/yr
2. Doyle Brothers – 29,000 t/yr
3. WasteFree – 15,000 t/yr
RDF
## RDF Manufacturing Facilities in Australia

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Facility</th>
<th>Status</th>
<th>RDF/PEF Output Capacity (tpa)</th>
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<tbody>
<tr>
<td>Biocoal</td>
<td>NSW</td>
<td>Earthcare SRF</td>
<td>Operational</td>
<td>50,000</td>
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<td>Global Renewables</td>
<td>NSW</td>
<td>Eastern Creek Ur-3R Facility</td>
<td>Awaiting Licence</td>
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<td>ResourceCo</td>
<td>NSW</td>
<td>Eastern Creek PEF Facility</td>
<td>Pipeline</td>
<td>57,000</td>
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<tr>
<td>ToxFree</td>
<td>NSW</td>
<td>St. Mary’s</td>
<td>Operational</td>
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<tr>
<td>Visy</td>
<td>NSW</td>
<td>Smithfield MRF</td>
<td>Operational</td>
<td>45,000</td>
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<tr>
<td>Veolia</td>
<td>NSW</td>
<td>Camellia Recycling Centre</td>
<td>In Development</td>
<td>45,000</td>
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<tr>
<td>Doyle Brothers</td>
<td>NSW</td>
<td>Fairfield MRF</td>
<td>Operational</td>
<td>5,000</td>
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<tr>
<td>SUEZ-ResourceCo</td>
<td>SA</td>
<td>Alternative Fuels</td>
<td>Operational</td>
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<tr>
<td>KTS Recycling</td>
<td>Vic</td>
<td>Knox Transfer Station Process Engineered Fuels</td>
<td>In Development</td>
<td>30,000</td>
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</table>

**TOTAL** 380,000
Infrastructure Options

18

[Diagram showing options for waste management]

- Source Separation
  - Commercial Wastes
    - Mixed Processing
      - Mechanical Biological
        - MRF + Dirty MRF
        - Landfill
        - Compost
        - Anaerobic Digestion
      - Thermal
        - Incineration
        - Gasification
        - Pyrolysis
The Next Generation Incinerator, Eastern Creek (almost refused)

- Proposed
- Moving grate incinerator
- 1.35 Mtpa of residual waste
- $800m capex
- 140MW electricity
# Thermal Processing Facilities in Pipeline or Proposed

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<thead>
<tr>
<th>Company</th>
<th>Proposed Location</th>
<th>Cost ($m)</th>
<th>Size (tpa)</th>
<th>Energy Outputs (MW)</th>
<th>Technology Type</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Dial-a-Dump</td>
<td>Eastern Creek (NSW)</td>
<td>$700</td>
<td>1,200,000</td>
<td>140</td>
<td>HZI Moving grate</td>
<td>Unlikely to proceed.</td>
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<td>ReGroup</td>
<td>Mt Piper Lithgow (NSW)</td>
<td>$160</td>
<td>400,000</td>
<td>30</td>
<td>Moving grate</td>
<td>Construction 2019</td>
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<tr>
<td>New Energy</td>
<td>Port Hedland (WA)</td>
<td>$180</td>
<td>130,000</td>
<td>18.5</td>
<td>Entech gasification</td>
<td>Construction 2019</td>
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<tr>
<td>New Energy</td>
<td>East Rockingham (WA)</td>
<td>$160</td>
<td>130,000</td>
<td>18</td>
<td>HZI moving grate</td>
<td>Construction 2019</td>
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<tr>
<td>Phoenix</td>
<td>Kwinana (WA)</td>
<td>$400</td>
<td>400,000</td>
<td>32</td>
<td>Martin GmbH reverse-acting grate</td>
<td>Subject to finance</td>
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<td>EMRC</td>
<td>Hazelmere (WA)</td>
<td>$25</td>
<td>13,000 Wood waste</td>
<td>3.5</td>
<td>Pyrolysis</td>
<td>Under construction.</td>
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<td>Aust Paper</td>
<td>Merryvale Vic</td>
<td>$200</td>
<td>MSW</td>
<td>?</td>
<td>Incinerator</td>
<td>Proposed</td>
</tr>
</tbody>
</table>
Imports of solid waste that can be substituted by domestic resources will be phased out by the end of 2019” – State Council of China

- it is NOT about contamination. It is about industry policy.
Australia - some key points

China takes half our exports: 600,000 t fibre; 40,000 t Plastic

Contamination
  - MRF contamination is not the same as Export contamination
    Export contamination is contracted and logical

It is efficient to capture the last 5% in the secondary re-processor
  - Reflected in the price
Relative importance – it is all about fibre
The impacts on commodity prices – China Product Glut & Glass Crash

The impacts:
1. Reduced import licenses
2. Oversupply
3. Crash in price globally
The impacts on MRF’s

MRFs are no longer profitable at new commodity prices and existing gate fees.

Gate fee +$30-($40)

$225 Paper Mix → $0-50
$250 Plastic Mix → $0-50
$72 Glass
$100 Steel
$1,500 Aluminum

Weighted Av loss:
Simple MRF = $112/input t
Full sort MRF = $60/input t
The impacts on Australian Councils and households

Increased Simple MRF costs - $112/t ($60 for Full Sort MRF)

Rate increase per Household: $31/year (80c per week)

Approx 4% increase in rates

- not including future falls

Average household generates 5.4 kg/wk\(^1\) or 280kg/yr

\(^1\) Source: NSW Local Government WARR Data Report
What is happening now?

Recyclables ARE still being exported, albeit at lower prices
• Prices for pure streams still strong
  - PET $250
  - HDPE $400
  - Alum $1500
  - OCC fibre $150
• Mixed paper and Mixed Plastic $0-50 – stabilised recently

MRF gate fees are increasing
• but they remain lower than landfill
• most Councils currently negotiating
What next: Options

Accept the lower sale price of exporting to other Asian countries
Cost $60-112/t
Only available if Asian markets are able to absorb

Operate MRFs to 99.5% quality
Up to $400/t

On-shore secondary reprocessing
value-add to product
Plastic and Glass most likely
Est $250/t
Cost benefit has not been done – limited markets for plastic pellets and glass. Unlikely fibre mill will be “on-shored”.

Mid term – Circular Economy - “On-shore” reprocessing
Recycling supply chain

Household → MRF → Secondary Reprocessing - AUS → Export

Secondary Reprocessing - Asia → Tertiary Remanufacture - Asia

Tertiary Remanufacture - AUS
Some take away messages:

Don’t argue to incinerate recyclables

Improve what we have today:
1. Education to reduce contamination
2. Improve MRF efficiency
3. “On-shore” secondary reprocessing
4. Adopt Circular Economy policies
NSW CDS architecture

- Subject of negotiations between Councils and MRFs
CDS Impacts - MRF

Gate Fee
- 17%

Tonnage
- 17%

Cost ↓ or =
- Maintenance costs
- Operational costs
- Insurance costs
- ?

Cost ↑
- CDS Costs
- Audit
- Reporting
- ?

$0

-$100 k*

* Assuming:
- $80k/annum for audits
- 1x $20 k Annual Recycling Statement (per MRF Protocol)
Climate Change
Carbon emissions

1. Landfills = 11 MT emissions

2. Capture = 50% of full life emissions

3. ERF - generate ACCU’s for capture and destruction of methane = $10.60

4. Need to register a project under a methodology:
   - Landfill gas destruction
   - Organics diversion from landfill e.g. 3 bin system
   - AWT
   - Energy efficiency – street lighting
   - Truck fuel
   - Energy from waste – energy, ACCU and REC’s
Paper & Cardboard embodied energy

240L bin fortnightly:

CO²e savings = 2.3 t per year

Equivalent to:

- 11,414 hours use of an average LCD TV
- 7,000 km travelled by an average car
Recycled containers embodied energy

FCM 240L bin:

**CO2e savings = 0.5 t per year**

Equivalent to:

- 2,470 hours use of an average LCD TV
- 1,500 km travelled by an average car
Summary – 3 key actions:

1. Capture landfill gas = 8.6 MT
2. Avoid landfilling Organics = 13.6 MT
3. Recycling high embodied energy materials = 11 MT

= 35 MT per year

Turnaround is 42.5 MT (35MT + avoided emissions of 7.5MT)
Almost equal to the GHG emissions of all cars in Australia in one year (43 Mt of CO$_2$e)
Typical C+I waste
Regulations

• Minimum landfill standards – 5% real cost increases/year

• Disposal bans
  • E Waste - Vic
  • Tyres - ACT, NSW, WA, Vic, SA
  • Mattresses - ACT
  • Clinical waste NSW Tas
  • E-waste – NSW,SA, ACT – tyres & clinical wastes
  • Hazardous waste Vic, SA
  • Contaminated Soil - Tas
  • Radioactive waste - Tas
  • Liquid waste - Vic
Extended Producer Responsibility (EPR)

• **Current:**
  - Packaging
  - Mobile phones
  - Agvet chemicals
  - Agvet chemical containers
  - Used oils and lubricants
  - Tyres
  - E-waste
  - Mercury-containing lamps
  - Paints

• **Proposed:**
  - Handheld batteries
  - Air conditioners
  - Refrigerators
Priority Streams
Organics Priority

20 MT Waste

1.3 MT
- Plastic bags
- Tyres
- Computers
- Printer Cartridges
- TV
- CDL
- Household paint
- Oil
- Cigarette butts

10.5 MT Organics
- Methane
- Climate change

MRA Consulting Group
Organics in Commercial stream = 78%
FOGO

Bin Systems
- 67 councils GO NSW
- 11 councils FOGO NSW
- 25 councils implementing FOGO NSW

- 30 metro Melbourne FOGO
- Approx 8 rural VIC

- 12 metro Adelaide FOGO
- 4 metro Perth FOGO
Preferred State Govt Household Bin systems

Put food into the GREEN bin
Collect it weekly
Push garbage to fortnightly

140 L  240 L  240 L  360 L  240 L

Green /Food Weekly

MRA Consulting Group
Preferred C&I bin system

Food  P&C  Garbage  Metal  Plastic
Focus on the right waste streams...

Plastic bags: 20,700t (3.92 billion bags)
Tyres 280,000t
Computers: 25,000t
Printer Cartridges: 5000t

CDL: 600,000 t (16 billion containers)

Textiles
Plastic
Stones
e tc.

TV: 15,000t
Paint: 77,400t
Cigarette butts: 15,000t
Oil: 93,000t

23 MT
Mixed C&I
Mixed C&D
MSW
ORGANICS

21.7 MT
Landfill
Commercial Considerations
## Grants

### Waste and Recycling Infrastructure Package

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### Other Programs

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<td>Regional coordination and strategy for the Greater Sydney Region</td>
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<td>Regional coordination and strategy for the Voluntary Regional Waste Groups</td>
<td>$8 million</td>
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<tr>
<td>Landfill consolidation and environmental improvements</td>
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<td>Waste management in Aboriginal communities</td>
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<td>Education campaign and support</td>
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<td>Local government litter programs</td>
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<td>Community Litter Grants</td>
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Grants for bins - NSW

• Up to 50% funding, capped at $50,000 per site
Grants for food - NSW

Up to 50% funding, capped at $50,000 per site

ORCA
• Rapid composting organic material
• Offers 30 Day Free Trial

Closed Loop
• Rapid Composting organic material
• Reduces waste volume by up to 90% in 24 hours

Pulp Master
• Pulps food waste to produce organic fertilizer
Bin Trim

• Waste less recycle more gran
• Increase recycling
• Divert waste from landfill
• 22,000 businesses
• Limited to businesses with 400 FT employees
• Reduce costs
Bin Trim - Round 3

- MRA aims to help 900 businesses to divert 3000 tonnes

“Rebate Program”
- $1,000 - $50,000 worth for recycling equipment
- Rebate up to 50% of capital costs
Weight Based Billing

• The problem – volume based charging

• WBC allows waste generators to:
  • be more aware of the true cost of landfilling waste
  • adjust their behaviour

• Proven results
  • - 45% reduction in waste to landfill in parts of the UK
  • - 31% decrease in waste generation in Sweden HHs

• MUST use NMI approved scales
# Weight Based Billing

## Small C&I generator (e.g. a café)
- Waste stream: MSW
- Volume mechanism: ✔$/bin lift
- Weight mechanism: ✔$/t at facility per truck

## Large C&I generator (e.g. Bunnings)
- Waste stream: C&I
- Volume mechanism: ✔$/skip bin size
- Weight mechanism: ✖ Unneeded due to job size

## C&D generator (e.g. multi unit development)
- Waste stream: C&D
- Volume mechanism: ✖ No price transparency
- Weight mechanism: ✔$/t at facility per truck

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<tr>
<th>Waste stream</th>
<th>Volume mechanism</th>
<th>Weight mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW</td>
<td>✔$/bin lift</td>
<td>✔$/t at facility per truck</td>
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<tr>
<td>C&amp;I</td>
<td>✔$/skip bin size</td>
<td>✖ Unneeded due to job size</td>
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<tr>
<td>C&amp;D</td>
<td>✖ No price transparency</td>
<td>✔$/t at facility per truck</td>
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C+I sorting and PEF
C+I Sorting facilities

SITA
Bingo
Remondis – Taren Pt
Veolia
Doyle Bros

All small
Tendering and Contracts

• Prices rising
• Landfill levy
• MRA standard Collection Contract
• Waste Specifications
**Tender Assessment Macro (TAM)**

1. Costs
2. Service
3. Reporting

<table>
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<th>Services</th>
<th>General waste</th>
<th>Plastic</th>
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</tbody>
</table>
Education

Build engagement
Reduce contamination
Maximise diversion
Education and Training pays dividends

Relationship between landfill costs and % reduction in cost of disposal

- Recycling rates
  - 5%
  - 10%
  - 20%
  - 30%
  - 40%
  - 50%

% reduction in cost of disposal vs. Landfill costs
Paper & Cardboard embodied energy

240L bin fortnightly:

$\text{CO}_2\text{e savings} = 2.3 \text{ t per year}$

Equivalent to:

- 11,414 hours use of an average LCD TV
- 7,000 km travelled by an average car
Recycled containers embodied energy

FCM 240L bin:

CO2e savings = 0.5 t per year

Equivalent to:

- 2,470 hours use of an average LCD TV
- 1,500 km travelled by an average car
THE NABERS RATING SCALE

1 STAR
POOR

2 STARS
BELOW AVERAGE

3 STARS
AVERAGE

4 STARS
GOOD

5 STARS
EXCELLENT

6 STARS
MARKET LEADING

MRA Consulting Group
Rating categories

- National rating system that measures the environmental performance of Australian buildings, tenancies, and homes

Launched in May 2018
## Waste Sorting

<table>
<thead>
<tr>
<th>Mandatory</th>
<th>Optional</th>
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<tbody>
<tr>
<td>General waste</td>
<td>Green waste</td>
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<tr>
<td>Dry waste</td>
<td>Soft plastic</td>
</tr>
<tr>
<td>Mixed recycling</td>
<td>Secure paper</td>
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<tr>
<td>Cardboard</td>
<td>E-waste</td>
</tr>
<tr>
<td>Paper</td>
<td>Batteries</td>
</tr>
<tr>
<td>Organics</td>
<td>Light globe/tubes</td>
</tr>
<tr>
<td>Glass</td>
<td>Polystyrene</td>
</tr>
</tbody>
</table>
Waste rating methodology

On site weighing

Densities Contamination rates
Data Integrity

Raw Data

Adjusted Data

Waste Collection

Waste Rating

Waste performance and reporting
NSW Container Deposit architecture

- Subject of negotiations between Councils and MRFs

$120/t
$150/t
Eligible Beverage Containers

**IN**
Size: 150 ml – 3L

**OUT**
Size: >3L, wine and milk

Full list of ineligible containers on the NSW EPA website
Recommendations

1. Maximise source separation
   - Cardboard
   - Food
   - Plastic
   - RVM’s
   - Metal
2. Introduce WBB and invoicing
3. Require reporting
4. Tender regularly and at scale
   - Using a proper waste contract (‘Unfair Terms’)
5. Staff training, Signage and Education
6. Use C+I sorting facilities
7. Apply for grants – Bin Trim etc
thank you

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• Commercial
• Strategy
• Planning
• Auditing
• Education
• Modelling
• Engineering
• Due diligence