AUSTRALIA & NEW ZEALAND BIOSOLIDS PARTNERSHIP

BIOSOLIDS PRODUCTION IN AUSTRALIA

OCTOBER 2019
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Pollution Solutions & Designs (PSD) pty ltd
contact: Catherine Vero
catherine.vero@psd.net.au
(08) 8955 0033
0432 722 387
## Table of Contents

1. Introduction ................................................................................................................. 3  
2. Method ........................................................................................................................ 3  
3. Classifications ........................................................................................................... 4  
   3.1 Production ............................................................................................................. 4  
   3.2 End use .................................................................................................................. 4  
   3.3 Stabilisation grade ............................................................................................... 4  
   3.4 Contamination grade ......................................................................................... 4  
   3.5 Stabilisation process .......................................................................................... 5  
   3.6 Dewatering process ......................................................................................... 5  
4. Results ....................................................................................................................... 6  
   4.1 Production ........................................................................................................... 6  
   4.2 End use ................................................................................................................ 7  
   4.3 Stabilisation grade ............................................................................................. 11  
   4.4 Contaminant grade ............................................................................................ 15  
   4.5 Stabilisation process ......................................................................................... 19  
   4.6 Dewatering process ......................................................................................... 23
1 INTRODUCTION

In 2010, the Australian & New Zealand Biosolids partnership (ANZBP) commissioned a national survey to identify the main features of biosolids management across Australia and New Zealand. The survey was repeated in 2013, 2015, 2017 and again in 2019. This report pertains to Australia only and collates survey results for the 2018/19 financial year. This survey catalogues the following primary parameters:

- Biosolids production;
- Biosolids end use;
- Biosolids stabilisation grade;
- Biosolids contamination grade;
- Biosolids primary stabilisation process;
- Biosolids dewatering process.

These are the same parameters as previous surveys, with the exception of contamination grade which was added to the 2013 survey data. The results of this survey are presented on a national and state basis. Some discussion is also provided on significant changes since 2010.

2 METHOD

The approach used to determine the biosolids production in Australia was to survey as a minimum all plants servicing over 25,000 people or 5 ML/day. The ANZBP identified that this criterion would capture around about 80% of Australia’s population. In the course of the survey many water utilities provided information on plants smaller than this threshold and where they did, the data was included. This year over 320 sites were surveyed representing a total equivalent person (EP) count of about 24.8 million. Note that EP can include commercial inflow so does not cover every site in Australia however the data collected represents a very high proportion of biosolids produced in Australia.

All classifications are made on the basis of dry tonnes of production.

The method for collecting biosolids production figures for lagoon-based systems changed in 2016/17. Previously, utilities were asked to estimate the average biosolids output from a lagoon. For the 2016/17 survey and this year they were asked to provide data on the quantity of biosolids which were removed from a lagoon. If no biosolids were removed, then the quantity was zero.

The standardised Contaminant Grades were streamlined this year as described in section 3.4. There is no significant change to the results because of lack of data one of the now combined categories.
3 CLASSIFICATIONS

To enable relatively simple analysis and presentation of the data, each area of information, such as end use, is classified into broad groupings. These groupings are discussed below.

3.1 PRODUCTION

Production is presented in terms of tonnes of dry biosolids.

3.2 END USE

The following classifications were used for end use:

- Agriculture: for biosolids applied to land for its fertiliser value without value added processing;
- Landscaping (compost): for biosolids processed through a composting facility and used for landscaping or other horticultural use;
- Forestry: for biosolids applied to plantation forests to aid tree growth;
- Landfill: for biosolids disposed to landfill;
- Ocean discharge: for biosolids discharged to the ocean;
- Stockpile: for biosolids stored, pending future planning, processing or use;
- Land rehabilitation: for biosolids applied to land, such as mine sites for rehabilitation of the land;
- Other: any other uses;
- Unspecified: for sites for which no data was provided by the utility or for which the end use could not be identified.

The following uses can be classified as being ‘beneficial’ uses: agriculture, landscaping, forestry and land rehabilitation.

3.3 STABILISATION GRADE

Due to the different standards and naming conventions used for Stabilisation Grades across Australia, a standardised grading schema was applied (see Table 1). Stabilisation grade was classified on the basis of an A, B or Unstabilised grading. Some biosolids were not graded by the utility and are marked as NG (not graded) in the survey results.

Table 1 – Stabilisation grading

<table>
<thead>
<tr>
<th>Classification</th>
<th>NSW</th>
<th>Vic</th>
<th>SA</th>
<th>Qld</th>
<th>Tas</th>
<th>WA</th>
<th>NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>T1, T2</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>P1, P2</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>T3</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>P3</td>
<td>B</td>
</tr>
<tr>
<td>Unstabilised</td>
<td>C</td>
<td>Unstabilised</td>
<td>Unstabilised</td>
<td>C</td>
<td>C</td>
<td>P4</td>
<td>Unstabilised</td>
</tr>
</tbody>
</table>

3.4 CONTAMINATION GRADE

Due to the different standards and naming conventions used for Contaminant Grades across Australia, a standardised grading schema was applied (see Table 2). Contamination grade was classified on the basis of an A, B, C and Restricted/ Unsuitable for Use. Some biosolids were not graded by the utility and are marked as NG (not graded) in the survey results.
Victorian biosolids classified as C2 have been allocated a B contaminant grading consistent with previous surveys.

A previous category of Unsuitable for Use was used for Contaminant Grade E biosolids from New South Wales and Queensland. This year, any data collected with this grading was rolled in with the Restricted/Unsuitable for Use category. This biosolids with E contaminant grade was less than 0.2% of biosolids produced.

### Table 2 – Contaminant grading

<table>
<thead>
<tr>
<th>Classification</th>
<th>NSW</th>
<th>Vic</th>
<th>SA</th>
<th>Qld</th>
<th>Tas</th>
<th>WA</th>
<th>NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>C1</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>C1</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>C2</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>C2</td>
<td>B</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C2</td>
<td>B</td>
</tr>
<tr>
<td>Restricted or Unsuitable for Use</td>
<td>D, E</td>
<td>Unsuitable for use</td>
<td>Unsuitable for use</td>
<td>D, E</td>
<td>Unsuitable for use</td>
<td>Unsuitable for use</td>
<td>Unsuitable for use</td>
</tr>
</tbody>
</table>

#### 3.5 STABILISATION PROCESS

Classification of the stabilisation process was made on the basis of the primary stabilisation process following the sewage treatment process. The following stabilisation process categories were used:

- **Anaerobic digestion**
- **Aerobic digestion**
- **Agitated air drying**
- **Thermal drying**
- **Autothermal thermophilic aerobic digestion (ATAD)**
- **Thermal hydrolysis (e.g. CAMBI)**
- **Composting** (used only for biosolids with no prior stabilisation)
- **Incineration**
- **Lagoon** (used for biosolids stored in liquid form)
- **Lime stabilisation**
- **Long term storage** (used for biosolids stored in dewatered form)
- **Thermophilic anaerobic digestion**
- **None**
- **Other**
- **Unspecified**

#### 3.6 DEWATERING PROCESS

Classification of the dewatering process was made on the basis of the following categories:

- **Belt filter press**
- **Conventional centrifuge**
- **High solids centrifuge**
- **Drying bed or drying lagoons**
- **None**
- **Other**
- **Unspecified**
4 RESULTS

4.1 PRODUCTION

The total biosolids production of Australia identified in the current survey is 371,000 tonnes per year of dry solids, representing approximately 13% growth from the 2016/17 year. The previous survey results are shown in Table 3. From the data, the average solids content of dewatered biosolids is around 16% and this equates to around 2.3 million tonnes of biosolids in dewatered form (also called wet biosolids).

Table 3 – Annual biosolids production

<table>
<thead>
<tr>
<th>Year</th>
<th>Tonnes dry solids</th>
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<tbody>
<tr>
<td>2010</td>
<td>300,000</td>
</tr>
<tr>
<td>2013</td>
<td>333,000</td>
</tr>
<tr>
<td>2015</td>
<td>310,000</td>
</tr>
<tr>
<td>2017</td>
<td>327,000</td>
</tr>
<tr>
<td>2019</td>
<td>371,000</td>
</tr>
</tbody>
</table>

A breakdown by state of biosolids production is given in Chart 1. There were no significant changes in proportional state contribution from 2017 to 2019.

Chart 1: Biosolids Total Production 2018/19
Australia
4.2 END USE

Biosolids end use nationally and for each state is presented in Charts 2 to 8 following.

Beneficial use counts for 91% of biosolids end use in Australia, a slight drop from 94% in the previous survey.

The proportion of biosolids to agricultural is now about 70%, after an upward trend from 55% in 2010 to 75% in 2017. Land rehabilitation increased in proportion this year from 11 to 16% with the change in use being from agriculture to land rehabilitation.
Chart 3: Biosolids End Use 2018/19
New South Wales & Australian Capital Territory

- Agriculture: 48%
- Land rehabilitation: 22%
- Landfill: 9%
- Landscaping (compost): 17%
- Ocean discharge: 3%
- Stockpile: 1%

Chart 4: Biosolids End Use 2018/19
Queensland

- Agriculture: 92%
- Land rehabilitation: 8%

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Page 8

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Chart 5: Biosolids End Use 2018/19
South Australia

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture (compost)</td>
<td>98%</td>
</tr>
<tr>
<td>Landscaping (compost)</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
</tr>
</tbody>
</table>

Chart 6: Biosolids End Use 2018/19
Tasmania

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill</td>
<td>1%</td>
</tr>
<tr>
<td>Landscaping (compost)</td>
<td>99%</td>
</tr>
</tbody>
</table>
Chart 7: Biosolids End Use 2018/19
Victoria

- Agriculture: 61%
- Land rehabilitation: 31%
- Stockpile: 5%
- Landscaping (compost): 3%

Chart 8: Biosolids End Use 2018/19
Western Australia & Northern Territory

- Agriculture: 59%
- Landfill: 12%
- Stockpile: 17%
- Other: 6%
- Landscaping (compost): 6%
4.3 Stabilisation Grade

Biosolids stabilisation grade nationally and for each state is presented in Charts 9 to 15 following.

Not graded and Grade B have remained in similar proportions from the previous survey. Grade A is slightly higher in proportion and Not Graded slightly lower.

Chart 9: Biosolids Stabilisation Grade 2018/19
Australia

Chart 10: Biosolids Stabilisation Grade 2018/19
New South Wales & Australian Capital Territory
Chart 11: Biosolids Stabilisation Grade 2018/19
Queensland

- Unstabilised: 35%
- A: 25%
- B: 40%
Chart 12: Biosolids Stabilisation Grade 2018/19
South Australia

Chart 13: Biosolids Stabilisation Grade 2018/19
Tasmania
Chart 14: Biosolids Stabilisation Grade 2018/19
Victoria

Chart 15: Biosolids Stabilisation Grade 2018/19
Western Australia & Northern Territory
4.4 CONTAMINANT GRADE

Biosolids stabilisation grade nationally and for each state is presented in Charts 16 to 22 following. This is the first survey where there has been a significant shift in the contaminant grade from previous surveys. The proportion of biosolids graded as contaminant grade C reduced from 49% to 36% with most of this shift being to contaminant grade B. This is almost entirely a shift by New South Wales producers.

Chart 16: Biosolids Contaminant Grade 2018/19
Australia

Chart 17: Biosolids Contaminant Grade 2018/19
New South Wales & Australian Capital Territory
Chart 18: Biosolids Contaminant Grade 2018/19
Queensland

Chart 19: Biosolids Contaminant Grade 2018/19
South Australia
Chart 20: Biosolids Contaminant Grade 2018/19
Tasmania

Chart 21: Biosolids Contaminant Grade 2018/19
Victoria
Chart 22: Biosolids Contaminant Grade 2018/19
Western Australia & Northern Territory

- A: 12%
- B: 71%
- Not graded: 17%
4.5 **STABILISATION PROCESS**

Biosolids stabilisation process nationally and for each state is presented in Charts 23-29 following.

The types of stabilisation processes have stayed much the same as previous years.

**Chart 23: Biosolids Stabilisation Processes 2018/19 Australia**

- **Anaerobic digestion**: 41%
- **Lagoon storage**: 15%
- **Incineration**: 5%
- **Composting**: 4%
- **Lime Stabilisation**: 3%
- **Temperature Phased Anaerobic Digestion (TPAD)**: 0.2%
- **Thermal drying**: 3%
- **Aerobic digestion**: 9%
- **Agitated air drying**: 1%
- **Thermal hydrolysis**: 5%
- **ATAD**: 1%
- **None**: 10%
- **Long term storage (of dewatered biosolids)**: 3%
- **None**: 10%

The types of stabilisation processes have stayed much the same as previous years.
Chart 24: Biosolids Stabilisation Processes 2018/19
New South Wales

- Aerobic digestion: 21%
- Anaerobic digestion: 38%
- Incineration: 19%
- Composting: 4%
- ATAD: 0.1%
- None: 10%
- Long term storage (of dewatered biosolids): 3%
- Lagoon storage: 5%

Chart 25: Biosolids Stabilisation Processes 2018/19
Queensland

- Aerobic digestion: 12%
- Anaerobic digestion: 33%
- Thermal hydrolysis: 25%
- Lagoon storage: 1%
- None: 29%
Chart 26: Biosolids Stabilisation Processes 2018/19
South Australia

- Anaerobic digestion 87%
- Aerobic digestion 1%
- Lagoon storage 12%

Chart 27: Biosolids Stabilisation Processes 2018/19
Tasmania

- Anaerobic digestion 50%
- Aerobic digestion 10%
- Composting 25%
- Lime Stabilisation 14%
- None 1%
Chart 28: Biosolids Stabilisation Processes 2018/19
Victoria

- Lagoon storage: 43%
- Anaerobic digestion: 39%
- Lime Stabilisation: 20%
- Composting: 12%
- None: 12%

Chart 29: Biosolids Stabilisation Processes 2018/19
Western Australia & Northern Territory

- Anaerobic digestion: 39%
- Lime Stabilisation: 20%
- Composting: 12%
- Long term storage (of dewatered biosolids): 17%
- None: 12%
4.6 DEWATERING PROCESS

Biosolids dewatering process nationally and for each state is presented in Charts 30 to 36 following. There was very little change in the proportion of use of dewatering processes from the 2016/17 survey to now.

**Chart 30: Biosolids Dewatering Processes 2018/19**

**Australia**

- Belt filter press: 19%
- Conventional centrifuge: 34%
- Drying beds or lagoons: 25%
- High solids centrifuge: 17%
- None: 3%
- Other: 2%

**Chart 31: Biosolids Dewatering Processes 2018/19**

**New South Wales**

- Belt filter press: 20%
- Conventional centrifuge: 39%
- Drying beds or lagoons: 2%
- High solids centrifuge: 32%
- None: 6%
- Other: 1%
Chart 32: Biosolids Dewatering Processes 2018/19
Queensland

Chart 33: Biosolids Dewatering Processes 2018/19
South Australia
Chart 34: Biosolids Dewatering Processes 2018/19  
Tasmania

Chart 35: Biosolids Dewatering Processes 2018/19  
Victoria
Chart 36: Biosolids Dewatering Processes 2018/19
Western Australia & Northern Territory

- Conventional centrifuge: 71%
- Drying beds or lagoons: 12%
- Other: 2%
- Belt filter press: 3%
- None: 12%