Australia and New Zealand Biosolids Partnership

New Zealand Biosolids Survey 2023

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Revision Schedule

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3	26/03/2024	Update to address ANZBP comments	Marcus Richardson	Andrew Slaney	Jim Bradley	Robert Searle

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Abbreviations

Abbreviations	Full Name
ANZBP	Australia New Zealand Biosolids Partnership
ATAD	Autothermal thermophilic aerobic digestion
$cBOD_5$	Carbonaceous biological oxygen demand 5-day test
DS	Dry solids
EP	Equivalent persons
PFAS	Per-and polyfluoroalkyl substances
WWTP	Wastewater treatment plant

Glossary

Term	Definition
Dry solids (DS)	Mass of material after drying to 0% water content.
Equivalent persons (EP)	A measure of the total biological oxygen load to the plant in terms of the number of person equivalents (60 mg $cBOD_5$/person/day)
Pie diagram percentage values	Values have been rounded to whole numbers so may not sum to 100%

1. Executive Summary

The results from the 2023 Australia and New Zealand Biosolids Partnership (ANZBP) biosolids survey are largely consistent with those from the last survey in 2021. In summary, notable changes from the previous survey include:

- A nearly 13% increase in the total daily dry mass production of biosolids to 205 tonnes/day.
- A moderate reduction in unstabilised biosolids.
- A slight increase in the proportion of New Zealand biosolids meeting the requirements for contamination grade a.

New questions were asked of local authorities on the risks and opportunities facing the biosolids industry.

- Some common concerns such as the possibility of regulatory change, and the status of emerging contaminants emerged in respondents' answers.
- New organic waste guidelines for New Zealand are awaited to replace the Guidelines for Safe Application of Biosolids to Land (New Zealand Water and Wastes Association , 2003). This may be fueling some of the concern around possible changes to how the industry is regulated.
- The most commonly expressed opportunity was to increase the beneficial reuse of biosolids to recover valuable nutrients and reduce the cost of disposal routes.

2. Introduction

The Australia and New Zealand Biosolids Partnership (ANZBP) have conducted a survey of biosolids production at wastewater treatment plants (WWTP) across both countries semiannually since 2010. These surveys are conducted semiannually and aim to form an accurate and comprehensive dataset of biosolids production and end use. The parameters surveyed are:

- Biosolids production
- Biosolids end use
- Biosolids stabilisation grade (based on the Guidelines for the Safe Application of Biosolids to Land in New Zealand, 2003)
- Biosolids main stabilisation process
- Biosolids further stabilisation process
- Biosolids dewatering process
- Transportation of biosolids to end use
- Stockpile data
- Emerging contaminant measurement
- Emerging contaminant risk management
- Production of renewable energy from biosolids
- End Use risk management
- Biosolids transactions
- Biosolids branding
- Opportunities and risks for the biosolids industry

3. Method

A survey requesting the aforementioned information was sent to New Zealand local authorities operating wastewater treatment plants (WWTPs) with a load of 25,000 person equivalents (PE) or larger. Some smaller plants were also surveyed, having been included in previous surveys, and where they responded the data was included. For most categories the results are presented per dry tonne of biosolids produced, or by number/proportion of New Zealand WWTPs. Additionally, note that values have been rounded to whole numbers so some proportions will not sum exactly to one.

Of the thirty-six plants surveyed, seven did not respond. For five of these plants historical survey data was available. Based on this data these plants constitute an estimated 8-9% of the annual dry solid biosolids production of New Zealand plants exceeding 25,000 PE. Survey data from 2021 with a 2% increase applied was used to estimate data for 2023 for these plants. However, two plants which both likely exceed the 25,000 PE cutoff did not provide a response to the survey and there is no historical data from which to estimate 2023 values. These plants should be contacted early in future survey rounds as their inclusion would improve the survey's completeness.

WWTPs that do not produce a separate biosolids stream (such as Hastings, Napier, and Greymouth WWTPs that use the biological trickling filter process) are not included in the results.

4. Classifications

To enable simple analysis, presentation, and comparison between survey years the responses for each question, such as end use, are classified into broad groupings. These groupings are discussed below.

4.1 Production

The amount of biosolids produced is presented in terms of tonnes of dry solids (DS) per day.

4.2 End Use

The following categories were used to classify the end use of biosolids on a dry solids basis:

- Agriculture – for biosolids applied to land for its fertiliser value without value added processing
- Forestry – for biosolids applied to plantation forests to aid tree growth
- Landscaping – for biosolids used for landscaping or other horticultural use. Note this end use category changed in 2021 from "Landscaping (compost)", as composting is classed as a stabilisation process not an end use.
- Landfill – for biosolids disposed to landfill, including monofill
- Ocean Discharge – for WWTP where solids are disposed of to the ocean. These solids are not defined as biosolids and no biosolids mass is associated with these WWTP
- Stockpile – for biosolids stored, pending future planning, processing or use
- Land rehabilitation – for biosolids used in the rehabilitation of land including mine rehabilitation
- Landfill capping - biosolids used in the capping of landfills
- Other (Unspecified).

Note that there are many smaller oxidation ponds and aerated lagoons in New Zealand which have a significant bottom layer of accumulated sludge/biosolids that in time will need removal. This is often referred to as 'legacy sludge'. Due to their small size the majority are not included in this survey.

4.3 Stabilisation Grade

The stabilisation of biosolids refers to applying processes which reduce the presence of pathogens, odour generation, and vector attraction potential. In New Zealand, stabilisation of biosolids is given an 'A' or 'B' grade. in Australia a 'C' grade is also sometimes used. In the Australian survey a 'C' grade indicates no stabilisation. The equivalent gradings from the Guidelines for Safe Application of Biosolids to Land in New Zealand (New Zealand Water and Wastes Association , 2003) are shown in Table 4-1. In this report the terms, "A", "B", and unstabilised have been used to align with the New Zealand guidelines.

New interim guidelines for organic wastes in New Zealand, that includes updated guidance on biosolids, were first developed in 2017. However, they have not yet been finalised, although a final version is anticipated in 2024. Accordingly, the grading criteria for this survey are based on the 2003 guidelines.

Table 4-1: Stabilisation gradings

Classification in the Australian Survey	Classification in Guidelines for Safe Application of Biosolids to Land in New Zealand
A	A
B	B
C	Unstabilised

4.4 Contamination Grade

Contamination was classified into grades ‘a’ or ‘b’ based on metal levels per dry weight of biosolids. The required levels for each grade, from Table 7.1 in Guidelines for the Safe Application of Biosolids to Land in New Zealand, (New Zealand Water and Wastes Association , 2003), are shown in Table 4-2. That reference also covers organic compounds, nutrients, and acceptable annual loading to land. The new interim guidelines which have been developed also contain updated contamination guidance. However, as discussed, this draft has yet to be finalised so the grades for this survey are those found in the 2003 guidelines.

Table 4-2: New Zealand biosolids contaminant metals gradings

Parameters	Soil limit or ceiling concentrations (mg/kg dry weight)	Biosolids limits for Grade a (mg/kg dry weight)	Biosolids limits for Grade b (mg/kg dry weight)
Arsenic	20	20	30
Cadmium	1	1	10
Chromium	600	600	1500
Copper	100	100	1250
Lead	300	300	300
Mercury	1	1	7.5
Nickel	60	60	135
Zinc	300	300	1500

4.5 Stabilisation Process(es)

Classification of the stabilisation process was of the main stabilisation process following wastewater treatment. From the 2021 survey year onward there has been an additional option to include a further/secondary stabilisation process which comes after the main stabilisation process. The following categories were used for both the primary stabilisation process and the further stabilisation process:

- Anaerobic digestion (standard mesophilic digestion)
- Anaerobic digestion (with thermal hydrolysis pre-treatment)

- Anaerobic digestion (Temperature phased anaerobic digestion)
- Anaerobic digestion (acid phase digestion)
- Anaerobic digestion (thermophilic anaerobic digestion)
- Autothermal thermophilic aerobic digestion (ATAD)
- Thermal drying
- Lagoon storage
- Long term storage (of dewatered biosolids)
- Lime Stabilisation
- Composting
- Incineration
- Agitated air drying
- Extended aeration
- Solar drying
- Sludge drying beds and drying lagoons
- Pyrolysis and gasification
- Aerobic digestion
- No further stabilisation
- Other

4.6 Dewatering Process

Dewatering was classified into one of the following types of biosolids dewatering processes:

- Conventional centrifuge
- High solids centrifuge
- Belt filter press
- Drying beds or lagoons
- Screw press
- None
- Other

4.7 Stockpile Data

The following information was collected about biosolids stockpiles:

- Whether plants are currently stockpiling biosolids
- The size of any historical stockpiles in dry tonnes
- The net change in the size of the stockpile in tonnes of dry solids during the past year

4.8 Transportation to End Use

Classification of the transportation of biosolids to its end use was made based on the following distance ranges:

- No Transport
- 1-50 km
- 51-150 km

- 151-400km
- Over 400 km.

4.9 Emerging Contaminants

An identification of the risk management approach to emerging contaminants was made within the following categories (this could be either for the solids or liquid phase of the WWTP treatment process):

- No risk management approach to emerging contaminants
- Monitoring only
- Screening level risk assessment
- Detailed risk assessment

Additionally, data was collected on whether plants were testing biosolids for PFAS and/or other emerging contaminants or not.

4.10 Renewable Energy

Classification of whether and for what purposes renewable energy was produced from biosolids was made according to the following categories:

- No energy is produced from biosolids processing
- Biogas is used to provide heat for onsite use; no electricity is produced
- Biogas is used to provide heat for export; no electricity is produced
- Biogas is used to provide heat and electricity for onsite use
- Biogas is used to provide heat for onsite use and electricity is exported to the grid
- Biogas is exported offsite
- Other (pls specify in comments field)

If renewable energy was produced, plants were requested to indicate the amount in GWh/year.

4.11 End Use Risk Management

Classification of local authorities' End Use Risk Management of biosolids was made based on the following categories:

- Managed in-house
- Managed by a 3rd party
- Managed by a 3rd party and audited in-house

It is noted that under the New Zealand Resource Management Act 1991 procedures are required in terms of classifying permitted and discretionary activities. For discretionary activities, such as biosolids discharge onto land, individual resource consents are required. These resource consents require a full environmental effects assessment, which includes a full assessment of risks and risk mitigation techniques.

4.12 Biosolids Transactions

The transactions involved in biosolids reuse, disposal including removal at each plant were classified into the following categories:

- Give biosolids away with costs covered by the recipient
- Receive payment for biosolids
- Pay for removal from site for end use/disposal
- Not applicable

- Other

4.13 Biosolids Branding

Local authorities were asked to classify the commercialisation status and branding of their biosolids according to the following categories:

- Sold by utility/council with a brand name
- Sold by utility/council but unbranded
- Sold by a third party with a brand name
- Sold by a third party but unbranded
- Not applicable

4.14 Industry Risks and Opportunities

Respondents were asked to reflect on the main risks and opportunities to the biosolids industry. No classifications were predetermined for these questions. After reviewing the responses, key themes around both risk and opportunity were identified and responses were classified as such.

5. Results

5.1 Production

The total biosolids production reported by New Zealand WWTP's exceeding 25,000 PE was 205 tonnes per day on a dry solids basis (74,620 tonnes per year) as shown in Table 5-1. This is an increase of nearly thirteen percent from the total reported in 2021, though still less than the maximum result of 211 tonnes per day obtained in 2015. The majority of the increase is due to three WWTPs, the remainder are growing more slowly, or even showing slight reductions in biosolids production. The population equivalent load of plants has also increased, but only by around 11% from the 2021 result.

Table 5-1: Total daily biosolids production, and population equivalent load of plants in New Zealand responding to ANZBPs survey request in each survey year.

Survey Year	Total reported biosolids dry solids production (tonnes per day, dry solids)	Total reported biosolids production (tonnes per day, wet weight)	Total reported PE (Person equivalent, $cBOD_5$ basis) for the plants surveyed
2010	159	650	-
2013	189	866	-
2015	211	1201	-
2017	176	975	-
2019	174	856	-
2021	182	996	3,794,995
2023	205	1023	4,212,386

To sense check these results they were compared against the 2021 New Zealand WWTP inventory (Water New Zealand, 2022). The average daily wet weight of biosolids produced in 2021 reported in the ANZBP survey equated to around 99% of the same measure in the inventory for that year. This is a positive result, demonstrating that this survey represents a good overview of the state of the biosolids industry in New Zealand.

5.2 End Use

The proportion of different end uses of biosolids in 2023, on a dry solids mass basis, is presented in Figure 5-1. Note that three plants responding to this survey reported ocean discharge as the end use of their biosolids. But, as discussed in section 3, these plants were excluded and so do not appear in the end use figures.

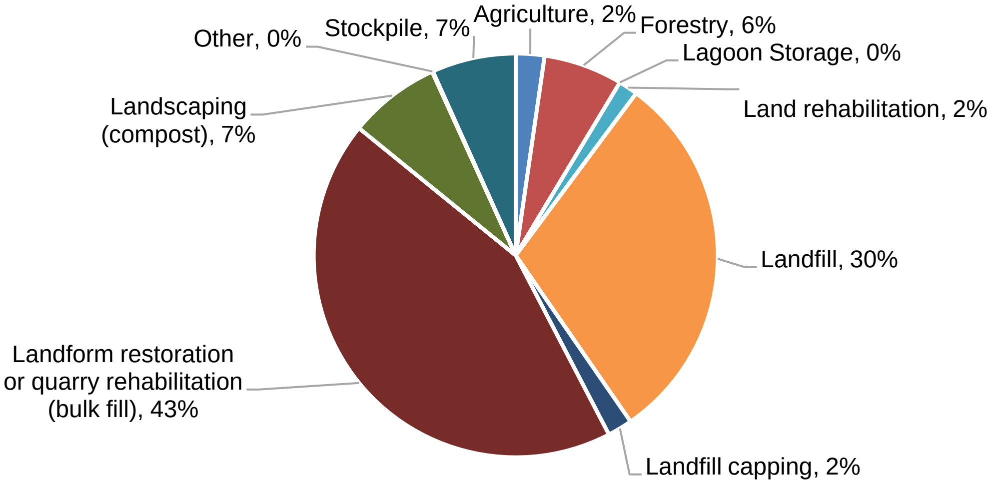


Figure 5-1: End use of biosolids produced by New Zealand WWTPs in 2023 (dry mass basis) (figures rounded)

In 2023, the largest proportion of biosolids, 43% was used for landform restoration. This was largely due to Māngere WWTP in Auckland for restoration of a quarry, which now operates as a fully lined monofill. However, the project purpose is to restore the quarry site to the contours of the original volcano. The next largest end use was disposal in landfill; this was the fate of 30% of biosolids by mass. That figure would be only 28% as around 2% of biosolids by dry mass are incinerated, but these incinerated biosolids have been categorised as being landfilled as this is the ultimate end use. Regardless, this is a reduction from 33% landfilled in 2021. As in previous years there are several less significant end uses for biosolids. When looking at end use in terms of number of plants employing each category as in Figure 5-2, the dominance of landform restoration disappears which demonstrates the oversized effect of Māngere WWTP. Also note that around 2% of annual biosolids production is incinerated before ultimately ending up in landfill., all of this from one WWTP.

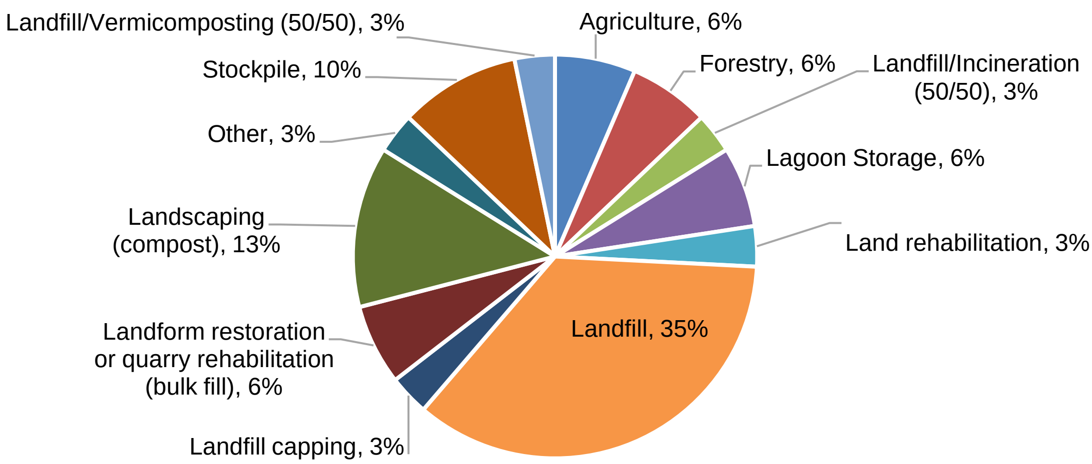
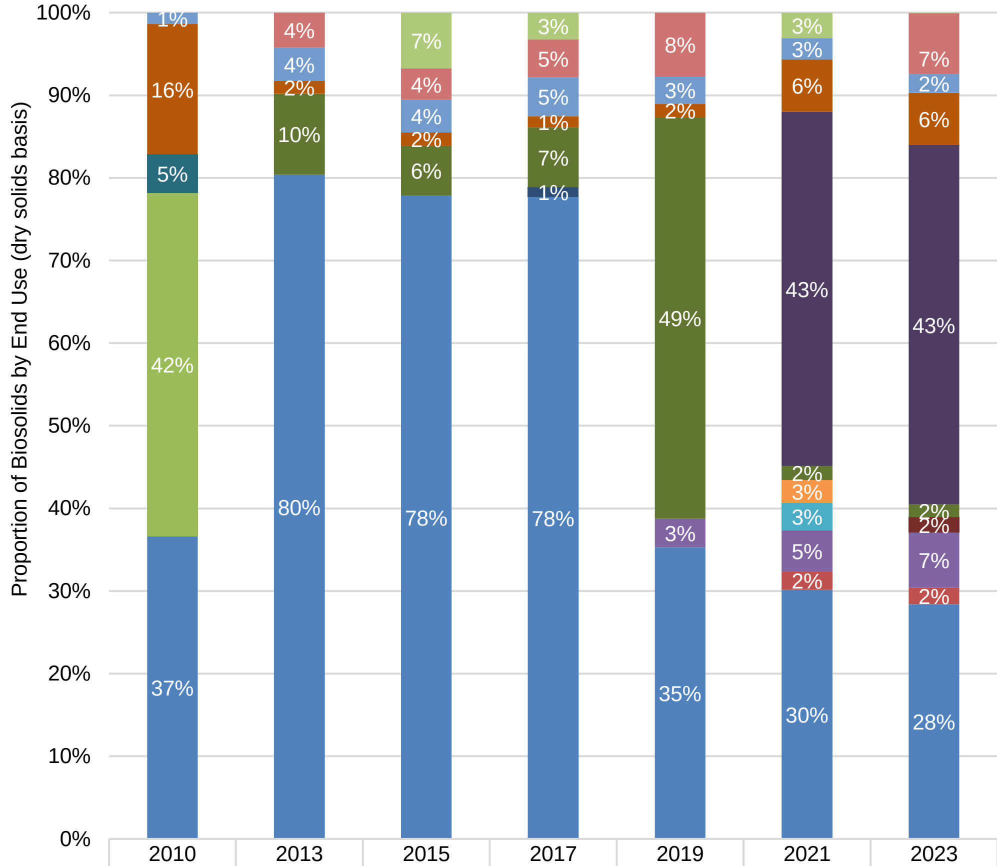


Figure 5-2: End use of biosolids produced by New Zealand WWTPs in 2023 (plant count basis)

Additionally, there are some categories in the plant count basis split of biosolids end use, such as landfill/incineration (50/50), which do not appear on a mass basis. For the mass basis measure the biosolids from plants reporting a split like this were distributed according to the reported proportions into the two end uses. Also of note, plants which report no biosolids production, those using lagoon storage, make up 6% of the respondents. When these biosolids must eventually be removed they may appear to contribute disproportionately to that year's total biosolids production. Or, if they are emptied during a non-surveyed year, they may go uncounted. The end uses in each year surveyed are presented in Figure 5-3.



	2010	2013	2015	2017	2019	2021	2023
Other			7%	3%		3%	0%
Landscaping (compost)		4%	4%	5%	8%		7%
Agriculture	1%	4%	4%	5%	3%	3%	2%
Forestry	16%	2%	2%	1%	2%	6%	6%
Ocean discharge	5%						
Landform restoration or quarry rehabilitation (bulk fill)						43%	43%
Land rehabilitation		10%	6%	7%	49%	2%	2%
Incinerated							2%
Lagoon Storage				1%			
Landfill/Vermicomposting (50/50)						3%	
Landfill/Incineration (50/50)						3%	
Stockpile					3%	5%	7%
Monofill	42%						
Landfill capping						2%	2%
Landfill	37%	80%	78%	78%	35%	30%	28%

Figure 5-3: Changes in end use of biosolids produced by New Zealand WWTPs 2010-2023 (dry mass basis)

Historically, landfilling or monofilling, have been where the majority of biosolids produced in New Zealand's WWTP have ended up. This has changed in recent years with a significant proportion now being used for landform restoration of a former quarry, though this is almost entirely due to Māngere WWTP in Auckland. This end use was originally classified as land rehabilitation in 2019, before moving to its own category in 2021. Since 2019 almost half of the dry mass of biosolids leaving the surveyed plants have been used for quarry rehabilitation, due entirely to Māngere WWTP. Also of note, in the original survey year ocean discharge plants' biosolids production were included in that year's total production and the breakdown of end uses.

5.3 Stabilisation Grade

The stabilisation grade of biosolids in New Zealand is presented in Figure 5-4.

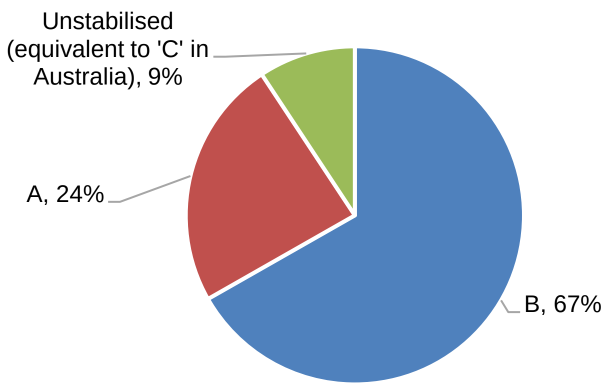


Figure 5-4: Proportion of each stabilisation grade achieved by biosolids produced by New Zealand WWTPs in 2023 (dry mass basis)

The stabilisation grade of biosolids in New Zealand is predominantly B. This has been the case during all previous surveys, although the proportion has slightly increased from 65% to 67% between 2021 and 2023.The proportion of biosolids stabilsed to an A grade level has also increased from 21% in 2021 to 24% in 2023. Due to both these changes, the proportion of unstabilised biosolids, here termed grade C, has decreased from 14% in 2021 to 9% in 2023. For more information on the requirements of each stabilisation grade see the Guidelines for the Safe Application of Biosolids to Land in New Zealand (New Zealand Water and Wastes Association , 2003).

5.4 Contamination Grade

The proportion of biosolids assigned to each contamination grade is shown in Figure 5-5.

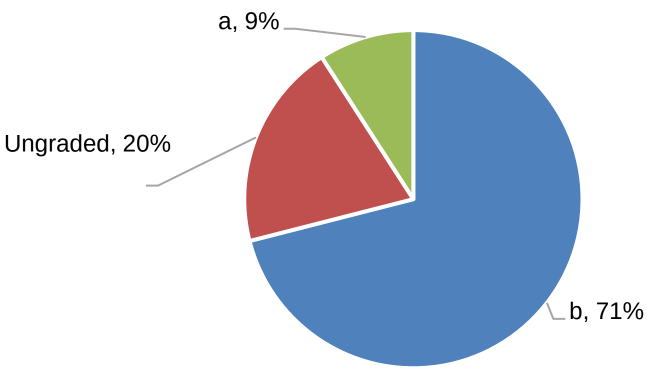


Figure 5-5: Proportion of each contamination grade achieved by biosolids produced in New Zealand WWTPs in 2023 (dry mass basis)

The majority of biosolids are grade b, around 71%. A smaller proportion, 9%, achieve grade a. However, this is an increase on 2021, when only 6% of biosolids were reported to achieve contamination grade a. For further information on the requirements of each grade see the Guidelines for the Safe Application of Biosolids to Land in New Zealand (New Zealand Water and Wastes Association , 2003).

5.5 Stabilisation Process

The relative importance of primary stabilisation processes is shown in Figure 5-6.

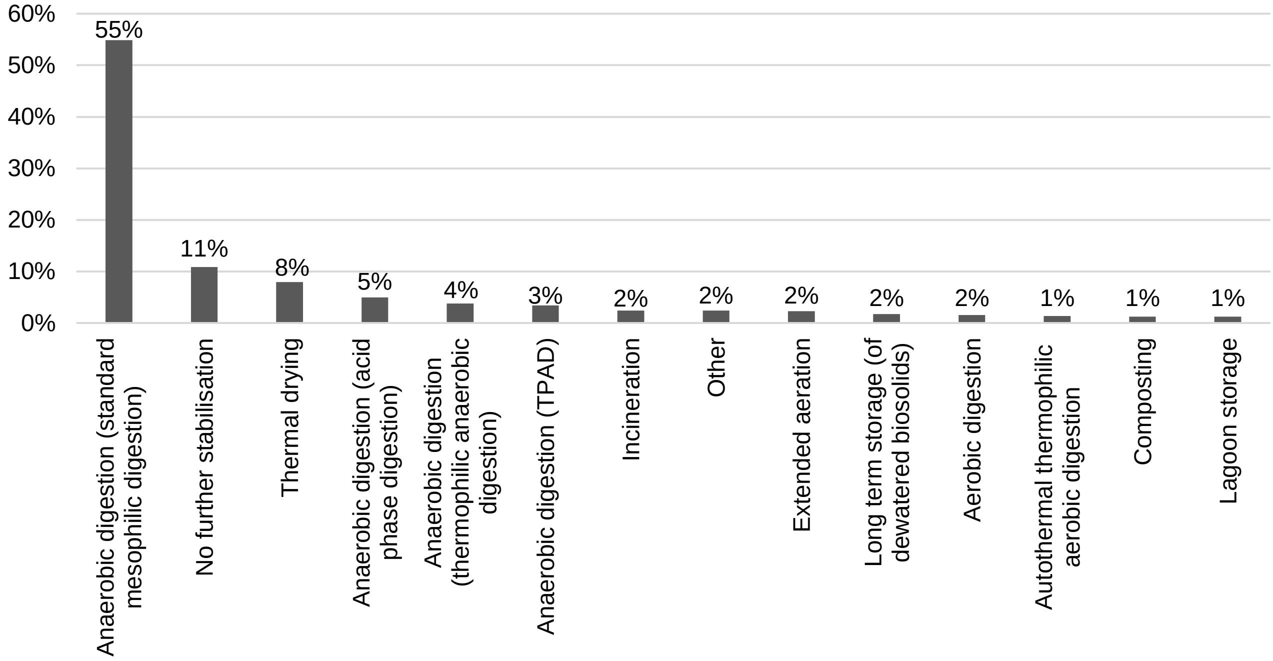


Figure 5-6: Percentage of biosolids produced by New Zealand WWTPs in 2023 subject to each main stabilisation process (dry mass basis)

On a dry mass basis, the majority of New Zealand biosolids were stabilised using anaerobic digestion in 2023, almost entirely using the standard mesophilic process. These results are skewed by the large biosolids production of Māngere WWTP. On a plant count basis results are markedly different, around a third of participating WWTPs did not use any stabilisation process. On both counts however, all other stabilisation processes are much less prevalent than anaerobic digestion This is a similar situation to the results collected for 2021. Although, the proportion of biosolids receiving no further stabilisation has reduced from 13% in 2021 to 11% in 2023.

The relative importance of further/secondary stabilisation processes used is presented in Figure 5-7.

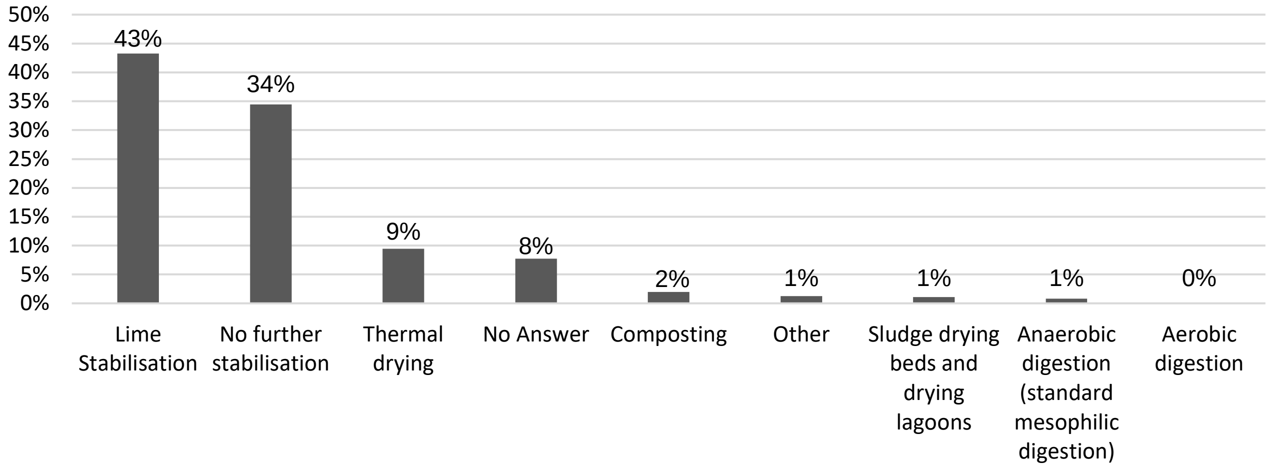


Figure 5-7: Percentage of biosolids produced in New Zealand WWTPs subject to each process for further/secondary stabilisation, after the main stabilisation step, in 2023 (dry mass basis)

Further/secondary stabilisation process data was first collected in 2021. At that time, on a dry mass basis, lime stabilisation was the most significant process, and this result has been replicated in 2023. This is largely because Māngere WWTP uses this process and produces the greatest dry tonnage of biosolids. A large proportion of New Zealand biosolids goes through no additional stabilisation process, around 43%. This is because, on a plant count basis, most plants do not have a secondary stabilisation step. Amongst those that do, lime stabilisation and thermal drying are the most common.

5.6 Dewatering Process

The relative importance of different dewatering processes is shown in Figure 5-8.

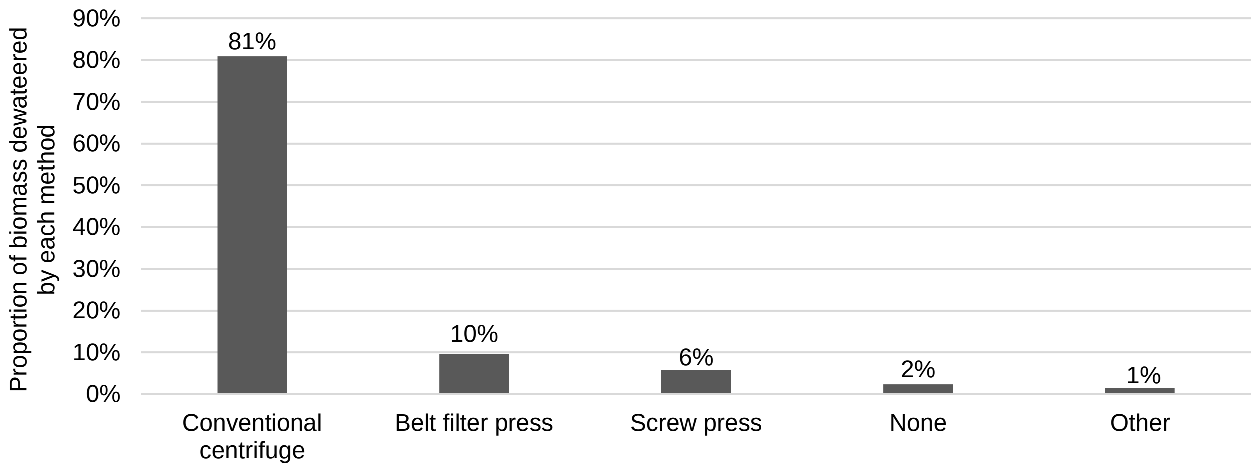


Figure 5-8: Proportion of biosolids dewatered by each dewatering process in New Zeland WWTPs in 2023 (dry mass basis)

As has been the case in previous surveys, centrifuges are by the far the most significant process used for dewatering biosolids. With belt filter presses as a distant second most significant dewatering process.

5.7 Stockpile Data

In 2023, a total of 131,500 dry tonnes of sludge was reported as being stockpiled. Stockpiling was reported by only five plants, around 15% of the total. Most plants report holding no stockpiles of sludge, Figure 5-9.

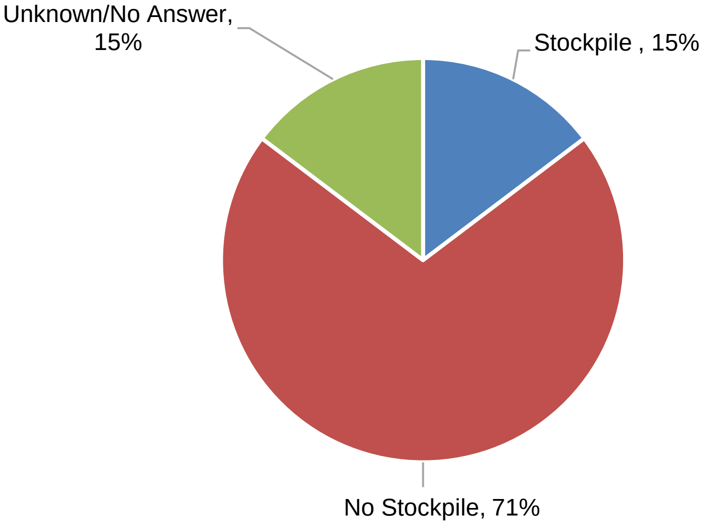


Figure 5-9: Proportion of New Zealand WWTPs stockpiling biosolids in 2023 (figures rounded)

5.8 Transportation to End Use

The distance New Zealand biosolids are travelling to their end use point is shown in Figure 5-10.

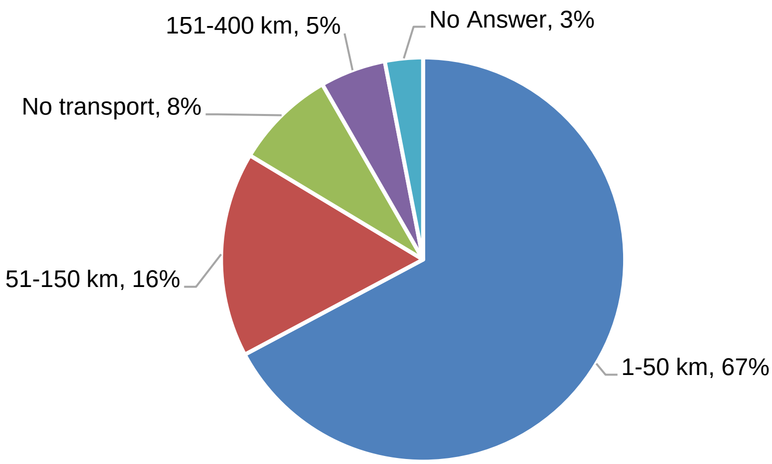


Figure 5-10: Proportion of biosolids travelling each distance range to its end use point from New Zealand WWTPs in 2023 (dry mass basis) (figures rounded)

The majority of biosolids travel only one to fifty kilometers to their end use point. This is consistent with previous surveys, though a greater proportion were travelling between fifty one and one hundred and fifty in 2021, 22% compared with only 16% in 2023.

5.9 Emerging Contaminants

The proportion of biosolids produced in New Zealand WWTPs being tested for PFAS or other emerging contaminants is presented in Figure 5-11.

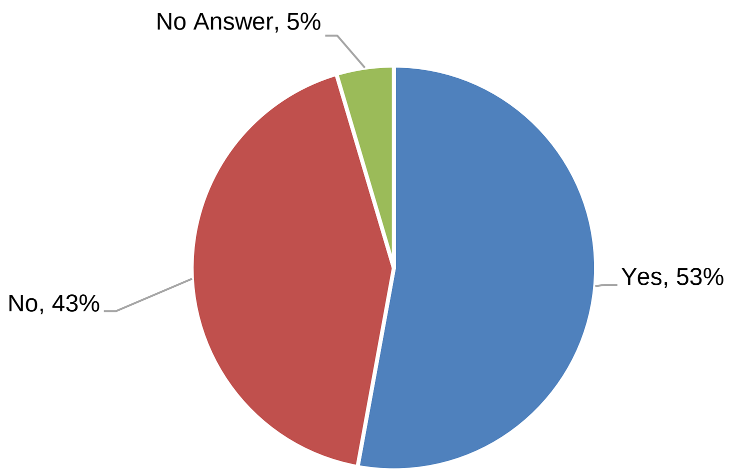


Figure 5-11: Proportion of biosolids produced in New Zealand WWTPs being tested for PFAS or other emerging contaminants in 2023 (dry mass basis) (figures rounded)

On a dry mass basis, the majority of biosolids produced by New Zealand WWTPs is being tested for PFAS or other emerging contaminants. Though this is skewed by the large Auckland plants which are testing biosolids for these PFAS or emerging contaminants. On a per plant basis however, only around 24% of plants report testing for these contaminants, Figure 5-12. This shows that larger WWTPs are testing while smaller plants are not.

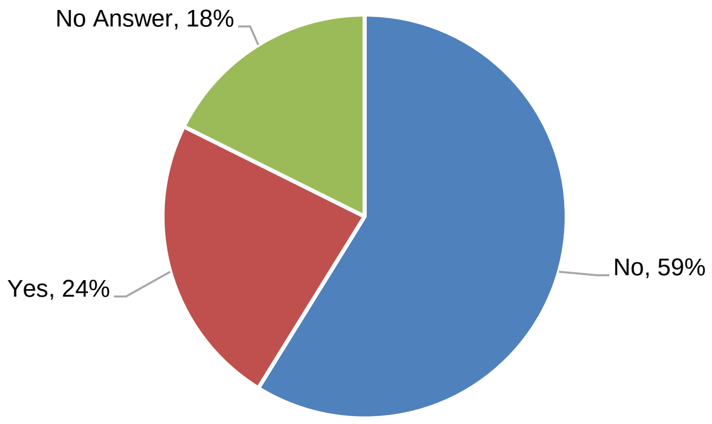


Figure 5-12: Proportion of New Zealand WWTPs testing biosolids for PFAS or other emerging contaminants in 2023

The risk management approach taken by New Zealand WWTPs toward emerging contaminants is shown in Figure 5-13.

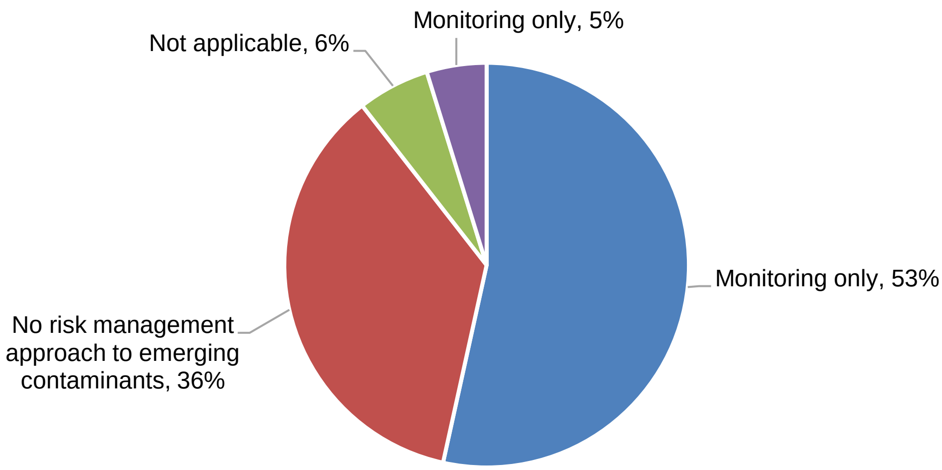


Figure 5-13: Proportion of biomass produced by New Zealand WWTPs in 2023 covered by each risk management approach to emerging contaminants (dry mass basis)

The majority of biosolids are covered by a monitoring only risk management approach. No surveyed local authority in New Zealand presently claims to go further to a screening or detailed level risk assessment. As for emerging contaminant testing, these numbers are skewed by larger plants particularly in Auckland. On a plant count basis only 24% report having a risk management approach to emerging contaminants.

5.10 Renewable Energy

In total, plants in New Zealand exceeding a load of 25,000 PE, reported generating around 139 gigawatt hours of renewable energy. Some respondents included both electricity and heat in their total. For context, the total electricity production in New Zealand in 2022 was 43,476 GWh (Hīkina Whakatutuki - Ministry of Business, Innovation and Employment, 2023). The proportion of biosolids being used to produce renewable energy is shown in Figure 5-14.

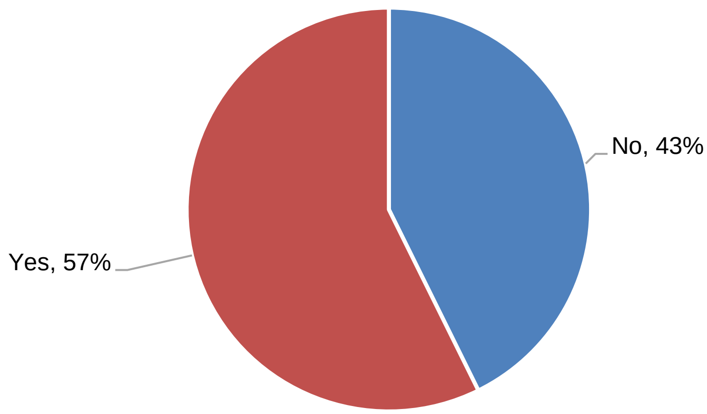


Figure 5-14: Proportion of biosolids from New Zealand WWTPs used to produce renewable energy in 2023 (mass basis)

The generation of renewable energy covers a greater percentage of biosolids than it did in 2021, 57% up from 53% then. There is significant potential for further increases in energy production. Already, around 22 dry tonnes of biosolids produced in 2023 was anaerobically digested in plants reporting zero renewable energy production. If these plants all captured their biogas to produce energy the proportion of biosolids used to produce renewable energy would increase to 68%. Additionally, some plants which were reported to use biogas for heat onsite, or for both heat and electricity on site reported a value of zero for total renewable energy production for 2023. In future surveys it may be useful to make a distinction between renewable electricity and the total energy in heat and electricity used onsite or exported to ensure that the full energy production of the New Zealand biosolids industry is being captured.

Of those plants generating renewable energy from biosolids, the proportion creating heat, and/or electricity for use on-site or to export to the grid is shown in Figure 5-15.

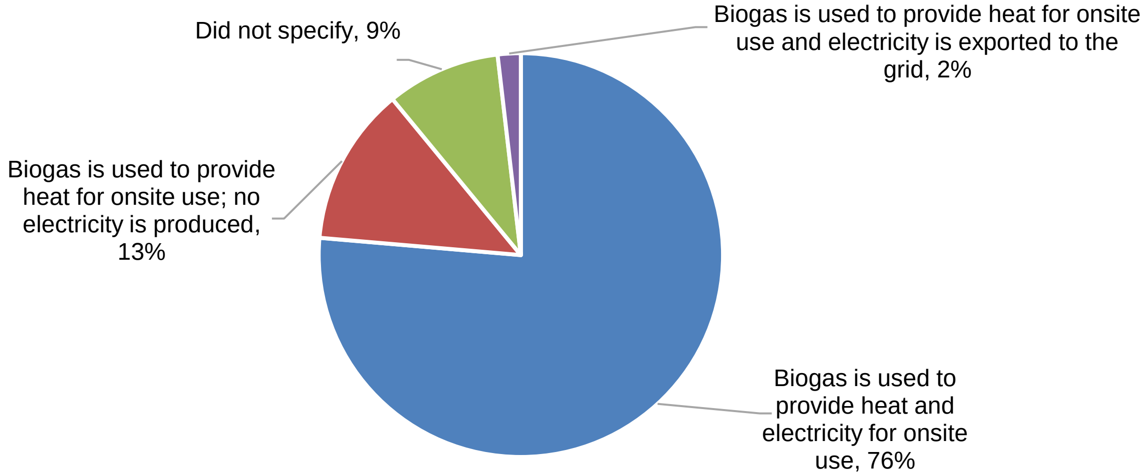


Figure 5-15 Proportion of renewable energy end uses applied at New Zealand WWTPs generating renewable energy from biosolids in 2023 (dry mass basis)

All respondents generating renewable energy from biosolids did so using anaerobic digestion to generate biogas. The majority of WWTPs used their biogas to produce both heat and electricity, though only one exported this electricity to the grid.

5.11 End Use Risk Management

The range of biosolids end use risk management employed at New Zealand WWTPs is shown in Figure 5-16.

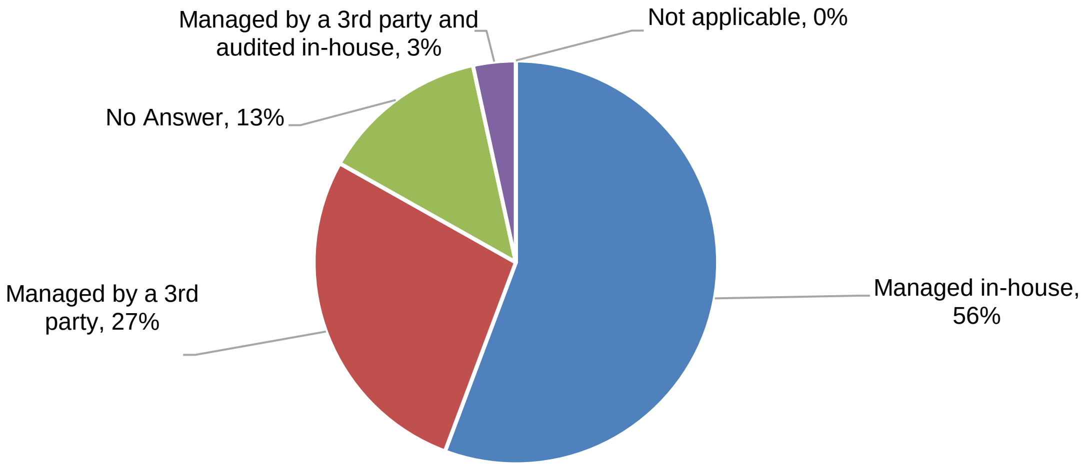


Figure 5-16: Proportion of biosolids produced in New Zealand WWTPs covered by different end use risk management schemes in 2023 (dry mass basis)

These results are like those from 2021. There has been a slight decrease in the number of plants giving no response or indicating that this was not applicable to them, and a corresponding increase in both in-house and 3rd party risk management approaches. Four plants indicated 'not applicable', these were plants reporting no biosolids production hence the nonexistent slice on the above plot.

5.12 Biosolids Transactions

The proportion of biosolids being sold, or requiring payment to be removed from site is shown in Figure 5-17.

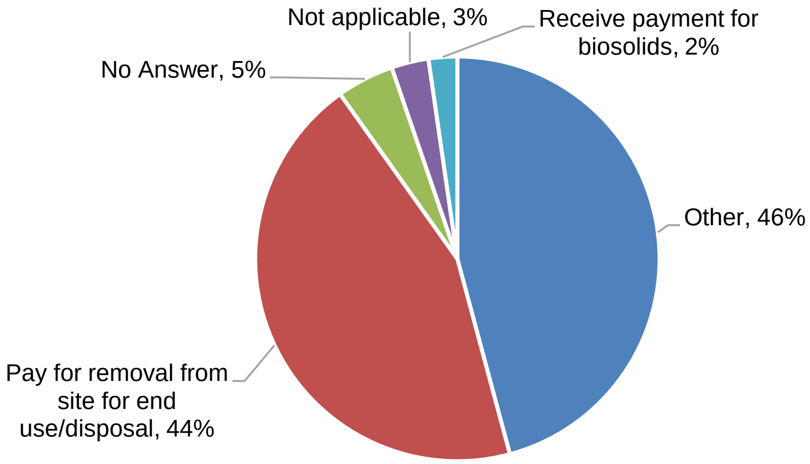


Figure 5-17: Proportion of biosolids removed from New Zealand WWTPs by each transaction type (dry mass basis)

Most biosolids incur a cost for removal/end use disposal. Only around 2% of biosolids are purchased. Some authorities don't fall neatly into either category, in general because they stockpile their biosolids or make use of it within the local authority itself. The 'other' category is the largest, though this is mainly due to Māngere WWTP whose sludge is used to fill a quarry and so is not paid for nor is there a fee paid to remove it. On a plant count basis 62% pay for removal of biosolids.

5.13 Biosolids Branding

Of those local authorities who sold biosolids in 2023, Figure 5-18 shows the proportion who used a brand name and not.

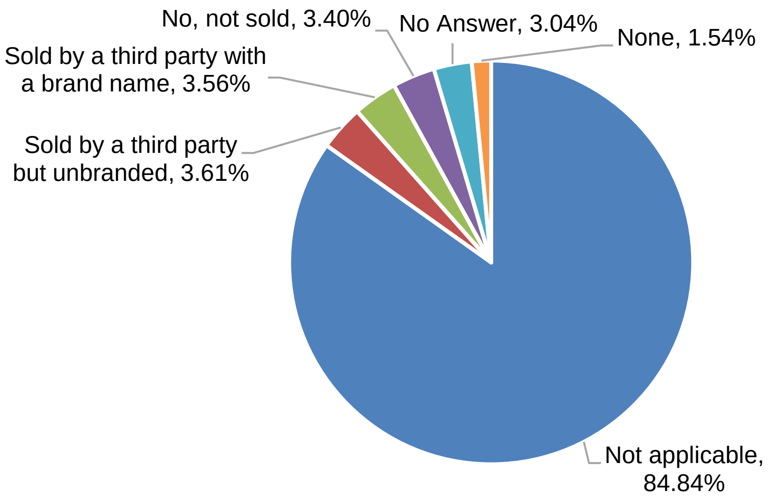


Figure 5-18: Brand name status of sold biosolids from New Zealand WWTPs in 2023, (dry mass basis) (figures rounded)

As shown previously, the majority of biosolids are not sold. For over 90% of biosolids the response to the question around branding was not applicable, not sold, none, or no response to this question was given. However, for biosolids which are sold, from five New Zealand WWTPs, all are sold by a third party, and the biosolids from three of these WWTP's are being sold under a brand name while two are not.

5.14 Industry Risks and Opportunities

Once the responses to the survey questions around biosolids industry risks and opportunities were received several key themes were identified. The risks were categorized into the following broader themes:

- Changing regulations
- Cost
- Disposal routes
- Emerging contaminants
- Miscellaneous
- Stakeholder perceptions

And the opportunities into the following broader themes:

- Beneficial reuse
- Changing regulations
- Creation of high value products
- Education
- Miscellaneous
- R&D, new technology
- Renewable energy
- Soil health

The frequency of themes surrounding biosolids industry risks identified by different respondents is shown in Figure 5-19. This is a new question in 2023 so no comparison can be made to previous surveys.

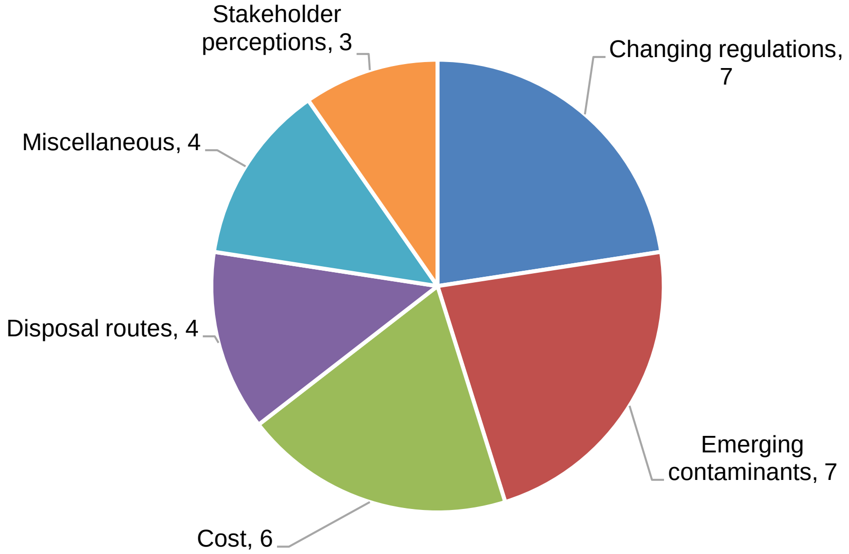


Figure 5-19: Number of responses from New Zealand WWTPs matching each risk category

Local authorities identified a range of risks, emerging contaminants, uncertainty about future changes to regulation, and the cost of managing biosolids were key among them. They also identified several opportunities, the frequency of themes surrounding biosolids industry opportunities identified by different respondents is shown in Figure 5-20.

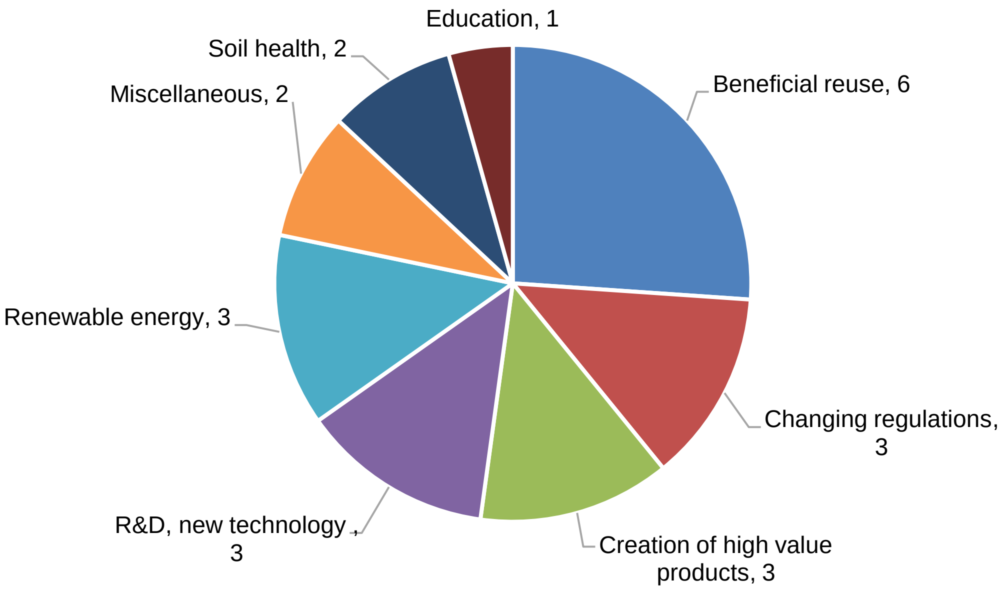


Figure 5-20: Number of responses from New Zealand WWTPs matching each opportunity category

The largest number of responses mentioned the opportunity to redirect biosolids from landfill towards beneficial reuse. In a similar theme there were several mentions of the ability to generate renewable energy or produce value added products from biosolids, which could go some way to alleviating one main risk identified, biosolid management cost. Notably, as well as a risk, changing regulations were also identified as an opportunity for positive change by several local authorities.

6. Conclusion

The results from the 2023 Australia and New Zealand Biosolids Partnership (ANZBP) biosolids survey are largely consistent with those from the last survey in 2021. In summary, notable changes from the previous survey include:

- A nearly 13% increase in the total daily dry mass production of biosolids to 205 tonnes/day.
- A moderate reduction in unstabilised biosolids.
- A slight increase in the proportion of New Zealand biosolids meeting the requirements for contamination grade a.

New questions were asked of local authorities on the risks and opportunities facing the biosolids industry:

- Some common concerns such as the possibility of regulatory change, and the status of emerging contaminants emerged in respondents' answers.
- New organic waste guidelines for New Zealand are awaited to replace the Guidelines for Safe Application of Biosolids to Land (New Zealand Water and Wastes Association , 2003). This may be fueling some of the concern around possible changes to how the industry is regulated.
- The most commonly expressed opportunity was to increase the beneficial reuse of biosolids to recover valuable nutrients and reduce the cost of disposal routes.

This summary has also been brought forward into a brief executive summary.

7. Acknowledgements

Stantec and Pollution Solutions and Design Pty Ltd, and the Australia New Zealand Biosolids Partnership greatly appreciate the valued input, time, and effort of those local authorities who have contributed to this industry survey.

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