Analysis of NSW Kerbside Green Lid bin Audit Data Report

March 2020

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Executive Summary

The New South Wales Department of Planning Industry and Environment (DPIE) engaged Rawtec to independently review and analyse kerbside audit results undertaken by councils across NSW. The project objective was to understand the performance of the kerbside residual waste and organics recycling services, including outcomes for:

- Diversion of food and garden material from landfill (kilograms per household per week – kg/hh/wk)
- Diversion efficiency (percentage of material diverted via food and garden organics [FOGO] bins)
- Food and Garden Organics (FOGO) bin contamination levels.

Based on available data from 38 audited areas/councils, performance was measured at the individual household level, by audited area/council and according to the service configuration (bin size and frequency of residual waste and organics recycling services). The sections below summarise key findings from this analysis. Note these figures are updated from a similar report in May 2018 that involved analysis of 26 audits.

Overall food and garden organics performance

Across the audited areas/councils, the average proportion of available food and garden organics diverted from landfill was 85%, which is a positive result. This performance is mainly driven by the high volume of garden organics diverted from landfill (see below).

Food waste performance

On average, 44% of available food waste (or 1.45 kg/hh/wk) was diverted from landfill across the audited areas/councils. This performance varied largely across audited areas/councils from 5% to 78% (or 0.17 kg/hh/wk to 7.3 kg/hh/wk).

In general, councils providing a fortnightly residual waste collection achieved higher food waste diversion efficiencies compared to those on a weekly residual waste service. Additionally, councils providing smaller residual waste bins (120/140 litre) achieved higher food waste diversion efficiencies compared to councils with larger residual waste bins (240 litre). The service configuration that achieved the highest food waste diversion on average was Configuration 4 (small 120/140 litre residual waste bins collected fortnightly and large 240 litre FOGO bins collected weekly) at 57%. However, food diversion performance is not only explained by configuration, as food diversion percentage can vary significantly across councils within a service configuration. For example, Configuration 5 (councils with a 240 litre residual waste bin collected fortnightly and a 240 litre FOGO bin collected weekly) included one council with a food efficiency of 5% while another council within this configuration achieved a food efficiency of 78%.

Analysis was undertaken to determine if variation in food waste diversion performance within service configurations may be explained by how long the FOGO service had been in place. Services that had been in place longer than one year were found to achieve higher food efficiency (46%) than those established less than one year (34%[1]) or those in a trial period (28%). The average food diversion for councils with a

[1] The 'Established <1 year' group food efficiency score is 45% if one apparently high performing council is not removed from the data set. The audit from this council was atypical in many aspects and therefore may not be representative.

FOGO service longer than a year was below the food diversion performance for Configuration 4 (120/140 litre residual waste bin collected fortnightly and 240L FOGO bin collected weekly) with 57% diversion.

The food waste results demonstrate that food diversion varies when accounting for differences in the length of service as well as bin configuration. This highlights that configuration and length of service are not the only factors influencing the results and other factors, such as education, are also important for achieving higher food waste diversion outcomes.

Five councils had data that allowed the authors to undertake a bin-by-bin analysis (Councils 1 – 5). A total of 1,331 FOGO bins were collected across these five councils. The amount of food waste collected in the FOGO bin for Council 1 ranged from 0 to 7 kilograms per bin (average of 0.67 kg per bin). Council 2 food waste ranged from 0 to 15 kilograms per bin (average of 1.85 kg per bin) and Council 3 food waste ranged from 0 to 48 kilograms per bin (average of 7.2 kg per bin). Council 4 had 0 to 31 kilograms per bin (average of 1.6 kg per bin) and Council 5 had 0 to 11 kg per bin with an average of 1.3 kg per bin. A varying proportion of households (27% up to 70% for the five councils) had no food waste in their FOGO bin[2], with the remaining households using the FOGO bins efficiently.

Garden organics performance

On average, 98% of available garden organics (or 10.81 kg/hh/wk) was diverted from landfill across the audited areas/councils. This high performance was relatively consistent across councils, which varied from 89% to 99.9% (0.94 – 23.50 kg/hh/wk). There was also consistency in garden organics efficiency across service configurations, which ranged from 94% to 99% (7.15 – 15.04 kg/hh/wk diverted).

The total amount of garden organics generated varied considerably across the audits, from 1.06 kg/hh/week up to 23.67 kg/hh/week. This large difference in garden organics generation is expected to be due to differences in rainfall, vegetation levels, block size, population densities and the time of year the audit was undertaken across the audited areas/councils.

FOGO bin contamination levels

On average, contamination of the FOGO bin was 2.2% by weight (0.27 kg/hh/wk) across the audited areas/councils. However, this ranged significantly, from 0.04% up to 17.83%. The top five contaminants by weight were recorded for each audited area/council. Out of these, the most frequently cited contaminants were[3]:

- plastic
- all other organics (leather, rubber and oils)
- containerised food
- metals
- other miscellaneous.

Analysis of contamination levels by service configuration showed that Configuration 6 had the highest contamination rate on average (5.4%). The remaining configurations all had average contamination rates between 1.5% and 1.7%. An analysis was undertaken to check the strength of the correlation between

[2] This only includes households that disposed food organics in residual waste bins as households with no food or garden organics in residual waste or FOGO bins were excluded from this analysis.
[3] Two methods for identifying the top five contaminants were considered. See Section 5.1 for detail on each method.

contamination and food efficiency for all audited areas/councils. It was found that there is weak correlation between these factors.

The bin-by-bin analysis of the five councils which had data available at this level found that councils 1, 2 and 3 had a low percentage of contamination in FOGO bins (0.7-0.8%), while Council 4 had 1.3% and Council 5 had 2.5%. This compares to all audited areas/councils (2.2%). A large proportion of bins for the five bin-by-bin councils contained no contamination at all (68% to 92%). Councils may be able to achieve reductions in contamination through targeting households that are contaminating bins (such as through a bin tagging program) rather than broad education strategies focused on all households.

Conclusion

NSW weekly FOGO services are performing well in diverting organics materials. However, there are opportunities to improve diversion rates through focusing on education around food waste. The less access households have to landfill disposal options (i.e. residual waste bins are smaller and collected less frequently) and those with a user selected service for residual waste had higher food waste diversion scores on average. Promoting these types of configurations and services could therefore be beneficial for increasing food waste diversion. A key finding from the five bin-by-bin data sets was that around one third and up to almost three quarters of residents are disposing food waste in residual waste bins but not FOGO bins. Food waste diversion is therefore more likely to increase by increasing the number of participating households, rather than encouraging active participants to be more efficient in their source separation.

Recommendations for future audits

The project scope included examining audit data to assess the integrity of the audit and check for errors, omissions or anomalies. This process identified a few issues with audit methodology and/or data analysis. To prevent future errors and to deliver standardised and comparable audits, it is recommended that the DPIE continues to provide guidance to auditors and councils regarding the recommendations outlined below.

A review of the most recent NSW Environment Protection Authority (NSW EPA) kerbside audit guidelines found that comprehensive guidance is already available, however there are a few areas that could be reinforced or clarified to help auditors, councils and future statewide analysis projects. The following recommendations are made:

1. Continue to emphasise the importance of a randomised sampling approach
2. Ensure future guidelines provide clear guidance on when and how to ensure stratified sampling for Multi-Unit Dwellings
3. Emphasise the importance of representative sample sizes that ensure greater confidence in the data
4. Provide guidance on what typically constitutes contamination in the FOGO bin within the audit guidelines, noting it is sometimes different depending on the council and where the organics is sent. Auditors should clearly define and document what they have regarded as contamination in the FOGO bins in the audit reports, as this would enable a comparison across councils.
5. Support and train auditors on how to calculate waste generation rates in line with existing guidance. Evaluation of the audit data revealed several issues in the calculation of waste generation rates and participation rates.

6. Record instances of gross contamination in audit reports. Where possible, auditors should compare the results with and without these bins to assess whether the contaminated bins are skewing the data.
7. Emphasise the importance of providing key audit information in audit reports, for example the sample size, and retaining raw data sheets.

CONTENTS

Acronyms

DPIE	Department of Planning Industry and Environment
EPA	Environment Protection Authority
FOGO	Food and Garden Organics
Kg/hh/wk	Kilograms per household per week
MUD	Multi-unit dwelling
NSW	New South Wales

Definitions

Diversion efficiency	Weight of waste that is diverted from landfill in a recycling bin divided by the weight of waste generated and disposed of in all kerbside bins.

1. Introduction

1.1. Background

Kerbside organics recycling services have increased in New South Wales (NSW) over the past decade. The NSW Department of Planning, Industry and Environment (DPIE) supports local councils in providing kerbside organics services through the Organics Collection grants program. The services provided by councils vary and can range from garden organics, food and garden organics (FOGO) or food only organics services. Variation also occurs in the bin sizes available to residents and the frequency of collection. Currently, most FOGO services are provided by councils outside of the Sydney Metropolitan area.

As part of the service provision, councils periodically undertake kerbside bin audits. Audits are generally conducted in consideration of the NSW EPA Guidelines for Conducting Household Kerbside Residual Waste, Recycling and Garden Organics Audits in NSW Local Government Areas.

1.2. Project scope

The NSW DPIE engaged Rawtec to independently review kerbside audits undertaken by councils. NSW DPIE provided audit reports and raw data (where available) for audits undertaken between 2011 and 2019. The data was examined to assess the integrity of the audit and check for errors, omissions or anomalies.

Following the review and any necessary adjustments of the data, analysis was undertaken to understand the performance of the kerbside residual waste and organics recycling services (taking into account presentation rates). This analysis included estimation of averages and ranges in:

- Kilograms per household per week (kg/hh/wk) of food and garden material diverted via FOGO bins.[4]
- Kg/hh/wk contamination in FOGO bins.[4]
- Percentage efficiency of FOGO bins in diverting organics from landfill.

The data analysis and findings of this report provides a greater understanding of FOGO systems currently operating in NSW and their performance.

Considerations to improve the audit guidelines and future audits have been provided. These have been formulated through the thorough examination of the audit data and guided by errors or anomalies which were consistently found.

[4] Note the average kg/hh/wk considers the weight of all audited materials divided by the number of bins audited, which is then adjusted for the presentation rate of the bins and frequency of collection. In some instances, the auditor provided the kg/hh/wk but did not state the presentation rate. Rawtec was therefore unable to verify whether presentation rate had been accounted for. In these cases, it was assumed that presentation rate had been considered by the auditor in their reported kg/hh/wk.

1.3. Audits and service configurations analysed

A total of 38 kerbside audit results across NSW were analysed which included 13,288 bins (7,387 residual waste bins and 5,901 FOGO bins). Five councils/areas with FOGO only audited residual waste bins (not FOGO bins). Of these, one fit into its own service configuration (see Configuration 1 below) and as such this data set was suitable for some of the analyses. The other four audits of only residual waste bins were removed from the analyses. The remaining 34 audits represented data from 26 councils, as several councils provided multiple audits. There were a range of service configurations in place and they have been classified as follows for this project:

- Configuration 1: 240 L FOGO fortnightly and small residual waste bin (120/140L) weekly.
- Configuration 2: 240 L FOGO weekly and small residual waste bin (120/140L) weekly.
- Configuration 3: 240 L FOGO weekly and large residual waste bin (240L) weekly.
- Configuration 4: 240 L FOGO weekly and small residual waste bin (120/140L) fortnightly.
- Configuration 5: 240 L FOGO weekly and large residual waste bin (240L) fortnightly.
- Configuration 6: 240 L FOGO weekly and residual waste Other (user select bin size and/or frequency).

Table 1-1 provides a breakdown of audits analysed by service configuration. Analysis was undertaken to identify any differences in performance of FOGO systems across these configurations.

Table 1-1: Number of kerbside audits analysed by service configuration system.

Configuration system	# Kerbside FOGO and residual waste audits analysed	Total # bins audited across the system (residual waste, FOGO)
Configuration 1: FOGO fortnightly and small residual waste bin (120/140L) weekly	1[5]	216 (216, 0)
Configuration 2: FOGO weekly and small residual waste bin (120/140L) weekly	3	1,548 (738, 810)
Configuration 3: FOGO weekly and large residual waste bin (240L) weekly	3[6]	938 (536, 402)
Configuration 4: FOGO weekly and small residual waste bin (120/140L) fortnightly	11	3,970 (1,936, 2,034)
Configuration 5: FOGO weekly and large residual waste bin (240L) fortnightly	10	3,431 (1,709, 1,722)
Configuration 6: FOGO weekly and residual waste Other (user selected bin size and/or frequency)	6	2,136 (1,203, 933)
All Configurations	**34**	**12,239 (6,338, 5,901)**
Audit data sets removed from the analysis	4	1,049 (1,049,0)
Total including audits removed from the analysis	**38**	**13,288 (7,387, 5,901)**

[5] Residual waste audit only, no FOGO audit.
[6] One council with Configuration 3 provided food waste only collection (no garden organics) and hence was excluded from analysis of garden organics volumes but included in all other analyses.

1.4. Aggregated versus bin-by-bin analysis

Two methods are used for auditing kerbside waste and recycling in NSW:

- Aggregated method
- Bin-by-bin method.

The aggregated method involves emptying sampled waste or recycling bins into a waste collection vehicle and sorting through the combined volumes. This method enables analysis of the average waste generation, diversion and contamination levels across the audited area.

Alternatively, the bin-by-bin method involves separately collecting and auditing each bin. This method enables analysis of individual household performance and identification of outliers that may skew averages.

For this project, 23 audited councils/areas used the aggregated method and 11 used the bin-by-bin method. However, detailed datasets showing performance by bin and matched to the residual bin from the same household was only available for five of these audits[7]. Additional analysis was undertaken using the bin-by-bin data for these five councils.

[7] The other six data sets were provided in an aggregated form that did not allow individual analysis.

2. Overall food and garden organics efficiency

The overall food and garden organics efficiency is the proportion of food waste and garden organics in the residual and FOGO bins, that is placed into the FOGO bins by residents[8]. The results across all audited areas/councils are presented in Table 2-1 below. On average, households discarded 14.4 kilograms per week of food and garden organics, and placed 85% (12.3 kg/hh/wk) of this material into the FOGO bins. This is a high diversion rate, although it is important to recognise that this rate is driven mostly by garden organics as this comprises a high proportion of FOGO bin contents. Sections 3 and 4 provide further detail on food and garden organics as separate streams.

Table 2-1: Average proportion of food waste and garden organics discarded into FOGO bins[9]

Item	Performance
Average food waste and garden organics discarded into FOGO bins across all audited areas/councils (kg/hh/wk)	12.3
Average food waste and garden organics discarded into FOGO and residual waste bins across all audited areas/councils (kg/hh/wk)	14.4
Average food waste and garden organics efficiency	85%[10]

[8] The efficiency calculation only considers food waste and garden organics in FOGO and residual waste bins, whereas another method for calculating the 'diversion rate' would consider the average weight of all contents from the FOGO bins by the average weight of all contents from both FOGO and residual waste bins. Although there are other materials in the residual waste bin outside of food waste and garden organics that could be discarded into FOGO bins (e.g. serviettes), most of the materials are likely to be comingled recyclables or residual waste items and as such, the food waste and garden organics efficiency score is a more accurate reflection of the diversion of these materials from landfill than this other calculation method.

[9] Note one council was excluded from the analysis due to collecting food waste only (not garden organics), which would have skewed the results by lowering the average food waste and garden waste discarded in FOGO bins per week (as no garden waste is discarded and traditionally households discard high volumes of this material)

[10] Note this percentage was calculated using a weighted average approach (as opposed to a simple average)

3. Food Waste

Food waste is a key component of the kerbside waste stream, making up an estimated 35% of total waste and recycling volumes[11]. Diverting food waste from landfill represents a significant opportunity to reduce greenhouse gas emissions, turn the waste into valuable products (such as compost) and create jobs in the circular economy.

3.1. Audit data by Council and configuration

Table 3-1 overleaf summarises key outputs from analysis of average food waste diversion volumes (kg/hh/wk) and the percentage of available food waste diverted from landfill via the FOGO bin, by service configuration. Ranges in values (min and max) for average performance of councils are provided for each configuration type.

On average, 44% of available food waste was diverted from landfill across the audited areas/councils. All of the audits included in this analysis (33 included and one excluded due to not auditing FOGO bins) were undertaken for councils that have a weekly organics recycling service.

Analysis of food waste performance by service configuration[12] shows, in general, councils providing a fortnightly residual waste collection achieved higher food waste diversion efficiencies compared to those on a weekly service. In addition, councils providing smaller residual waste bins (120/140 litre) achieved higher food waste diversion efficiencies compared to councils with larger residual waste bins (240 litre). The diversion efficiency performance by configuration (highest to lowest) is as follows:[13]

- 57% - Configuration #4: Small bin residual waste fortnightly and large bin FOGO weekly.
- 47% - Configuration #6: User-select residual waste bin size and/or collection frequency and large bin FOGO weekly.
- 38% - Configuration #5: Large bin residual waste fortnightly and large bin FOGO weekly.
- 28% - Configuration #2: Small bin (120/140L) residual waste weekly and large bin FOGO weekly.
- 14% - Configuration #3: Large bin (240L) residual waste weekly and large bin FOGO weekly.

Performance can vary significantly across audited areas/councils within a service configuration. For example, the food diversion efficiency of councils with Configuration 5 (FOGO weekly and 240 litre residual waste fortnightly) ranged from 5% up to 78%. See Figure 3-2, which includes each audited area/council (letters A through AH), and the average food efficiency performance by configuration.

Analysis was undertaken to determine whether this variation in food waste diversion performance may be explained by how long the FOGO service had been in place (and therefore how familiar residents were with using the service). Areas with a FOGO service for more than a year performed better on average (at 46%) than those established less than one year and those in the trial groups (34%[14] and 28% respectively). The results demonstrate that performance varies when accounting for differences in the length of service,

[11] Environment Protection and Heritage Council (2010), National Waste Report. Accessed at: https://www.environment.gov.au/system/files/resources/af649966-5c11-4993-8390-ab300b081f65/files/national-waste-report-2010.pdf

[12] Average performance for a given configuration was calculated by a weighted average approach (as opposed to a simple average)

[13] Note a small bin is 120 litres or 140 litres and a large bin is 240 litres

[14] The 'Established <1 year' group food efficiency score is 45% if one apparently high performing council is not removed from the data set. The audit from this council was atypical in many aspects and therefore may not be representative.

as well as configuration. This suggests that service configuration and length of FOGO service are not the only contributing factors to food waste performance and other initiatives, such as the quality of community education and the messaging and delivery method, are likely to also be important for influencing food waste diversion outcomes.

Table 3-1: Average food in FOGO bins, residual waste bins and total (kg/hh/wk), diversion efficiency (%) by configuration. The range of values (min and max) is provided in brackets.

Configuration	Food waste in FOGO bin kg/ hh / wk	Food waste in Residual waste bin kg/ hh / wk	Total food waste kg/ hh / wk	Average Diversion Efficiency (%)[12]
Configuration 1: FOGO fortnightly and small residual waste bin (120/140L) weekly.[15]	NA	2.16 NA	NA	NA
Configuration 2: FOGO weekly and small residual waste bin (120/140L) weekly.	1.04 (0.37 - 1.88)	2.73 (2.62 - 2.9)	3.77 (3.27 - 4.5)	28% (11% - 42%)
Configuration 3: FOGO weekly and large residual waste bin (240L) weekly.[16]	0.49 (0.38 - 0.6)	2.94 (1.01 - 4.08)	3.43 (1.61 - 4.57)	14% (9% - 37%)
Configuration 4: FOGO weekly and small residual waste bin (120/140L) fortnightly.[17]	2.24 (0.27 – 7.3)	1.69 (0.81 - 2.68)	3.93 (1.6 – 9.99)	57% (17% - 73%)
Configuration 5: FOGO weekly and large bin (240L) residual waste fortnightly.[18]	0.88 (0.17 - 2.69)	1.43 (0.76 - 3.22)	2.31 (1.29 - 4.03)	38% (5% - 78%)
Configuration 6: FOGO weekly and residual waste Other (user select bin size and/or frequency)[19]	1.63 (1.31 - 2.55)	1.85 (0.75 - 2.72)	3.48 (2.06 - 4.88)	47% (34% - 64%)
All Configurations	**1.45** **(0.17 – 7.3)**	**1.89** **(0.75 – 4.08)**	**3.30[20]** **(1.29 – 9.99)**	**44%** **(5% - 78%)**

[15] Only one residual waste audit was available for councils with Configuration 1 (and no FOGO audits were available). Therefore, calculation of food waste volumes in FOGO bins and total food waste generation were unable to be calculated. Ranges in the average weight of residual waste bins for councils in this configuration is also therefore not applicable (given there was only one council analysed).
[16] The analysis above includes one audit where non-randomised sampling was suspected. A separate analysis excluding this audit was undertaken to check its potential impact on the average performance of Configuration 3. It was found that if this audit is removed then the average food waste efficiency for this configuration would increase slightly by 3 percentage points up to 17%.
[17] The analysis above includes four audits where grossly contaminated bins (>20%) were found. A separate analysis excluding these highly contaminated bins was undertaken to check its potential impact on the average performance of Configuration 4. It was found that if these highly contaminated bins are removed, then the average food waste efficiency for Configuration 4 would remain the same.
[18] The analysis above includes one audit where six of 225 bins were grossly contaminated bins (>20%). The main contaminants by weight were magazines/brochures, nappies and loose plastic bags. A separate analysis excluding these six highly contaminated bins was undertaken to check its potential impact on the average performance of Configuration 5. It was found that if these highly contaminated bins are removed, then the average food waste efficiency for Configuration 5 would remain the same.
[19] The analysis above includes one audit where two of 233 bins were grossly contaminated (>20%). The main contaminants by weight were plastic film, nappies and plastic bags. A separate analysis excluding these contaminated bins was undertaken to check its potential impact on the average performance of Configuration 6. It was found that if these highly contaminated bins are removed, then the average food waste efficiency for Configuration 6 would remain the same.
[20] The average total kg/hh/wk of food in all bins does not equate to the food in FOGO bins + food in residual waste bins due to the total average not including the Configuration 1 data point (as no FOGO audit was undertaken for this council).

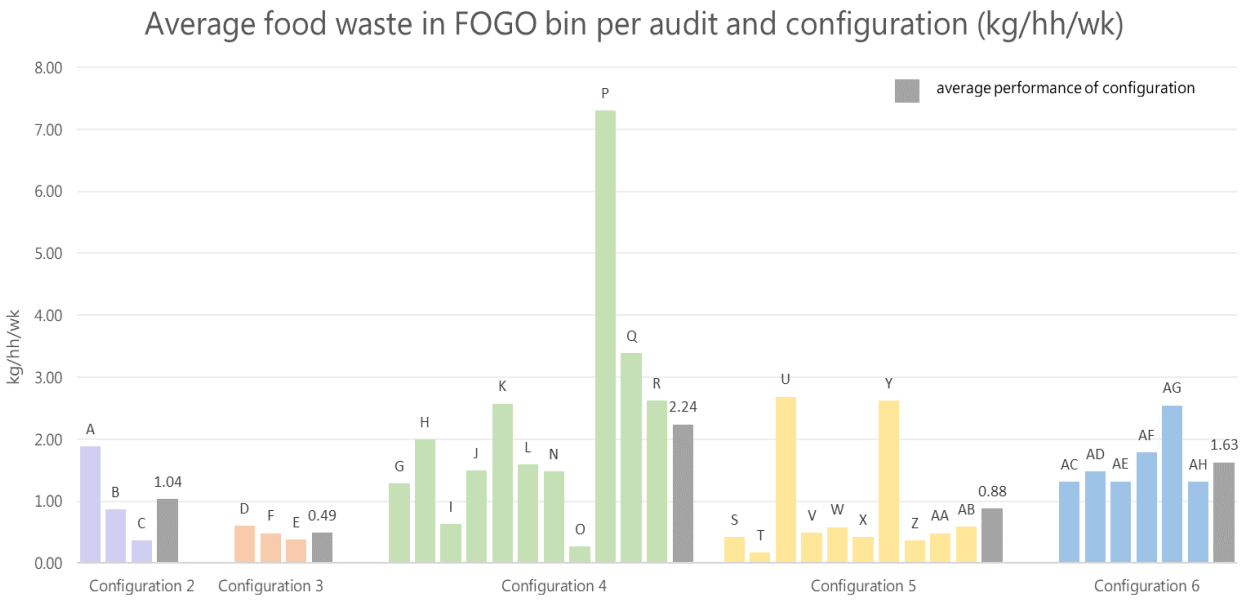


Figure 3-1: Food waste in FOGO bins per audit and configuration (kg/hh/wk), including averages for each configuration[21]

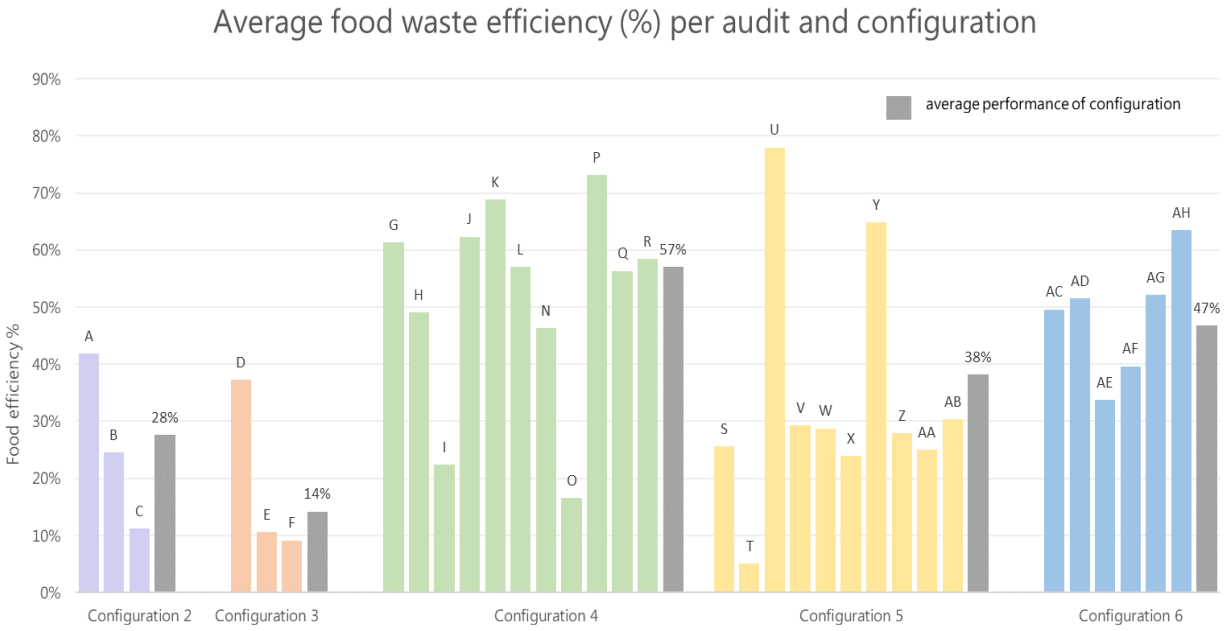


Figure 3-2: Food waste efficiency (% of food waste in FOGO bins out of all food waste discarded), by configuration, including averages for each configuration[21] [12]

[21] Note that the letter above each data point refers to the Audit ID (see Appendix Two). Audits M, AI, AJ, AK and AL are not included due to insufficient data.

3.2. Bin-by-bin data

Table 3-2 and Figure 3-3 overleaf present bin-by-bin data for food waste in FOGO bins for five councils. The table shows that as few as 1% (Council 3) and up to 21% (Council 1) of households did not discard food waste in either the FOGO of residual waste bins[22]. After removing these bins and non-matching households from the analysis, a high proportion of FOGO bins did not contain food waste: 70% of Council 1's 177 remaining FOGO bins, 39% of Council 2's 209 FOGO bins, 26.9% of Council 3's 202 FOGO bins, 48% of Council 4's 327 FOGO bins and 38% of Council 5's 134 FOGO bins had no food present. Additional gains in food waste recycling volumes for these councils may be achieved if efforts are focused on encouraging greater participation from households not currently participating.

A surprising finding was the variation across the five councils, with Council 1 generally at one end of the scale and Council 3 at the other. This included variation in food waste diversion efficiency (22% for Council 5 and 73% for Council 3), proportion of households with no food in FOGO bins (70% for Council 1 and around 27% for Council 3), the average kilograms of food per FOGO bin (from 0.7 to 7.3 for Councils 1 and 3 respectively), and the range of these weights in household bins (Council 1 had a maximum of 7 kilograms food waste in FOGO bin, whereas a household in Council 3 had almost 50 kilograms of food waste in one bin). This variation suggests that bin-by-bin audits are important to better understand differences at a household level and that larger sample sizes will help gain more accurate estimations of average performance at a council level and when comparing across councils.

The difference of the range of weights can be seen in Figure 3-3 two pages overleaf, where 75% of Council 1 bins were less than 0.6 kilograms, and 75% of Council 3's were less than 12.1 kilograms. The differences cannot be attributed to configuration only. Councils 3, 4 and 5 all had the same configuration, and there was some variance for these councils in average kilograms per bin and maximum kilograms per bin.

Despite these differences, it is worth noting that for any given council there appears to be a high proportion (from a third up to two thirds) of households that do not discard any food waste in FOGO bins but do discard food in general waste bins. Also common to all councils are outliers in each sample, which can be seen in Figure 3-3 based on the number of small circles. This shows that approximately 3% of the bins in Council 1 (or 5 bins) were considered outliers (i.e. the weight of the food waste in the bins was significantly higher than the average food waste kg/bin), 2% for Council 2 (or 4 bins), 1.5% for Council 3 (or 3 bins), 5 bins or 1.5% of Council 4 households and 5 bins or 4% of Council 5 households

Bin-by-bin data for these five councils show that food weights bin by bin and overall food diversion performance can differ from council to council. However, in all cases a select proportion of households are contributing to food diversion, with 27% up to 70% of households discarding food in the residual waste bins but not FOGO bins in the five councils sampled here. Food waste diversion is therefore more likely to be higher through increasing the number of participating households, rather than encouraging active participants to be more efficient in their source separation.

[22] Households that did not present any food waste across both the residual waste and FOGO bins were subsequently removed from the bin-by-bin analysis. It was assumed these households were managing their food waste separately to the kerbside system (e.g. home composting).

Table 3-2: Summary of bin-by-bin data for food waste in FOGO bins

Item	Council 1	Council 2	Council 3	Council 4	Council 5
Configuration	Configuration 5: 240L residual waste fortnightly, FOGO weekly	Configuration 6: Other (user selected service/unknown bin size weekly/ fortnightly), FOGO weekly	Configuration 4: 120L/140L red bin fortnightly, FOGO weekly	Configuration 4: 120L/140L red bin fortnightly, FOGO weekly	Configuration 4: 120L/140L red bin fortnightly, FOGO weekly
Number of FOGO bins sampled	225	234	216	436[23]	220
Number bins excluded due to no food waste across all bins	47 (21% of sample)	24 (10% of sample)	3 (1% of sample)	48 (11% of sample)	4 (2% of sample)
Number bins excluded due to non-matched hhs	1	1	12	61	82
Bins remaining in sample	177	209	201	327	134
Length of service	>1 Year	<1 Year	<1 Year	>1 Year	<1 Year
Bin-by-bin data (after excluded households removed)					
Average kg/bin	0.67	1.85	7.31	1.63	1.27
No. bins with food waste weights above the average food waste kg/bin	43 (24%)	74 (35%)	88 (44%)	113 (35%)	41 (31%)
Min kg/bin (if food present)	0.02	0.21	0.32	0.02	0.009
Max kg/bin	7.05	15.05	47.5	31.0	10.6
% FOGO bins with no food present	70.1%	39.2%	26.9%	48.3%	38.1%
Interquartile range in Figure overleaf (first and third quarters containing the middle 50% of data points)[24]	(0 - 0.6)	(0 - 2.8)	(0 - 12.1)	(0 – 2.4)	(0 – 1.7)
Aggregated data (including households excluded above)					
Food waste diversion efficiency %	28%	64%	73%	61%	22%
Average food waste kg/hh/wk	0.36	1.31	7.30	1.29	0.63

[23] 436 datapoints were used from 222 households as households were sampled over two weeks.
[24] Analysis of the bin-by-bin food weight data showed a left-skewed distribution, not a normal distribution. The standard deviation is therefore not an appropriate measure of variability (or spread) of the distribution. As the data is left skewed, the first and third quartiles were reported, as these give a sense of the asymmetry of the distribution. See https://www.ma.utexas.edu/users/mks/statmistakes/skeweddistributions.html for further details

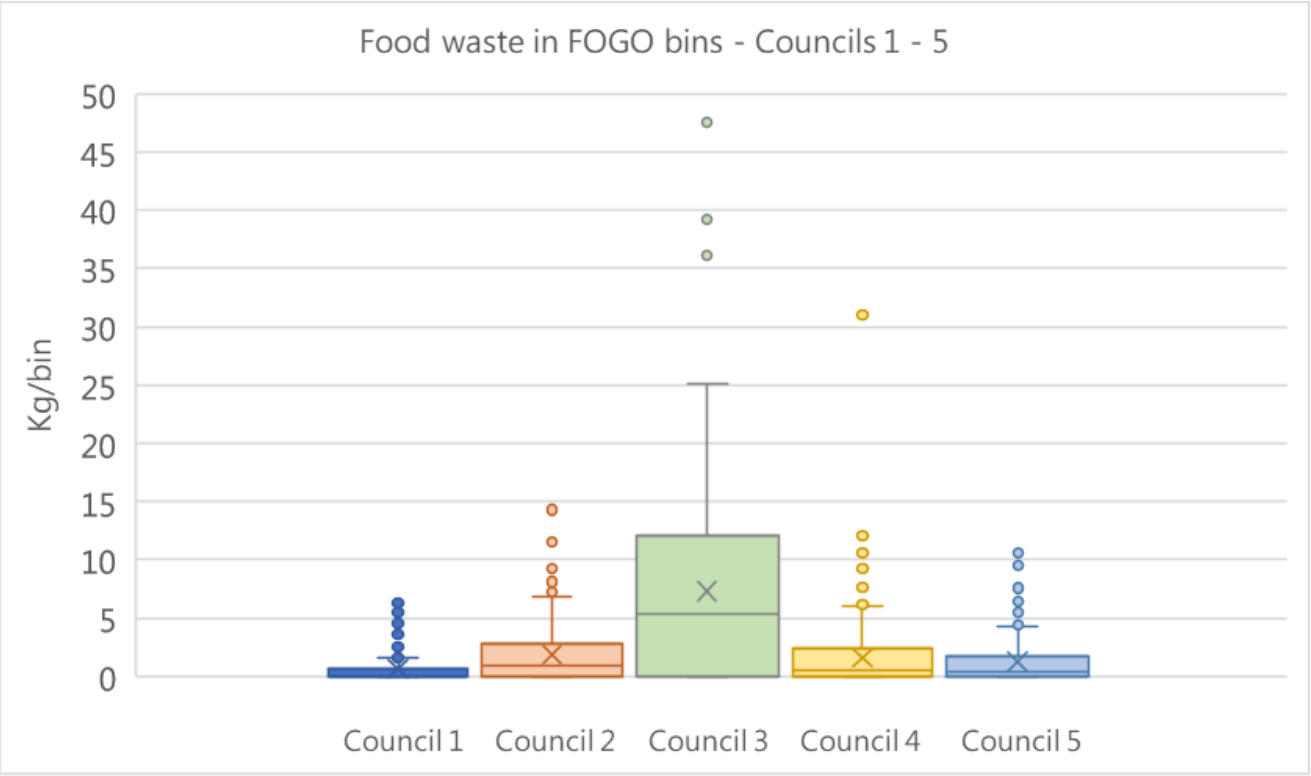


Figure 3-3: A box and whisker plot of the bin-by-bin data for food waste in FOGO bins. Note the rectangle is the interquartile range (IQR) and comprises 50% of the data, the 'x' is the average and the whisker edge captures data within 1.5 times the width of the IQR (any data points outside of this range are considered outliers and are represented by small coloured circles). The median is the line within the rectangle.

4. Garden Organics

4.1. Audit data by Council and configuration

Table 4-1 overleaf provides key outputs from analysis of garden organics diversion volumes (kg/hh/wk) and the percentage of available garden organics diverted from landfill via the residual waste stream (%), by service configuration[25]. Ranges in values (min and max) for average performance of councils are provided for each configuration type.

The total amount of garden organics generated varies considerably by council, from 1.06 kg/hh/week up to 23.67 kg/hh/week. This large difference in garden waste generation is likely due to differences in rainfall, vegetation levels, block sizes and population densities. The time of year that the audit took place could also impact the results.

On average, 98% of available garden organic waste was diverted from landfill across the audited areas/councils. Analysis of garden waste performance by service configuration shows there is little difference in diversion efficiency performance, ranging between 94% and 99%. See Figure 4-2 two pages overleaf. There was also little variation in performance at individual council level, which ranged from 89% up to 99.9%.

[25]Average performance for a given configuration was calculated by a weighted average approach (as opposed to a simple average).

Table 4-1: Average garden organics in FOGO bins, residual waste bins and total (kg/hh/wk), diversion efficiency (%) by configuration. Note that the range of values (min and max) is provided in brackets.

Configuration	Garden organics in FOGO bin kg/ hh / wk	Garden organics in residual waste bin kg/ hh / wk	Total garden organics kg/ hh / wk	Average Diversion Efficiency (%)[25]
Configuration 1: FOGO fortnightly and small residual waste bin (120/140L) weekly[26]	NA	0.01 NA	NA	NA
Configuration 2: FOGO weekly and small residual waste bin (120/140L) weekly	12.50 (3.21 - 19.32)	0.25 (0.15 - 0.43)	12.75 (3.38 - 19.75)	98% (95% - 99%)
Configuration 3: FOGO weekly and large residual waste bin (240L) weekly[27, 28]	15.04 (10.66 - 19.42)	0.97 (0.59 - 1.35)	16.01 (12.01 - 20.01)	94% (89% - 97%)
Configuration 4: FOGO weekly and small residual waste bin (120/140L) fortnightly[29]	11.05 (0.94 – 23.5)	0.14 (0.01 - 0.47)	11.20 (1.06 - 23.67)	99% (89% - 99.9%)
Configuration 5: FOGO weekly and large residual waste bin (240L) fortnightly[30]	11.40 (8.66 – 13.21)	0.20 (0.1 - 0.64)	11.60 (8.82 - 13.59)	98% (95% - 99%)
Configuration 6: FOGO weekly and residual waste Other (user select bin size and/or frequency)[31]	7.15 (3.13 - 11.25)	0.14 (0.02 - 0.3)	7.29 (3.15 - 11.32)	98% (97% - 99%)
All Configurations	**10.86** (0.94 – 23.5)	**0.21** (0.01 - 1.35)	**11.08[32]** (1.06 – 23.67)	**98%** (89% - 99.9%)

[26] Only one residual waste audit was available for Configuration 1 (and no FOGO audits were available). The calculation of garden organics volumes in FOGO bins and total garden organics generation was unable to be calculated. Ranges in the average weight of residual waste bins for councils in this configuration is also therefore not applicable (given there was only one council analysed).
[27] Removed audit data from one council with this configuration as it had food bins only (no garden waste accepted) and is therefore not relevant.
[28] Non randomised sampling was suspected in one audit with Configuration 3. A separate analysis excluding this audit was undertaken to check its potential impact on the average performance of Configuration 3. If this audit is removed then the average garden organics efficiency for this configuration would reduce to 89%.
[29] This analysis includes four audits where grossly contaminated bins (>20%) were found. A separate analysis excluding these highly contaminated bins was undertaken to check its potential impact on the average performance of Configuration 4. Removing these highly contaminated bins had no significant impact on garden organics diversion efficiency.
[30]The analysis above includes one audit where six of 225 bins were grossly contaminated (>20%). Removing these highly contaminated bins had no significant impact on garden organics diversion efficiency.
[31] The analysis above includes one audit where two of 233 bins were grossly contaminated bins (>20%). Removing these highly contaminated bins had no significant impact on garden organics diversion efficiency.
[32] The average total kg/hh/wk of garden in all bins does not equate to the garden in FOGO bins + garden in residual waste bins due to the total average not including the Configuration 1 data point (as no FOGO audit was undertaken for this Council)

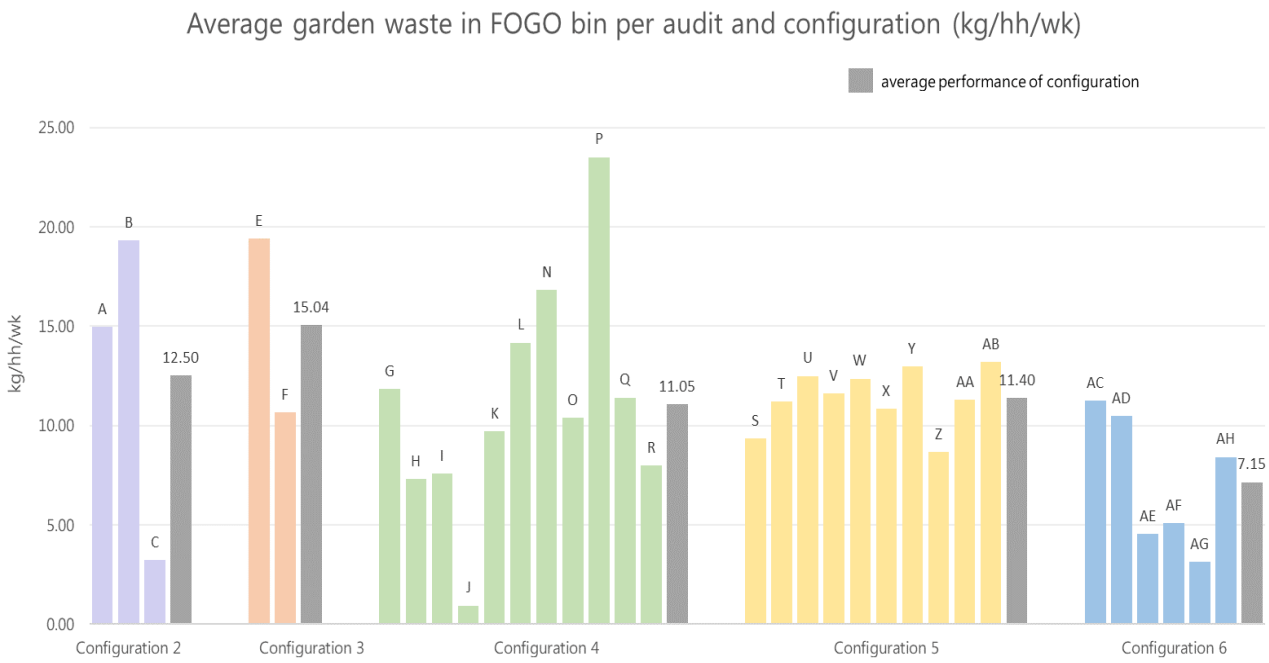


Figure 4-1: Garden organics in FOGO bins by configuration (kg/hh/wk), including averages for each configuration[33]

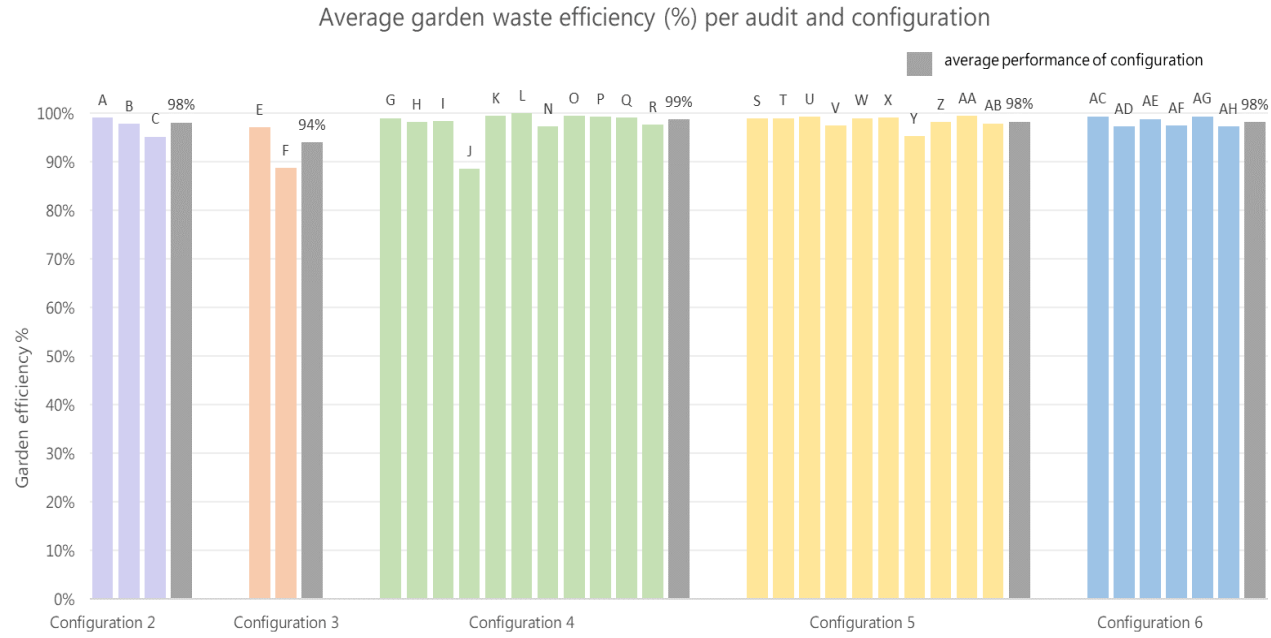


Figure 4-2: Garden organics efficiency (% of garden organics in FOGO bins out of all garden organics discarded), by audit and by configuration[33] [34]

[33] Note that the letter above each data point refers to the Audit ID (see Appendix Two). Audits D, M, AI, AJ, AK and AL are not included here due to insufficient data.
[34] Average performance for a given configuration was calculated by a weighted average approach (as opposed to a simple average).

4.2. Bin by bin data

The bin-by-bin data for garden organics in FOGO bins for five councils is presented below[35]. The average kilograms of garden organics per FOGO bin is similar across councils 1, 2, 4 and 5 (ranging from 11.4 kg/bin to 13.5 kg/bin), with Council 3 a little higher (at 26.6 kg per bin). The maximum weight of garden organics in a bin was similar for all councils, ranging from 45 to 67 kg per bin.

Almost no bins for Councils 1, 2, 3 and 5 contained no garden organics, while almost 16% of bins for Council 4 had no garden organics in FOGO bins (after excluding those that did not discard any garden organics across the FOGO and residual waste bins). Figure 4-3 displays the box and whisker plots for the five councils. This includes the number of outliers, which is around 2% of the bins in Council 1 (4 bins had volumes of garden organics significantly higher than the average), 2% of bins in Council 2 (or 5 bins), 0% for Council 3, 3 bins for Council 4 (0.8%) and 1 bin for Council 5 (0.7%).

Table 4-2: Summary of bin-by-bin data for garden organics

Item	Council 1	Council 2	Council 3	Council 4	Council 5
Configuration	Config 5: 240L residual waste fortnightly, FOGO weekly	Config 6: Other (user selected service/unknown bin size weekly/ fortnightly), FOGO weekly	Config 4: 120L/140L red bin fortnightly, FOGO weekly	Config 4: 120L/140L red bin fortnightly, FOGO weekly	Config 4: 120L/140L red bin fortnightly, FOGO weekly
Number of bins sampled	225	234	216	436[36]	220
Number bins excluded due to no garden waste across all bins	4 (2% of sample)	13 (6% of sample)	23 (11% of sample)	15 (3% of sample)	1 (0.5% of sample)
Number bins excluded due to non-matched hhs	1	1	12	61	82
hhs remaining in sample	220	220	181	360	137
Length of service	>1 Year	<1 Year	<1 Year	>1 Year	<1 Year
Bin-by-bin data (after excluded households removed)					
Average kg/bin	12.98	11.39	25.61	13.48	12.75
No. bins with garden weights > average garden waste kg/bin	87 (40%)	89 (40%)	59 (40%)	154 (43%)	58 (42%)
Min kg/bin (if garden waste present)	0.009	0.017	0.75	0.04	0.037
Max kg/bin	55.0	66.4	67.2	62.2	45.4
% bins with no garden waste present	0.5%	0.5%	0%	15.6%	0%
Interquartile range in Figure overleaf (first and third quarters containing the middle 50% of data)	(3.68 - 18.83)	(3.47 - 15.66)	(9.55 - 39.85)	(2.14 - 22.45)	(3.50 - 19.62)
Aggregated data (including households excluded above)					
Garden waste diversion efficiency %	98%	97%	99%	99%	98%
Average food waste kg/hh/wk	8.66	8.42	23.50	11.84	7.56

[35] Six bin-by-bin data sets were not analysed as the data was only provided in an aggregated format.
[36] 436 datapoints were used from 222 households as households were sampled over two weeks.

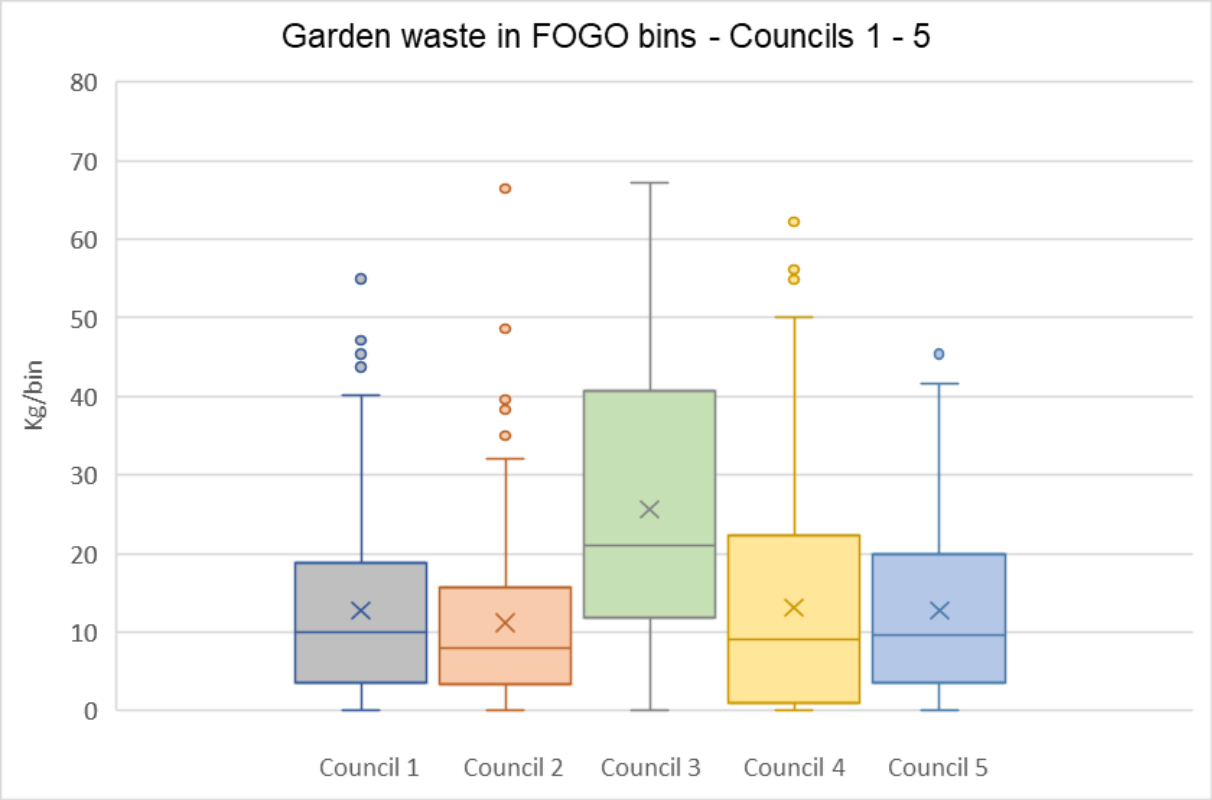


Figure 4-3: Box and whisker plot of the bin-by-bin data for garden organics in FOGO bins. Note the rectangle is the interquartile range (IQR) and comprises 50% of the data, the x is the average and the whisker edge captures data within 1.5 times the width of the IQR on either side of the IQR (data points outside of this range are considered outliers). The median is the line within the rectangle.

5. Contamination

Contamination of FOGO bins is undesirable because it requires further processing, incurs higher costs to remove the contaminants and/or results in a lower value recycled product.

Materials that are considered contaminants can vary from council to council, depending on the specifications of organics processors. For this project, a set of standard contaminants was agreed with DPIE to enable comparison of contamination levels across audits. Refer to Appendix 1 for contamination classifications. Each audit raw data set was assessed and adjusted if required to reflect these. Some audit reports and data sets did not clearly state what was considered contamination, and Rawtec spent some time assessing the raw data in detail to ensure consistent contaminants were reported across all audits for the purposes of this project.

Most data sets received were in aggregated bin format as opposed to bin-by-bin data. As such, grossly contaminated bins were not able to be identified and potentially removed to assess the impact these bins were having on the data sets and whether the grossly contaminated bins were skewing the data. Where data sets were not in aggregated bin format the impact of grossly contaminated bins (>20% contamination) has been considered and is mentioned within this section.

5.1. Audit data by Council and configuration

The top five contaminants by weight were recorded for each audited area/council. The authors then used two methods to assess the top five contaminants. The first involved a counting methodology where the number of times the contaminants appeared in the top five was summed and the top ranked reported. Using this method, the most frequently cited contaminants were:

- plastic
- all other organics (leather, rubber and oils)
- containerised food (e.g. glass and plastic containers and the food they contained)
- metals
- other miscellaneous (e.g. bagged materials, bulky household goods)[37].

An alternative method involved summing the weight (kg/hh/wk) of the contaminants that appeared in the top five heaviest contaminants in each audit (rather than counting the number of times each contaminant appeared in the top five heaviest contaminants). This method found the top contaminants were:

- miscellaneous (e.g. bagged materials, bulky household goods)
- earth-based materials
- plastic
- all other organics (leather, rubber and oils)
- containerised food (e.g. glass and plastic containers and the food they contained)[38].

[37] The order remained the same with grossly contaminated bins (bins with >20% contamination, 21 bins total) removed.
[38] The order changed slightly with grossly contaminated bins removed, with plastic ranked second and earth-based materials third.

Table 5-1 below provides key outputs from analysis of average contamination volumes (kg/hh/wk) and the percentage of contamination (%) in the FOGO bins, by service configuration. Ranges in values (min and max) for average performance of councils are provided for each configuration type.

On average, the level of contamination of the FOGO bin was 2.2% by weight across the audited areas/councils. Although this value ranged significantly, from 0.04% up to 17.83%, the middle 50% of contamination rates across audited areas/councils fell between a much narrower range (0.7% to 3.3%). Note that bin-by-bin data suggests contamination appears to be driven by a low proportion of the population, which is discussed in Section 5.2.

Analysis of contamination levels by service configuration shows that Configuration 6 had the top contamination rate. An analysis was undertaken to check the strength of the correlation between food efficiency and contamination for the audited councils and the correlation was found to be weak. See Figure 5-2.

Table 5-1: Average contamination in FOGO bins (kg/hh/wk), average contamination as a percentage of FOGO bin weight (%), and most common contaminants by configuration.

Configuration	Contamination in FOGO bin Kg/hh/week	Contamination in FOGO bin (%)[39]	Most common contaminants cited
Configuration 2: FOGO weekly and small residual waste bin (120/140L) weekly	0.23 (0.04 – 0.57)	1.7% (0.37% - 3.27%)	• Containerised food • Plastic • Earth-based • Miscellaneous
Configuration 3: FOGO weekly and large residual waste bin (240L) weekly	0.17 (0.1 - 0.25)	1.5% (1.25% - 12.74%)	• Plastics • Metals • All Other organics • Containerised Food
Configuration 4: FOGO weekly and small residual waste bin (120/140L) fortnightly	0.24 (0.01 – 0.93)	1.7% (0.04% - 17.83%)	• Plastics • All other organics • Metals • Miscellaneous
Configuration 5: FOGO weekly and large residual waste bin (240L) fortnightly	0.21 (0.02 – 0.57)	1.6% (0.2% - 3.87%)	• Plastics • Metals • Containerised food • All other organics
Configuration 6: FOGO weekly and residual waste Other (user select bin size and/or frequency)	0.51 (0.07 – 0.83)	5.4% (0.7% - 12.36%)	• Plastic • Containerised food • All Other Organics • Miscellaneous
All Configurations	**0.27** **(0.01 – 0.93)**	**2.2%[40]** **(0.04% - 17.83%)**	• Plastic • All other organics • Containerised food • Metals • Miscellaneous

[39]Average performance for a given configuration was calculated by a weighted average approach (as opposed to a simple average).
[40] This value changed by 1 percentage point to 2.1% with the removal of grossly contaminated bins.

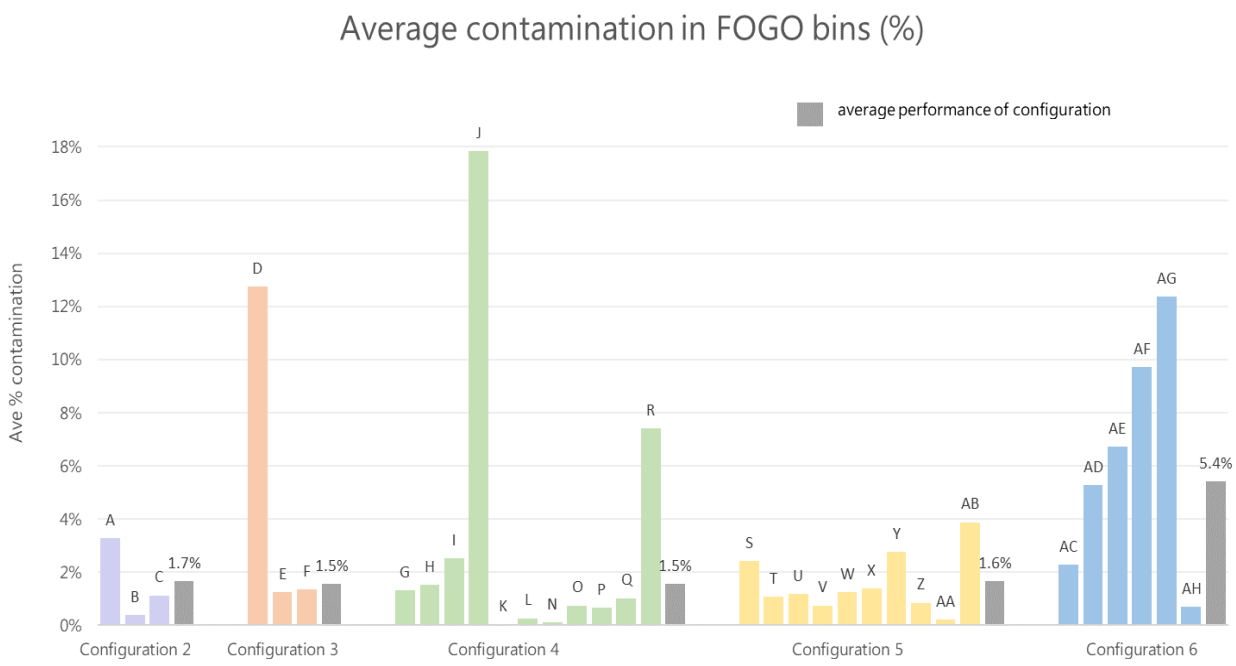


Figure 5-1: Average contamination in FOGO bins (% of bin weight) by audit and by configuration[21] [39]

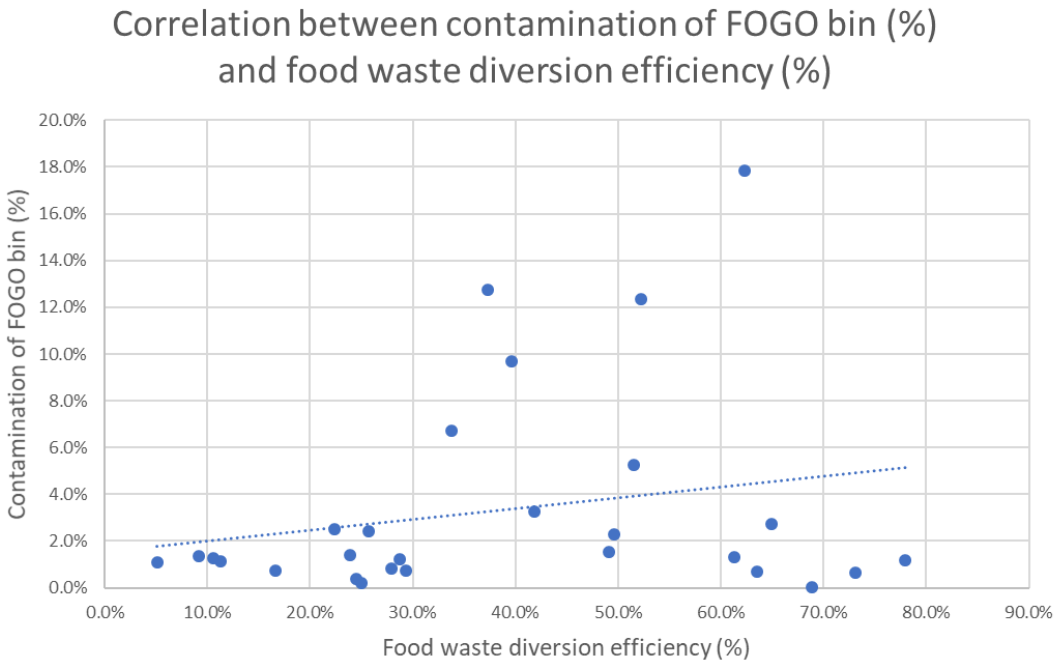


Figure 5-2: Correlation between contamination of FOGO bin (%) and food waste diversion efficiency (%) for audited councils/areas

5.2. Bin-by-bin data

A high proportion of bins did not contain any contamination (over 67% for all councils up to 92% for Council 3). This is reflected in Table 5-2 below and Figure 5-3 overleaf. Most data points sit in the '0 kg/bin' range. Figure 5-3 also shows the remaining contamination weights per bin are evenly spread from 0-0.01 through to 3+ kg/bin. One bin in Council 4's data had 44 kilograms of earth-based contaminants which can be considered a very high volume of contamination.

Analysis was undertaken to estimate the average weight of contamination only in bins that contained contamination. In these cases, the average kilograms of contamination per bin varied from 0.62 to 2.51 for Councils 2 and 3 respectively (versus 0.09 and 0.21 kilograms when all bins are considered). This suggests that when a household does contaminate FOGO bins, the volumes are much higher (in the cases below, 3 – 12 times more) than the average kilograms per households when considering an entire council.

Table 5-2: Summary of bin-by-bin data for contamination

Item	Council 1	Council 2	Council 3	Council 4	Council 5
Configuration	Configuration 5: 240L residual waste fortnightly, FOGO weekly	Configuration 6: Other (user selected service/unknown bin size weekly/fortnightly), FOGO weekly	Configuration 4: 120L/140L red bin fortnightly, FOGO weekly	Configuration 4: 120L/140L red bin fortnightly, FOGO weekly	Configuration 4: 120L/140L red bin fortnightly, FOGO weekly
Number of bins sampled	225	234	216	436[41]	220
Length of service	>1 Year	<1 Year	<1 Year	>1 Year	<1 Year
Bin-by-bin data					
Average kg/bin	0.11	0.09	0.21	0.20	0.35
Min kg/bin (if contamination present)	0.005	0.004	0.02	0.01	0.006
Max kg/bin	13.61	7.44	12.4	44.0	15.9
% bins with no contamination present	84.4%	85.9%	91.7%	87.4%	67.7%
Average contamination (kg/bin) all bins with contamination present	0.73	0.62	2.51	1.62	1.10
Interquartile range in Figure overleaf (first and third quarters containing the middle 50% of data points)	(0 - 0)	(0 - 0)	(0 - 0)	(0 – 0)	(0 – 0.02)
Aggregated data					
Average contamination %	0.8%	0.7%	0.7%	1.3%	2.5%
Average kg/hh/wk	0.08	0.07	0.21	0.19	0.22

[41] 436 datapoints were used from 222 households as households were sampled over two weeks.

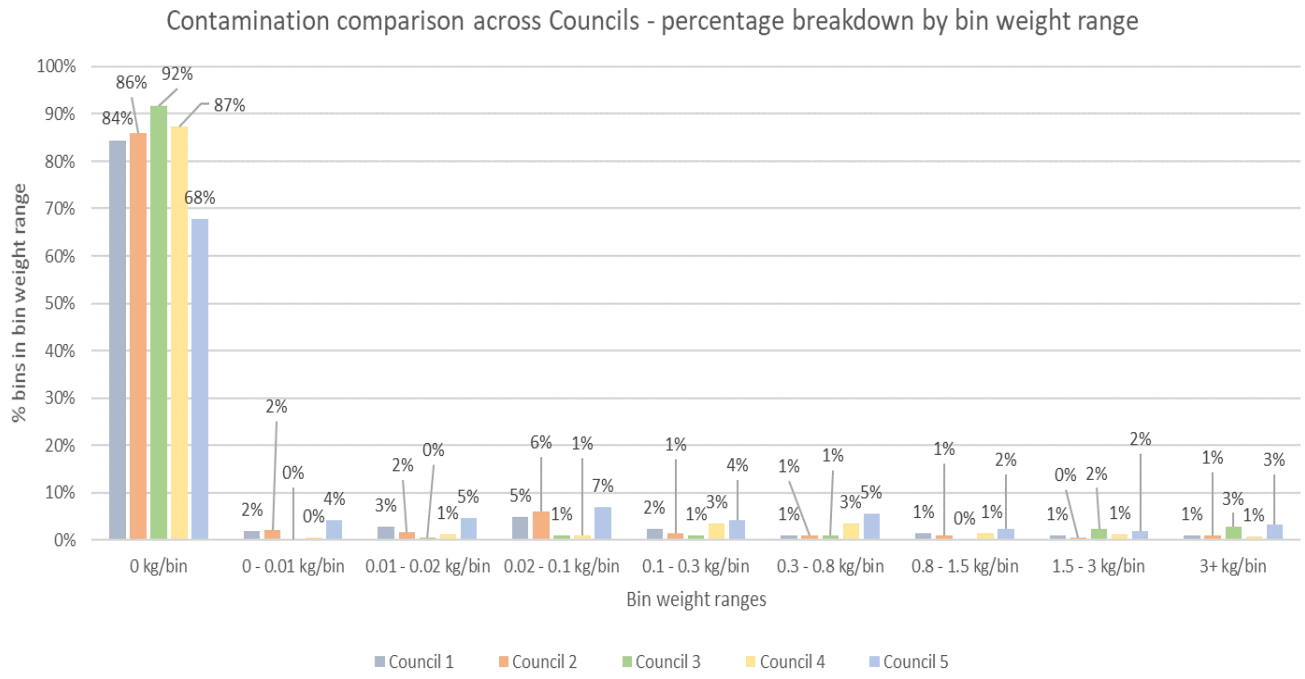


Figure 5-3: Percentage breakdown of bin contamination weight ranges by Council

6. Key findings and Recommendations

6.1. Performance of FOGO systems

This project identified the performance of FOGO systems at the individual household level, by council, and according to the service configuration (bin size and frequency of residual waste and organics recycling services).

Overall, the analysis considered data from 38 audits, of which four were removed[42]. The remaining 34 audits (26 councils) included a total of 12,239 FOGO and residual waste bins collected from NSW households. On average, residents were found to be diverting 85% of their food waste and garden organics by weight into FOGO bins.

When it comes to food waste, it was found that:

- 44% of available food waste (1.45 kg/hh/wk) was diverted from landfill across the audited areas/councils. This performance ranged significantly across councils from 5% to 78%.
- The average food efficiency across configurations ranged from 14% to 57%. In general, councils providing a fortnightly residual waste collection achieved higher food waste diversion efficiencies compared to those on a weekly service. In addition, councils providing smaller residual waste bins (120/140 litre) achieved higher food waste diversion efficiencies compared to councils with larger residual waste bins (240 litre).
- Performance can vary significantly by council within a service configuration. Therefore, service configuration is not the only contributing factor to food waste diversion performance.
- Analysis was undertaken to determine whether variation in food waste diversion performance may be explained by how long the FOGO service had been in place (and therefore how familiar residents were with using the service). On average, longer established FOGO services performed better (46% for >1 year) than less established services (34%[43] for those <1 year and 28% for those in the trial period). Performance was found to vary across councils with the same length of service or with the same service configuration.
- As such, other factors, such as waste education, are expected to be important for influencing food waste diversion outcomes.
- The bin-by-bin analysis revealed that 24 - 44% of bins contained volumes of food greater than the average kg/bin of food across all bins, and the proportion of households with no food waste in FOGO bins but food in residual waste bins varied from 27% to 70%. Additional gains in food waste recycling volumes for these councils may be achieved if efforts are focused on encouraging greater participation for those not currently using the service.

With regard to garden waste:

- 98% (ranging from 89% to 99.9% across audits) of available garden organics (10.81 kg/hh/wk) was diverted from landfill across the audited areas/councils.

[42] These were excluded from the analysis due to the audits including residual waste bins but not FOGO bins.
[43] The 'Established <1 year' group food efficiency score is 45% if one apparently high performing council is not removed from the data set. The audit from this council was atypical in many aspects and therefore may not be representative.

- This high performance was relatively consistent across councils and system configurations. Average performance by service configuration ranged between 94% and 99% diversion.
- The total amount of garden organics generated varied considerably by council, from 1.06 kg/hh/week up to 23.67 kg/hh/week. This large difference in garden waste generation is likely due to differences in rainfall, vegetation levels and population densities, and the time of year the audit was taken across the audited councils/areas.

On FOGO bin contamination:

- On average, contamination of the FOGO bin was 2.2% by weight (0.27 kg/hh/wk) across the audited areas/councils. However, this ranged significantly by from 0.04% up to 17.83% (although note that the middle 50% of contamination rates across all audited areas/councils was a much smaller range, falling between 0.7% and 3.3%).
- The most common top contaminants presented across audited councils were plastic, all other organics (leather, rubber and oils), containerised food, metals, and other miscellaneous.
- When considering contaminants by weight, the top five were miscellaneous (e.g. bagged materials, bulky household goods), earth-based materials, plastic, all other organics, and containerised food (e.g. glass and plastic containers and the food they contained).
- The bin-by-bin analysis of five councils found a large proportion of bins contained no contamination (from 68% to 92%). Reductions in contamination for these councils may be achieved by targeting households that contaminate (such as through a bin tagging program). Education campaigns or other behaviour change strategies that target all residents may be less effective given the majority of the population appear to not be contaminating their FOGO bins.

Other considerations:

- The above analysis demonstrates that the average food waste diversion and contamination rates vary greatly across councils and configurations.
- Bin-by-bin audits enable the most comprehensive analysis to be undertaken and the best understanding of variance within a council. As a number of residents may not be actively participating in the FOGO service, overall averages across the audit do not necessarily reflect those who are engaged in diverting food and garden organics via FOGO bins or the proportion of residents who are contaminating FOGO bins. This type of data can help guide education campaigns and other methods for influencing behaviour.

NSW Councils appear to be performing well regarding diverting organics materials via FOGO bins. However, there are opportunities to improve diversion rates by focusing on food waste. Higher performing councils appear to be those with less available residual waste disposal options for residents (i.e. residual waste bins are smaller or collected less frequently), or that offer a user selected service. Anywhere from one third to three quarters of residents are not diverting any food waste and less than one third of residents are contaminating FOGO bins according to the bin-by-bin data analysed. Tailoring education campaigns to focus on these individuals may be more effective than continuing broader interventions targeting all residents.

6.2. Comparison to the 2018 report

This report is an update of May 2018 report, which was based on available data from 26 audits areas/councils. The larger sample size in this 2020 report should increase the accuracy of results. The table below is included to compare differences in key results from the 2018 report to the current report.

Table 6-1: Comparison of key data, 2018 (previous report) to 2020 (current report)

Item	2020 report	2018 report
Total audits in the sample	38	26
Total vignettes[44]	37	25
Total audits included in the analysis[45]	34	23
Total bins (FOGO and residual) included in the analysis	12,239	8,119
Average food waste and garden organics discarded into FOGO bins across all audited areas/councils (kg/hh/wk)	12.3	11.4
Average food waste and garden organics efficiency	85%	83%
Bin-by-bin analyses:		
Number of councils included in the bin-by-bin analysis	5	2
Total FOGO bins collected	1,331	654
Repeat councils	Councils 4 and 5 in 2020 were titled Councils 1 and 2 in the 2018 report	
Key food data		
Ave kg/hh/wk food in FOGO bins (plus kg/hh/wk range by audit)	1.45 (0.17 - 7.3)	1.2 (0.17 - 2.69)
Ave kg/hh/wk food in residual waste bins	1.86	1.97
Food diversion efficiency score as a % (plus % range of all audits)	44% (5% - 78%)	38% (5% - 78%)
Food diversion efficiency score by configuration (Configuration 1 is NA):		
Configuration 2	28%	28%
Configuration 3	14%	14%
Configuration 4	57%	54%
Configuration 5	38%	41%
Configuration 6	47%	45%
Food diversion efficiency score by length of service:		
Trial	28%	28%
Established <1 Year	34%	22%
Established >1 Year	46%	46%
Key garden data		
Ave kg/hh/wk garden in FOGO bins (plus kg/hh/wk range by audit)	10.81 (0.94 - 23.5)	10.14 (0.94 - 19.42)
Ave kg/hh/wk garden in residual waste bins	11.04	10.39
Garden diversion efficiency score as a % (plus % range based on each audit)	98% (89% - 99.9%)	98% (89% - 99%)
Garden diversion efficiency score by configuration (Configuration 1 is NA):		
Configuration 2	98%	98%
Configuration 3	94%	94%
Configuration 4	99%	99%
Configuration 5	98%	98%
Configuration 6	98%	98%
Key contamination data		
Ave % contamination of FOGO bins (plus average kg/hh/wk contamination)	2.2% (0.27)	2.6% (0.30)
Range of contamination levels across all audits	(0.04% - 17.83%)	(0.04% - 17.83%)

[44] One audit was excluded as a vignette in both the 2018 and 2020 report as the vignette data allowed the council to be identified.
[45] Selected audits were included in the vignettes and not the analysis due to these audits not including FOGO bins.

6.3. Improving quality of future audits

The project scope included examination of audit data to assess the integrity of the audit and check for errors, omissions or anomalies. This process identified a few issues with some audits relating to their audit methodology and/or data analysis. Cleansing of the data was undertaken were possible prior to data analysis for this study. To prevent these errors from being repeated in future audits, it is recommended that DPIE provide further guidance to auditors and councils.

The NSW kerbside audit guidelines (2012 edition) provide comprehensive guidance. However, there are a few areas that could be reinforced or clarified to help auditors, councils and state-wide analysis projects. The following recommendations are therefore made for consideration by DPIE.

1. **Continue to emphasise the importance of a randomised sampling approach**

Some audits did not appear to take a randomized sampling approach. This included instances of samples being taken directly from waste collection vehicles on their regular run or collection of bins only from one or two streets. Whilst this may appear random, it doesn't necessarily provide a sample that is representative of the council's demographics.

2. **Ensure that future guidelines provide clear guidance on when and how to ensure stratified sampling for Multi-Unit Dwellings**

Several councils did not undertake appropriate sampling of Multi-Unit Dwellings within their area. The 2012 audit guidelines state, "Any MUD greater than a three storey walk up should be excluded from the analysis as the methodology expressed in these Guidelines is not suitable." A more suitable standard methodology has not been published in NSW.

3. **Emphasise the importance of large sample sizes to ensure greater confidence in the data**

A range of councils audited a smaller sample size than the guidelines recommended. It is understood that this may have been due to sample size calculation based on variability in previous audits or cost constraints. Appendix 3 of the 2012 guidelines provides the two approaches for determining sample size, i.e. using either the default recommendation for sample size as well as the option to depart from this if previous audits enable calculation of variability and estimation of a sample size that will achieve the same level of data confidence. However, analysis for this project has shown significant variation between households and councils, therefore a sample size below the guideline's default 220 sample size may lead to less accurate results.

4. **Clearer definition of contamination**

It is recommended that definitions of what is generally considered contamination for each waste stream be provided in audit guidelines. It is noted that there may be exceptions to the rule and councils should confirm with processors and composters what is regarded as contamination.

Authors of audit reports should provide a clear distinction of what has been considered contamination in their reports, as there were instances where it was unclear as to what had been regarded as contamination, and clearly stating these would allow an easier comparison of results across councils.

5. Provide clear guidance on the calculation of waste generation rates

Evaluating audit data revealed several issues in the calculation of waste generation rates. This included not considering presentation rates and not adjusting to account for the service frequency. The most recent version of the guidelines has expanded guidance and example calculations for estimating waste generation rates. It may be beneficial to facilitate a training session to ensure that auditors are familiar with the different methods for correct calculation of waste generation rates.

6. Record instance of gross contamination

Consider including direction around recording instances where bins contain gross levels of contamination. These should be included in the audit report. Additionally, with the bin by bin method, the performance of the system should be provided considering both the inclusion and exclusion of gross contamination.

7. Emphasise the need for providing audit information in the report and retention of raw data

Several reports lacked information regarding the audit that could have been used to confirm the data. Missing data included details such as the number of bins sampled, bins presented, and bins collected. Without this information the data is often unable to be independently verified. Auditors and councils should ensure that all raw data collected during the audit process is retained so that it can be returned to. It is recommended that the guidelines highlight the importance of including all information regarding the audit design and process as well as retaining all raw data that is collected.

Appendix 1 – Contamination Classification

	Material Classification	Considered as contamination for this project	Not regarded as contamination for this project
Paper	Newspaper		X
	Magazine/Brochures	X	
	Misc. Packaging	X	
	Corrugated Cardboard		X
	Cardboard/Package Board		X
	Liquid Paperboard Containers	X	
	Disposable Paper Products		X
	Print/Writing/Office Paper		X
	Composite (mainly paper)		X
	Nappies Disposable	X	
	Contaminated Soiled Paper		X
Organics	Food/Kitchen		X
	Garden/Vegetation		X
	Other Putrescible		X
	Wood/Timber		X
	Textile/ Rags	X	
	Leather	X	
	Rubber	X	
	Oils	X	
Glass	Glass Beverage Containers	X	
	Glass Non-Beverage Containers/Other Packaging Glass	X	
	Miscellaneous/ Other Glass	X	
	Mixed Glass / Fines	X	
Plastic	PET Beverage Containers	X	
	PET Packaging (excluding beverage containers)	X	
	PET Other Non Beverage / Non Packaging	X	
	HDPE Beverage Containers	X	
	HDPE Packaging (excluding beverage containers)	X	
	HDPE Other Non Beverage / Non Packaging	X	
	PVC Beverage Containers	X	
	PVC Other Non Beverage / Non Packaging	X	

	Material Classification	Considered as contamination for this project	Not regarded as contamination for this project
	PVC Packaging (excluding beverage containers)	X	
Plastic	LDPE Packaging	X	
	LDPE Non-Packaging	X	
	PP Packaging	X	
	PP Non-Packaging	X	
	PS & EPS Packaging	X	
	PS & EPS Non-Packaging	X	
	Other plastics	X	
	Composite (mostly plastic)	X	
Ferrous	Steel Beverage Containers	X	
	Steel Packaging (excluding beverage containers)	X	
	Steel Other Non-Packaging	X	
	Composite (mostly ferrous)	X	
Non-Ferrous	Aluminium Beverage Containers	X	
	Aluminium Packaging (excluding beverage containers)	X	
	Aluminium Non-Packaging	X	
	Other Non-Packaging	X	
	Non-ferrous Composite (mostly non-ferrous)	X	
Hazardous	Paint	X	
	Fluorescent tubes	X	
	Dry cell and car batteries (non-rechargeable)	X	
	Dry cell and car batteries (rechargeable)	X	
	Vehicle batteries *	X	
	Household chemicals	X	
	Asbestos	X	
	Clinical Pathogenic Infectious	X	
	Gas Bottles	X	
	Hazardous Other	X	
Building Waste	Building materials and fittings	X	

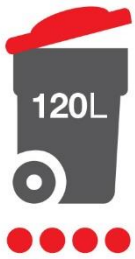
	Material Classification	Considered as contamination for this project	Not regarded as contamination for this project
Earth Based	Ceramics, Dust, Dirt, Rock, Inert Ash	X	
E-Waste	Computer Equipment	X	
	TVs	X	
	Mobile Phones		
	Electrical Items and Peripherals*	X	
	Toner Cartridges	X	
Misc.	Containerized Food & Liquid	X	
	Other (specify)	X	

Appendix 2 – Audit Vignettes

The following pages include the Audit Vignettes, which provide detail about each of the audit data points referred to in the report above.

Audit A

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Weekly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**Trial**
Date:	**September 2016**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**206**
FOGO:	**206**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.50 kg 42% is recycled	15.12 kg 99% is recycled	79% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.88	2.62	4.50	42%
Garden Waste	14.97	0.15	15.12	99%
Other acceptable materials[2]	0.11	1.62	1.73	7%
Total Organics[3]	**16.97**	**4.39**	**21.35**	**79%**

Contamination

Weight	**Percentage**
0.57 kg/hh/wk	3.27%

Top 5 contaminants - kg/hh/pw

1	Earth Based	0.409
2	Building Waste	0.067
3	Containerised Food	0.048
4	Plastic	0.022
5	Non-Compostable Organics (e.g. Textiles)	0.012

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit B

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Weekly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**Trial**
Date:	**November 2011**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**400**
FOGO:	**400**
Matched pairs:	**No**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
3.52 kg 24% is recycled	19.75 kg 98% is recycled	82% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.86	2.66	3.52	24%
Garden Waste	19.32	0.43	19.75	98%
Other acceptable materials[2]	0.04	1.49	1.53	3%
Total Organics[3]	**20.22**	**4.58**	**24.8**	**82%**

Contamination

Weight	**Percentage**
0.08 kg/hh/wk	0.37%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.055
2	Containerised Food	0.015
3	Comingled Containers	0.005
4	NA	
5	NA	

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit C

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Weekly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**Trial**
Date:	**May 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**132**
FOGO:	**204**
Matched pairs:	**Yes**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
3.27 kg 11% is recycled	3.38 kg 95% is recycled	45% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.37	2.90	3.27	11%
Garden Waste	3.21	0.16	3.38	95%
Other acceptable materials[2]	0.05	1.32	1.37	4%
Total Organics[3]	**3.63**	**4.39**	**8.02**	**45%**

Contamination

Weight	**Percentage**
0.04 kg/hh/wk	1.12%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.020
2	Earth Based	0.015
3	Plastic	0.003
4	Glass	0.001
5	Non-Compostable Paper (e.g. Magazines)	0.001

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit E

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Weekly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March/April 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**206**
FOGO:	**158**
Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.57 kg 11% is recycled	20.01 kg 97% is recycled	75% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.48	4.08	4.57	11%
Garden Waste	19.42	0.59	20.01	97%
Other acceptable materials[2]	0.09	1.86	1.95	5%
Total Organics[3]	**19.99**	**6.53**	**26.52**	**75%**

Contamination

Weight	**Percentage**
0.25 kg/hh/wk	1.25%

Top 5 contaminants - kg/hh/pw

1	Non-Compostable Organics (e.g. Textiles)	0.150
2	Plastic	0.026
3	Earth Based	0.026
4	Metals	0.018
5	Non-Compostable Paper (e.g. Magazines)	0.016

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit F

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Weekly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**March 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**220**
FOGO:	**220**
Matched pairs:	**Unsure**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.11 kg 9% is recycled	12.01 kg 89% is recycled	64% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.38	3.74	4.11	9%
Garden Waste	10.66	1.35	12.01	89%
Other acceptable materials[2]	0.50	1.35	1.85	27%
Total Organics[3]	**11.53**	**6.44**	**17.97**	**64%**

Contamination

Weight	**Percentage**
0.16 kg/hh/wk	1.35%

Top 5 contaminants - kg/hh/pw

1	Plastic	0.045
2	Non-Compostable Organics (e.g. Textiles)	0.033
3	Glass	0.018
4	Containerised Food	0.016
5	Metals	0.015

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit G

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2011**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**222**
FOGO:	**436**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.10 kg 61% is recycled	11.96 kg 99% is recycled	89% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.29	0.81	2.10	61%
Garden Waste	11.84	0.12	11.96	99%
Other acceptable materials[2]	0.82	0.74	1.56	52%
Total Organics[3]	**13.95**	**1.68**	**15.62**	**89%**

Contamination

Weight	**Percentage**
0.19	1.32%

Top 5 contaminants - kg/hh/pw

1	Earth-based	0.101
2	All Other Paper (Mags, LPB)	0.037
3	Plastic	0.017
4	Metals	0.010
5	Glass	0.007

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit H

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**July 2016**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**277**
FOGO:	**121**
Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.05 kg 49% is recycled	7.45 kg 98% is recycled	76% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.99	2.06	4.05	49%
Garden Waste	7.31	0.14	7.45	98%
Other acceptable materials[2]	0.20	0.74	0.95	22%
Total Organics[3]	**9.50**	**2.95**	**12.45**	**76%**

Contamination

Weight	**Percentage**
0.15 kg/hh/wk	1.52%

Top 5 contaminants - kg/hh/pw

1	All Other Organics	0.073
2	Plastic	0.024
3	Earth-based	0.020
4	Containerised Food	0.008
5	Hazardous	0.006

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit I

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**February 2017**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**215**
FOGO:	**218**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.83 kg 22% is recycled	7.69 98% is recycled	69%

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.63	2.19	2.83	22%
Garden Waste	7.56	0.13	7.69	98%
Other acceptable materials[2]	0.26	1.51	1.77	15%
Total Organics[3]	**8.46**	**3.83**	**12.29**	**69%**

Contamination

Weight	**Percentage**
0.22 kg/hh/wk	2.50%

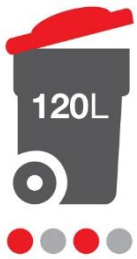
Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.107
2	Earth Based	0.070
3	Non-Compostable Paper (e.g. Magazines)	0.017
4	Plastic	0.009
5	Metals	0.005

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit J

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**May 2016**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**220**
FOGO:	**220**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.40 kg 62% is recycled	1.06 kg 89% is recycled	61% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.50	0.90	2.40	62%
Garden Waste	0.94	0.12	1.06	89%
Other acceptable materials[2]	0.34	0.71	1.05	32%
Total Organics[3]	**2.77**	**1.74**	**4.51**	**61%**

Contamination

Weight	**Percentage**
0.60 kg/hh/wk	17.83%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.361
2	Containerised Food	0.107
3	All Other Organics	0.044
4	Building Waste	0.031
5	Disposable Nappies	0.027

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit K

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**Sep 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**52**
FOGO:	**65**
Matched pairs:	**No**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
3.74 kg 69% is recycled	9.75 kg 99% is recycled	86% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	2.57	1.17	3.74	69%
Garden Waste	9.69	0.06	9.75	99%
Other acceptable materials[2]	0.04	0.84	0.88	4%
Total Organics[3]	**12.30**	**2.07**	**14.37**	**86%**

Contamination

Weight	**Percentage**
0.01 kg/hh/wk	0.04%
	

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.002
2	Plastic	0.001
3	Metals	0.001
4	Glass	0.001
5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit L

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**September 2019**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**52**
FOGO:	**65**
Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.80 kg 57% is recycled	14.18 kg 100% is recycled	89% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.59	1.20	2.80	57%
Garden Waste	14.17	0.01	14.18	100%
Other acceptable materials[2]	0.17	0.76	0.93	18%
Total Organics[3]	**15.94**	**1.97**	**17.91**	**89%**

Contamination

Weight	**Percentage**
0.04 kg/hh/wk	0.26%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.021
2	All Other Organics	0.010
3	Glass	0.008
4	Plastic	0.002
5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit M

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**April – November 2016**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**450**
FOGO:	**Did not audit**
Matched pairs:	**No**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
NA	NA	NA

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	NA	0.97	NA	NA
Garden Waste	NA	0.02	NA	NA
Other acceptable materials[2]	NA	0.67	NA	NA
Total Organics[3]	**NA**	**1.66**	**NA**	**NA**

Contamination

Weight	**Percentage**
NA	NA
	

Top 5 contaminants - kg/hh/pw

1	NA	NA
2	NA	NA
3	NA	NA
4	NA	NA
5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit N

Service Configuration		Audit details	
Red lid **Landfill**  **Fortnightly** Collection	Green lid **FOGO**  **Weekly** Collection	**Length of FOGO Service at time of audit**	**> 1 Year**
		Date:	**September 2019**
		Method:	**Aggregated**
		Sample size:	
		Red lid bin:	**52**
		FOGO:	**65**
		Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	Garden Waste (Average hh/pw)	FOGO efficiency
3.20 kg 46% is recycled	17.29 kg 97% is recycled	87% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	Residual waste bin *Average Kg/hh/wk*	Total *Average Kg/hh/wk*	FOGO Efficiency *(% diverted from landfill via FOGO)*
Food Waste	1.48	1.72	3.20	46%
Garden Waste	16.82	0.47	17.29	97%
Other acceptable materials[2]	0.14	0.63	0.77	18%
Total Organics[3]	**18.44**	**2.82**	**21.27**	**87%**

Contamination

Weight	Percentage
0.02 kg/hh/wk	0.09%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.017
2	NA	NA
3	NA	NA
4	NA	NA
5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit O

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**November 2017**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**220**
FOGO:	**220**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.60 kg 17% is recycled	10.44 kg 99% is recycled	79% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.27	1.33	1.60	17%
Garden Waste	10.38	0.06	10.44	99%
Other acceptable materials[2]	0.25	1.47	1.72	15%
Total Organics[3]	**10.90**	**2.86**	**17.91**	**79%**

Contamination

Weight	**Percentage**
0.08 kg/hh/wk	0.74%

Top 5 contaminants - kg/hh/pw

1	All Other Organics	0.027
2	Plastic	0.026
3	E-Waste	0.018
4	All Other Paper (Mags, LPB)	0.006
5	Earth-based	0.005

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit P

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**April 2018**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**216**
FOGO:	**216**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
9.99 kg 73% is recycled	23.67 kg 99% is recycled	87% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	7.30	2.68	9.99	73%
Garden Waste	23.50	0.17	23.67	99%
Other acceptable materials[2]	0.63	1.70	2.33	27%
Total Organics[3]	**31.43**	**4.56**	**35.99**	**87%**

Contamination

Weight	**Percentage**
0.21 kg/hh/wk	0.66%

Top 5 contaminants - kg/hh/pw

1	Earth-based	0.139
2	Miscellaneous	0.027
3	Plastic	0.021
4	All Other Organics	0.013
5	Metals	0.007

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit Q

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**April – May 2019**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**308**
FOGO:	**308**
Matched pairs:	**Unsure**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
6.02 kg 56% is recycled	11.51 kg 99% is recycled	82% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	3.39	2.63	6.02	56%
Garden Waste	11.41	0.11	11.51	99%
Other acceptable materials[2]	1.73	0.97	2.70	64%
Total Organics[3]	**16.52**	**3.70**	**20.23**	**82%**

Contamination

Weight	**Percentage**
0.17 kg/hh/wk	1.02%

Top 5 contaminants - kg/hh/pw

1	All Other Organics	0.064
2	Containerised Food	0.057
3	Plastic	0.016
4	Disposable Nappies	0.014
5	Metals	0.008

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit R

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2018**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**102**
FOGO:	**100**
Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.48 kg 58% is recycled	8.17 kg 98% is recycled	78% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	2.62	1.87	4.48	58%
Garden Waste	7.97	0.20	8.17	98%
Other acceptable materials[2]	0.98	1.22	2.20	45%
Total Organics[3]	**11.57**	**3.28**	**14.86**	**78%**

Contamination

Weight	**Percentage**
0.93 kg/hh/wk	7.41%

Top 5 contaminants - kg/hh/pw

1	Plastic	0.334
2	All Other Organics	0.240
3	Disposable Nappies	0.103
4	Metals	0.095
5	Containerised Food	0.052

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit S

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**March 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**220**
FOGO:	**220**
Matched pairs:	**Unsure**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.66 kg 26% is recycled	9.46 kg 99% is recycled	81% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.43	1.24	1.66	26%
Garden Waste	9.36	0.10	9.46	99%
Other acceptable materials[2]	0.68	1.06	1.73	39%
Total Organics[3]	**10.46**	**2.39**	**12.86**	**81%**

Contamination

Weight	**Percentage**
0.26 kg/hh/wk	2.42%

Top 5 contaminants - kg/hh/pw

1	Containerised Food	0.125
2	Plastic	0.070
3	Glass	0.058
4	Metals	0.005
5	Non-Compostable Paper (e.g. Magazines)	0.000

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit T

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**March 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**220**
FOGO:	**220**
Matched pairs:	**Unsure**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
3.40 kg 5% is recycled	11.32 kg 99% is recycled	75% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.17	3.22	3.40	5%
Garden Waste	11.20	0.11	11.32	99%
Other acceptable materials[2]	0.51	0.69	1.20	42%
Total Organics[3]	**11.88**	**4.03**	**15.91**	**75%**

Contamination

Weight	**Percentage**
0.13 kg/hh/wk	1.07%

Top 5 contaminants - kg/hh/pw

1	Plastic	0.083
2	Glass	0.021
3	Non-Compostable Organics (e.g. Textiles)	0.014
4	Metals	0.009
5	Disposable Nappies	0.001

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit U

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**October 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**100**
FOGO:	**100**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
3.45 kg 78% is recycled	12.59 kg 99% is recycled	86% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	2.69	0.76	3.45	78%
Garden Waste	12.49	0.10	12.59	99%
Other acceptable materials[2]	0.05	1.72	1.77	3%
Total Organics[3]	**15.23**	**2.58**	**17.81**	**86%**

Contamination

Weight	**Percentage**
0.18 kg/hh/wk	1.17%

Top 5 contaminants - kg/hh/pw

1	Containerised Food	0.165
2	Plastic	0.010
3	Metals	0.002
4	Building Waste	0.001
5	Non-Compostable Organics (e.g. Textiles)	0.001

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit V

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**150**
FOGO:	**150**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.66 kg 29% is recycled	11.92 kg 97% is recycled	84% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.49	1.18	1.66	29%
Garden Waste	11.61	0.31	11.92	97%
Other acceptable materials[2]	0.13	0.85	0.98	14%
Total Organics[3]	**12.23**	**2.33**	**14.57**	**84%**

Contamination

Weight	**Percentage**
0.09 kg/hh/wk	0.74%

Top 5 contaminants - kg/hh/pw

1	Building Waste	0.034
2	Plastic	0.026
3	Earth Based	0.016
4	Disposable Nappies	0.008
5	Containerised Food	0.007

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit W

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**151**
FOGO:	**151**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.02 kg 29% is recycled	12.48 kg 99% is recycled	83% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.58	1.44	2.02	29%
Garden Waste	12.36	0.12	12.48	99%
Other acceptable materials[2]	0.22	1.06	1.28	17%
Total Organics[3]	**13.16**	**2.63**	**15.78**	**83%**

Contamination

Weight	**Percentage**
0.16 kg/hh/wk	1.23%

Top 5 contaminants - kg/hh/pw

1	Containerised Food	0.072
2	Building Waste	0.047
3	Miscellaneous	0.020
4	Earth Based	0.014
5	Plastic	0.007

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit X

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**150**
FOGO:	**150**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.76 kg 24% is recycled	10.95 kg 99% is recycled	82% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.42	1.34	1.76	24%
Garden Waste	10.84	0.10	10.95	99%
Other acceptable materials[2]	0.13	1.08	1.21	11%
Total Organics[3]	**11.39**	**2.52**	**13.92**	**82%**

Contamination

Weight	**Percentage**
0.16 kg/hh/wk	1.38%

Top 5 contaminants - kg/hh/pw

1	Building Waste	0.078
2	Containerised Food	0.051
3	Plastic	0.019
4	Metals	0.004
5	Glass	0.002

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit Y

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**September 2017**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**52**
FOGO:	**65**
Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.03 kg 65% is recycled	13.59 kg 95% is recycled	82% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**General waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	2.62	1.42	4.03	65%
Garden Waste	12.96	0.64	13.59	95%
Other acceptable materials[2]	0.13	1.31	1.44	9%
Total Organics[3]	**15.70**	**3.36**	**19.07**	**82%**

Contamination

Weight	**Percentage**
0.44 kg/hh/wk	2.74%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.250
2	Non-Compostable Organics (e.g. Textiles)	0.125
3	Plastic	0.025
4	Hazardous	0.022
5	Metals	0.012

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit Z

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**November 2018**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**225**
FOGO:	**225**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.29 kg 28% is recycled	8.82 kg 98% is recycled	84% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.36	0.93	1.29	28%
Garden Waste	8.66	0.17	8.82	98%
Other acceptable materials[2]	0.11	0.63	0.74	15%
Total Organics[3]	**9.13**	**1.73**	**10.86**	**84%**

Contamination

Weight	**Percentage**
0.08 kg/hh/wk	0.84%

Top 5 contaminants - kg/hh/pw

1	All Other Paper (Mags, LPB)	0.043
2	Disposable Nappies	0.023
3	Plastic	0.010
4	Metals	0.002
5	All Other Organics	0.001

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AA

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**November 2017**
Method:	**Bin by Bin**
Sample size:	
Red lid bin:	**220**
FOGO:	**220**
Matched pairs:	**Yes**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.93 kg 25% is recycled	11.35 kg 99% is recycled	83% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.48	1.45	1.93	25%
Garden Waste	11.30	0.06	11.35	99%
Other acceptable materials[2]	0.12	0.90	1.02	11%
Total Organics[3]	**11.89**	**2.41**	**14.30**	**83%**

Contamination

Weight	**Percentage**
0.02 kg/hh/wk	0.20%
	

Top 5 contaminants - kg/hh/pw

1	Earth-Based	0.017
2	All Other Organics	0.005
3	Metals	0.001
4	Plastic	0.0004
5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AB

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**February 2019**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**221**
FOGO:	**221**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
1.94 kg 30% is recycled	13.50 kg 98% is recycled	82% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	0.59	1.35	1.94	30%
Garden Waste	13.21	0.28	13.50	98%
Other acceptable materials[2]	0.30	1.49	1.79	17%
Total Organics[3]	**14.10**	**3.12**	**17.22**	**82%**

Contamination

Weight	**Percentage**
0.57 kg/hh/wk	3.87%

Top 5 contaminants - kg/hh/pw

1	Earth-based	0.352
2	Plastic	0.129
3	Containerised Food	0.069
4	All Other Organics	0.007
5	Miscellaneous	0.006

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AC

Service Configuration		Audit details	
Red lid **Landfill**  **Fortnightly** Collection	Green lid **FOGO**  **Weekly** Collection	**Length of FOGO Service at time of audit**	**> 1 Year**
		Date:	**February 2017**
		Method:	**Aggregated**
		Sample size:	
		Red lid bin:	**215**
		FOGO:	**215**
		Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	Garden Waste (Average hh/pw)	FOGO efficiency
2.65 kg 50% is recycled	11.32 kg 99 % is recycled	84% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	Residual waste bin *Average Kg/hh/wk*	Total *Average Kg/hh/wk*	FOGO Efficiency *(% diverted from landfill via FOGO)*
Food Waste	1.31	1.33	2.65	50%
Garden Waste	11.25	0.07	11.32	99%
Other acceptable materials[2]	0.03	1.02	1.06	3%
Total Organics[3]	**12.59**	**2.43**	**15.02**	**84%**

Contamination

Weight	Percentage
0.29 kg/hh/wk	2.28%

Top 5 contaminants - kg/hh/pw

1	Building Waste	0.126
2	Containerised Food	0.102
3	Plastic	0.020
4	Hazardous	0.014
5	Miscellaneous	0.012

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AD

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2017**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**385**
FOGO:	**161**
Matched pairs:	**Yes**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.88 kg 52% is recycled	10.77 kg 97% is recycled	84% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.49	1.39	2.88	52%
Garden Waste	10.47	0.30	10.77	97%
Other acceptable materials[2]	0.45	0.75	1.20	38%
Total Organics[3]	**12.41**	**2.44**	**14.85**	**84%**

Contamination

Weight	**Percentage**
0.69 kg/hh/wk	5.26%

Top 5 contaminants - kg/hh/pw

1	Earth Based	0.232
2	Plastic	0.193
3	Non-Compostable Organics (e.g. Textiles)	0.077
4	Disposable Nappies	0.055
5	Non-Compostable Paper (e.g. Magazines)	0.033

4. Totals may not equate due to rounding
5. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
6. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AE

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**November 2015**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**100**
FOGO:	**98**
Matched pairs:	**Unsure**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
3.90 kg 34% is recycled	4.59 kg 99% is recycled	62% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.32	2.59	3.90	34%
Garden Waste	4.53	0.05	4.59	99%
Other acceptable materials[2]	0.12	1.05	1.17	10%
Total Organics[3]	**5.97**	**3.69**	**9.66**	**62%**

Contamination

Weight	**Percentage**
0.43 kg/hh/wk	6.72%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.247
2	Non-Compostable Organics (e.g. Textiles)	0.045
3	Plastic	0.038
4	Glass	0.029
5	Containerised Food	0.021

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AF

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**March 2016**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**160**
FOGO:	**116**
Matched pairs:	**Unsure**

Audit findings

Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
4.51 kg 40% is recycled	5.24 kg 97% is recycled	67% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.79	2.72	4.51	40%
Garden Waste	5.10	0.13	5.24	97%
Other acceptable materials[2]	0.13	0.66	0.79	16%
Total Organics[3]	**7.02**	**3.52**	**10.53**	**67%**

Contamination

Weight	**Percentage**
0.75 kg/hh/wk	9.71%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.423
2	Non-Compostable Organics (e.g. Textiles)	0.148
3	Disposable Nappies	0.067
4	Plastic	0.048
5	Containerised Food	0.030

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AG

Service Configuration

Red lid Landfill	Green lid FOGO
	 Weekly Collection

Audit details

Length of FOGO Service at time of audit	**> 1 Year**
Date:	**May 2016**
Method:	**Aggregated**
Sample size:	
Red lid bin:	**110**
FOGO:	**110**
Matched pairs:	**Unsure**

Audit findings

Food Waste (Average hh/pw)	Garden Waste (Average hh/pw)	FOGO efficiency
4.88 kg 52% is recycled	3.15 kg 99% is recycled	66% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	Residual waste bin *Average Kg/hh/wk*	Total *Average Kg/hh/wk*	FOGO Efficiency *(% diverted from landfill via FOGO)*
Food Waste	2.55	2.33	4.88	52%
Garden Waste	3.13	0.02	3.15	99%
Other acceptable materials[2]	0.24	0.64	0.89	27%
Total Organics[3]	**5.92**	**3.00**	**8.91**	**66%**

Contamination

Weight	Percentage
0.83 kg/hh/wk	12.36%

Top 5 contaminants - kg/hh/pw

1	Miscellaneous	0.627
2	Plastic	0.063
3	Containerised Food	0.060
4	Non-Compostable Organics (e.g. Textiles)	0.036
5	Metals	0.017

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AH

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Fortnightly Collection	**Weekly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**November 2018**
Method:	**Bin by bin**
Sample size:	
Red lid bin:	**233**
FOGO:	**233**
Matched pairs:	**Yes**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
2.06 kg 64% is recycled	8.65 kg 97% is recycled	85% recovery

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	1.31	0.75	2.06	64%
Garden Waste	8.42	0.23	8.65	97%
Other acceptable materials[2]	0.03	0.80	0.83	4%
Total Organics[3]	**9.76**	**1.78**	**11.55**	**85%**

Contamination

Weight	**Percentage**
0.07 kg/hh/wk	0.70%

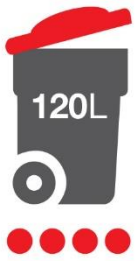
Top 5 contaminants - kg/hh/pw

1	Earth-based	0.056
2	Containerised Food	0.006
3	Plastic	0.004
4	All Other Organics	0.001
5	Metals	0.001

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Audit AI

Service Configuration

Red lid **Landfill**	Green lid **FOGO**
	
Weekly Collection	**Fortnightly** Collection

Audit details

Length of FOGO Service at time of audit	**< 1 Year**
Date:	**August 2015**
Method:	**Bin-by-Bin**
Sample size:	
Red lid bin:	**216**
FOGO:	**Did Not Audit**
Matched pairs:	**No**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
NA	NA	NA

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**Residual waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	NA	2.16	NA	NA
Garden Waste	NA	0.01	NA	NA
Other acceptable materials[2]	NA	0.70	NA	NA
Total Organics[3]	NA	**2.87**	NA	NA

Contamination

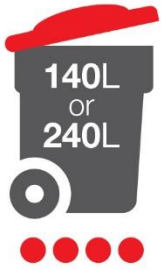
Weight	**Percentage**
NA	NA
	

Top 5 contaminants - kg/hh/pw

1	NA	NA
2	NA	NA
3	NA	NA
4	NA	NA
5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Council AJ

Service Configuration		Audit details	
Red lid **Landfill**  **Weekly** Collection	Green lid **FOGO**  **Weekly** Collection	**Length of FOGO Service at time of audit**	No FOGO, garden organics only
		Date:	**October 2011**
		Method:	**Bin-by-Bin**
		Sample size:	
		Red lid bin:	**240**
		FOGO:	**Did Not Audit**
		Matched pairs:	**Yes (Recycling)**

Audit findings

		
Food Waste (Average hh/pw)	**Garden Waste (Average hh/pw)**	**FOGO efficiency**
NA	NA	NA

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	**General waste bin** *Average Kg/hh/wk*	**Total** *Average Kg/hh/wk*	**FOGO Efficiency** *(% diverted from landfill via FOGO)*
Food Waste	NA	2.72	NA	NA
Garden Waste	NA	0.30	NA	NA
Other acceptable materials[2]	NA	1.37	NA	NA
Total Organics[3]	NA	**4.39**	NA	NA

Contamination		Top 5 contaminants - kg/hh/pw		
Weight	**Percentage**	**1**	NA	NA
NA	NA	**2**	NA	NA
		**3**	NA	NA
		4	NA	NA
		5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Council AK

Service Configuration		Audit details	
Red lid **Landfill**  **Fortnightly** Collection	Green lid **FOGO**  **Weekly** Collection	**Length of FOGO Service at time of audit**	**> 1 Year**
		Date:	**November 2016**
		Method:	**Aggregated**
		Sample size:	
		Red lid bin:	**145**
		FOGO:	**Did Not Audit**
		Matched pairs:	**No**

Audit findings

Food Waste (Average hh/pw)	Garden Waste (Average hh/pw)	FOGO efficiency
NA	NA	NA

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	Residual waste bin *Average Kg/hh/wk*	Total *Average Kg/hh/wk*	FOGO Efficiency *(% diverted from landfill via FOGO)*
Food Waste	NA	1.30	NA	NA
Garden Waste	NA	0.21	NA	NA
Other acceptable materials[2]	NA	0.91	NA	NA
Total Organics[3]	NA	**2.41**	NA	NA

Contamination		Top 5 contaminants - kg/hh/pw		
Weight	**Percentage**	**1**	NA	NA
NA	NA	**2**	NA	NA
		**3**	NA	NA
		4	NA	NA
		5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

Council AL

Service Configuration		Audit details	
Red lid **Landfill**  **Fortnightly** Collection	Green lid **FOGO**  **Weekly** Collection	**Length of FOGO Service at time of audit**	**< 1 Year**
		Date:	**November 2016**
		Method:	**Bin-by-Bin**
		Sample size:	
		Red lid bin:	**214**
		FOGO:	**Did Not Audit**
		Matched pairs:	**Unsure**

Audit findings

Food Waste (Average hh/pw)	Garden Waste (Average hh/pw)	FOGO efficiency
NA	NA	NA

Estimated average volumes[1]

	FOGO bin *Average Kg/hh/wk*	General waste bin *Average Kg/hh/wk*	Total *Average Kg/hh/wk*	FOGO Efficiency *(% diverted from landfill via FOGO)*
Food Waste	NA	1.77	NA	NA
Garden Waste	NA	0.08	NA	NA
Other acceptable materials[2]	NA	0.77	NA	NA
Total Organics[3]	NA	**2.63**	NA	NA

Contamination		Top 5 contaminants - kg/hh/pw		
Weight	**Percentage**	**1**	NA	NA
NA	NA	**2**	NA	NA
		**3**	NA	NA
		4	NA	NA
		5	NA	NA

1. Totals may not equate due to rounding
2. Includes Other putrescible, Wood/Timber. Newspaper, Corrugated Cardboard, Cardboard/Package Board, Disposable Paper Products, Print/Writing/Office Paper, Composite, Contaminated Soiled Paper
3. The total weight of organic material in the bin, not the total weight of all materials in the bin

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