Environment Protection Authority

NSW guide to food-waste recovery in multi-unit dwellings

Cover: Worms in a worm farm. Photo: EPA

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Introduction

Multi-unit dwellings (MUDs) are medium- and high-density residential developments with three or more dwellings on the same parcel of land. They include townhouses and villas, low-rise developments, residential unit blocks and high-rise residential developments.

Housing density is growing in NSW, and MUDs now make up 28% of the total occupied private dwellings in the Greater Sydney area. The waste-management systems MUDs need can be quite different to those that work successfully in houses.

In NSW there are currently few MUDs with food or organics recovery systems. This is due to several complex factors. This guide has been developed by the NSW Environment Protection Authority to help with the planning and design of food-waste recovery services in MUDs. It draws on international and local research and the experiences of practitioners in NSW councils who have undertaken trials in different types of MUDs, covering over 110,000 households. These trials were supported by grants from the NSW Government's *Waste Less Recycle More* Organics Collection programs.

Infrastructure

Bins

Food waste is heavy due to its high water content, making traditional 240-litre mobile bins hard to move when full of food waste. Consider how many bins you will need for the number of residents in the MUD, and how you could limit the weight of food waste placed in each bin – for instance, by rotating bins and using 120-litre mobile bins. Using 120-litre mobile bins for food waste will also help differentiate the food-waste bin from the standard 240-litre bins for mixed recycling and general waste. However, care will be needed to ensure the small bins don't get pushed out of view behind bigger bins.

Labelling and bin-lid colour

To help people quickly and easily identify where to put their food scraps, bins need to be consistently and clearly labelled (See Signage section for more details). Randwick City Council's FOGO (food organics and garden organics) MUD trial found that using burgundy-coloured bin lids for food waste (as per Australian Standard 4123) can make them hard to distinguish from red-lid bins in dark bin-bay rooms or at night. Green-lid bins are easier to distinguish, and the bold colour sets them apart from other bins on site.

Clear signage on bins, on walls and in bin bays helps residents choose the right bin. A project by North East Waste testing the effectiveness of three interventions to increase food-waste recovery in MUDs found that residents' recall was higher for bin-bay signage than for bin tags or information postcards.

Bin-servicing frequency

Also consider the bin-servicing frequency. The City of Sydney's food-waste recycling trial services MUDs twice a week and houses once a week. Servicing bins twice a week in MUDs can help minimise odour and the risk of pests, and allow buildings to have fewer bins, which is particularly important in buildings with already crowded bin rooms. Councils moving to food-collection services need to factor adequate space for bins and future services into the planning processes for new developments.

Figure 1 A green-lid food-and garden organics waste collection bin. Photo: EPA

A project in Rotterdam implementing a food-waste system in MUDs found that, even with clear signage, when the food-waste bin was the same size and shape as other bins, contamination was high.[1] When the shape and look were changed, contamination was reduced.

[1] Groot Koerkamp I 2019, Activating household waste separation behaviour in high-rise Rotterdam: Capitalising on the moment of moving for stimulating behavioural change, https://api.semanticscholar.org/CorpusID:197894818

Figure 2 Clean food-waste separation increased when distinctive FOGO bins were introduced. Image: City of Rotterdam

Bin cleaning and odour control

Food-waste bins may need to be cleaned more often than the yellow bins. In new and larger MUDs, a cleaning bay with hot and cold water and a floor graded to discharge to sewer rather than stormwater should be available[2]. Alternatively, the MUD manager can hire an external or mobile cleaning service and/or incorporate cleaning into the collection contract. Mobile services with high-pressure cleaning may include deodorising chemicals for a per-bin fee. Odours can also be controlled by using well-fitting bin lids and keeping them closed, ventilating bin-storage areas well, and using deodorising equipment in the bin-storage area or as part of the bin. Bin options include lids with carbon filters and pockets for pads that contain odour-masking or odour-destroying chemicals.

Councils can provide educational materials on how to keep bin odours and vermin to a minimum. Tweed Shire Council and Lake Macquarie City Council have good information on keeping down smells and pests during the heat of summer.

Kitchen caddies

Small bins or kitchen caddies will be needed to collect food scraps in individual apartments. The caddy also acts as a visual reminder to separate food scraps, and signage on the caddy can remind people about what can go into it.

It is best to have an easy-to-clean container with a well-fitted lid (that is also easy to open and close), to deter pests such as vinegar flies. Keep in mind that benchtop space in units may be limited so the footprint of the caddy needs to be small. Due to the often-limited space in apartments, the caddy is more likely to be kept in a cupboard than you would expect in a house. As a result, the height and size of the caddy needs to be considered to suit.

[2] NSW Environment Protection Authority 2019, *Better Practice Guide for Resource Recovery in Residential Developments*, https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/warrlocal/19p1559-resource-recovery-in-residential-developments.pdf?la=en&hash=C29AFB3B95D416F29A6F711B684C620900174075

Caddies can be provided by the council or residents can be directed to purchase them. Because there are many households within a MUD, and people may move in and out often, it may be helpful to keep a supply of caddies at the MUD or offer them as part of a welcome pack from the strata manager to new tenants.

Tweed Shire Council's guide to kitchen caddies gives good, clear information about choosing caddies and Recycle Now has video tips about cleaning them.

Figure 3 Example of ventilated and closed kitchen caddies. Photo: EPA

Bin and caddy liners

Bin and caddy liners can limit smells and reduce how often the bin or caddy needs cleaning. Kitchen-caddy liner bags may also be useful in transferring food scraps from the caddy to the mobile garbage bin (MGB) in the bin-storage area. The City of Sydney has found that MUD residents prefer liners with handles, which make it easy to take the scraps to the bin.

The use of liners depends on whether they are accepted by the processor. Where the processor does accept liners, only ones that are certified commercially compostable and comply with Australian Standard AS 4736-2006 (see Figure 4) should be used. These liners will break down in commercial composting facilities. Bags labelled bio- or oxy-degradable, on the other hand, break down into smaller pieces of plastic that do not degrade, and become a major contaminant in the commercial composting system and broader environment. Certified commercially compostable liners are available at many supermarkets and hardware stores.

Figure 4 Kitchen caddy liners must comply with Australian Standard AS 4736-2006. Image: Wollongong City Council

Even compostable bags are not recommended for home composting because they take a long time to break down. In some cases they do not break down at all, because home composting systems often don't get hot enough.

When compostable liners are used in a ventilated kitchen caddy, a piece of kitchen towel folded into quarters and placed between the liner bag and caddy can help absorb any moisture that may sweat through the bag.

Supply of compostable caddy liners

Many councils provide an initial roll of compostable kitchen-caddy liner bags to help MUD residents transition to the new service. However, an ongoing supply of bin liners is common only in commercial services. Caddy liners may need to be supplied to MUDs differently from how they are supplied to houses. For example, it may not be easy to deliver rolls of compostable bin liners to MUDs where the mailboxes are small or where locked entry doors prevent deliverers from accessing the building. After compostable caddy liners are first provided, consider seeking a commitment from the body corporate or facilities manager to either give residents an ongoing supply of liners or provide ongoing education about using alternatives such as newspaper. If the body corporate, facilities manager or cleaner struggles with bin cleaning for the new FOGO services, tell them where they can buy compostable bin liners.

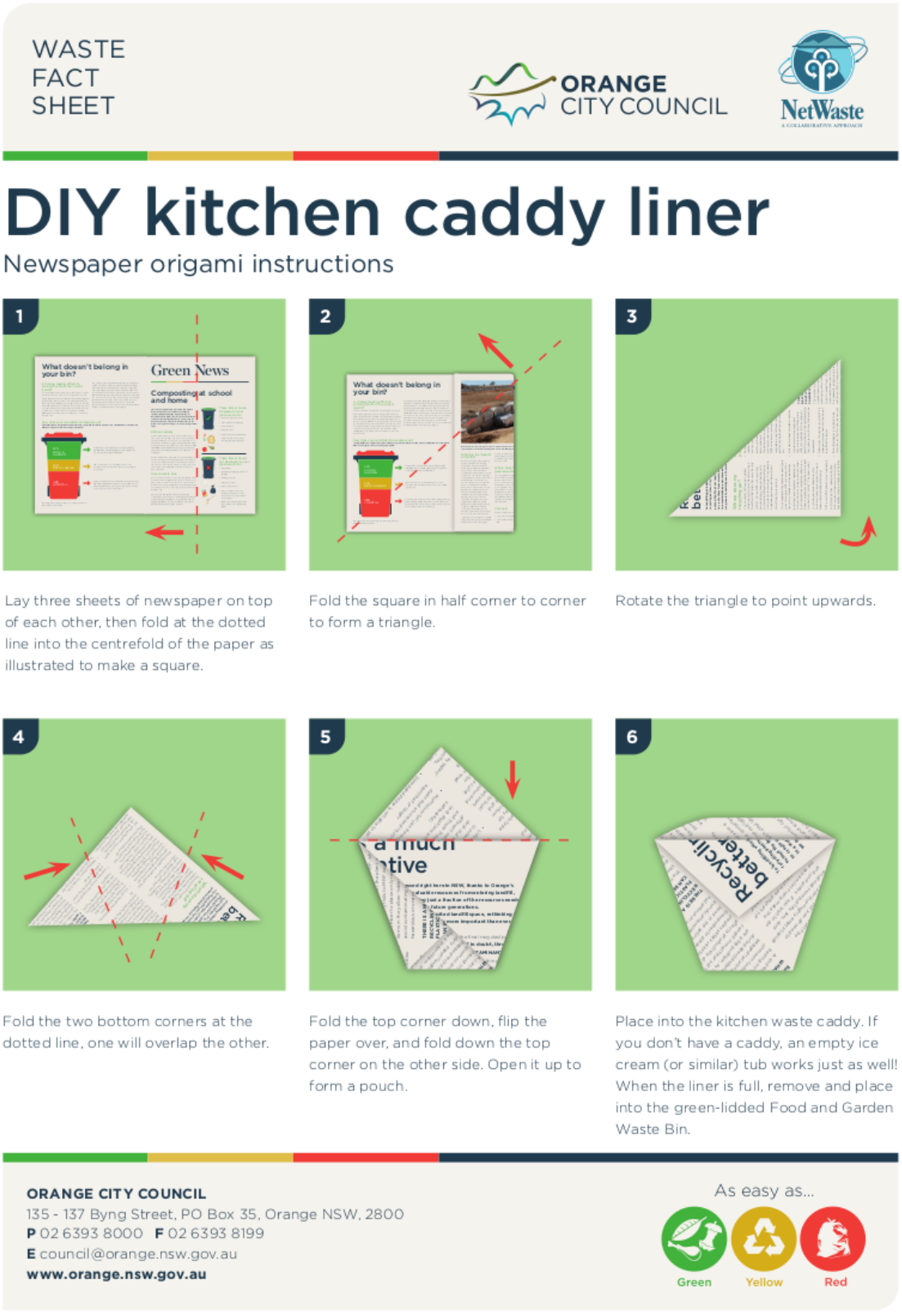
Other liners

Newspaper can be used as an alternative to compostable liners, if the processor will accept it. Placed at the bottom of the bin, or folded to make a kitchen-caddy liner bag, newspaper can be composted with the food scraps at home or in the bin. Orange City Council and the University of

Technology Sydney have developed good online resources on making newspaper liners. Speak with your processor first to see if they will accept newspaper.

People don't have to use liners or newspaper. If they wish, they can put their food scraps directly into the bin.

Figure 5 Example of caddy liner made out of newspaper. Image: Orange City Council



Macerators

Macerated food waste to sewer

These systems attach under the kitchen sink. They pulp food waste into fine particles that are then washed down the drain into the sewerage system. Individual macerators are installed by a plumber and allow residents to quickly dispose of food waste without having to bin or bag the waste and move it by hand. However, in-sink macerators increase water consumption and are considered a disposal option for food waste rather than a recovery option.

Recovery of food waste to sewer varies depending on the wastewater system. Solids recovery at Sydney Water's largest facilities can be as low as 40%. Wastewater treatment plants are high-energy consumers and while some of the food to sewer is recovered as energy, increased food to sewer will increase energy and chemical demand in the wastewater system. In some cases, food waste to sewers puts additional, difficult-to-manage, loads on networks with existing issues.

In regional NSW, the installation of such equipment in residential premises is regulated by local councils, which provide water and sewerage services. Most councils either ban or actively discourage the installation of food macerators in residential premises. The connection of equipment that macerates, pulverises or liquidises solid waste and sends it to sewer is not permitted by the Department of Planning and Environment (DPE) in regional NSW areas for non-residential premises.[3]

Sydney Water does not endorse the use of macerators by residential customers and sees other options as more effective for resource recovery from food waste. Sydney Water has also been concerned with the potential for macerators to increase the risk of contaminants going into sewers.

Macerated food waste to anaerobic digestion

Developers of new MUDs are starting to consider in-sink macerators that send pulped food waste to storage, after which it is anaerobically digested. Macerators are installed in each apartment under the kitchen sink and plumbed to a central collection tank in the basement. The food waste is then collected regularly by truck and taken to the local sewage treatment facility or a commercial anaerobic digestion facility for conversion into gas (i.e. energy) and fertiliser. This is new technology that is now being used overseas with good environmental outcomes. However, it is not likely that existing MUDs can be retrofitted with such technology.

In regional NSW, if the waste is transported to an anerobic digester at a sewage treatment facility, the discharge is regulated as trade waste and DPE's agreement to council's approval is required.

Communal macerators

Communal or larger-scale macerators are more common in commercial or retail settings. The larger maceration units are in a central waste area. Food waste is delivered by tenants to the unit and the pulped food waste is stored in a nearby tank. The waste is then collected regularly by truck and taken off site for anaerobic digestion. Due to the cost of equipment hire and pick-up fees, this system is more cost-effective where there is medium- to larger-scale food-waste generation (around 0.2 tonnes of food waste a day or more).[4] A system of this scale may be better suited to new MUDs that are also serviced by restaurants, supermarkets or other retail businesses that could contribute more food waste to the collection system.

[3] Note: some exceptions apply for existing installations in hospitals and aged care facilities i.e. they may be permitted to continue use. However, macerators must be removed if a kitchen is refurbished.

[4] NSW Environment Protection Authority 2016, *Bin Trim Rebates Recycling Equipment Guide*

On-site rapid decomposition units (ORDUs)

There are several types of on-site organics processing units that rapidly decompose or dehydrate food waste by heating and agitating the waste for short periods (often 24 hours), with or without bacterial starter cultures. Once processed, the organic matter can then be collected more easily and less frequently for re-use off site or further processing. In NSW the output captured from these ORDUs cannot be directly applied to land without compliance with a Resource Recovery Order and Resource Recovery Exemption (see information on Orders and Exemptions below): in some cases an Environment Protection Licence may be required. It is very unlikely that MUDs will have enough land for continued safe use of these products on site. Rewetting the output will also restart the usual decomposition process and can potentially pose risks to human health and odour.

ORDUs are usually best for precincts with high volumes of food waste, such as sites with multiple restaurants. However, there may be opportunities for their use in high-rise MUDs or where there is limited space for separated food-waste bins. ORDUs may also be appropriate in other situations such as aged care, universities or hospital MUDs.

The benefit of ORDUs is that they remove most of the food waste's liquid, significantly reducing the waste's volume and leaving drier, less smelly material to transport. They can process between 100 kg and 1,000 kg of food waste a day.

However, there are some factors to consider when thinking about using these systems.

- Some units require three-phase power, which may be an additional cost to install.
- Some units vent the moisture to atmosphere and will therefore require a suitable ventilation point (either passive or mechanically vented). This extraction point should be located where odours will not impact residents and neighbours.
- Because food waste is being used, wherever the unit is placed will need enough general air circulation and ventilation to minimise odour build-up from bins waiting to be processed.
- Compostable bags must **not** be added to these units as they will remain unchanged by this process and will become plastic contaminants in the outputs and broader environment.
- Some units vent the moisture to sewer and will require a readily accessible outlet pipe. Please note that for installations in MUDs with commercial businesses such as supermarkets or restaurants, DPE's agreement to council's approval for discharge to sewer will be required.
- You need to consider how the unit will be accessed for cleaning and maintenance, and the space required for the temporary storage of food bins (inputs) and processed material (outputs).
- The unit operating area may need to be fenced or secured to prevent vandalism and unauthorised use, as well as for work health and safety reasons. Units may be housed in a separate, lockable waste room, for example.
- You may need additional equipment such as:
    - bin lifters to help tip the heavy food waste into the ORDU
    - a table or chute to allow the waste to be inspected and contamination removed before it is loaded into the ORDU
    - a shovel, and storage or transfer devices that fit easily under the outlet hatch of the ORDU (e.g. buckets with lids), to temporarily store the output material.
- ORDUs may use a significant amount of energy and the outputs may need to be further composted before they can be used. Energy consumption and the costs of any additional consumables, bin lifter, etc., need to be considered when looking at the costs and benefits of different approaches. The energy used in an ORDU is likely to exceed any energy recovery potential from subsequent anaerobic digestion of ORDU waste.

- Several people may interact with the collection and processing of food waste through an ORDU, so clear roles, responsibilities and protocols should be in place for everyone operating the machine. For example, there should be:
    - protocols around the correct loading, processing and emptying of the ORDU to ensure all food waste is properly processed through a full cycle. This prevents food waste being added mid-processing, which can impact the quality of the resultant product
    - processes for removing any gross contamination (such as metal cutlery) that may impact operation of the unit or the quality of the output material
    - awareness of how the outputs can be safely and lawfully used, such as how the outputs must be incorporated into the soil and the frequency and type of testing required on the output material. All relevant legislative requirements should be part of governing protocols and readily accessible to those managing the system
    - issues that may impact on the processing or quality of the resultant product, such as reducing heat to save on electricity or faults in moisture sensors.

On-site composting

Household composting

Many councils in NSW offer support to residents to help them manage their own food waste. Several have adapted these programs for MUD residents.

Worm farms

Worm farms are compact, odour-free and can be used on balconies or even inside units if used correctly. Many councils offer rebates for the purchase of worm farms and workshops to help residents learn to set up and use the worm farm effectively. There are also numerous online videos and sources of information to help solve common problems for first-time worm-farm users. A well-run, domestic-sized worm farm can manage most food waste of a two- to four-person household. Worm farms on balconies require shade to stop the worms from getting too hot and may need screening to keep them out of view.

Some clear online resources include:

- Northern Beaches Council – setting up and looking after your worm farm
- Gardening Australia – setting up three different types of worm farm.

Figure 6 Worm farms are compact and odour-free. Photo: EPA

What to consider with worm farming in MUDs

- Apartment owners will need to work out what they will do with the resultant liquid and solid fertiliser. For example, it can be watered down and used on balcony gardens or landscaped areas in the MUDs.
- What will happen to other food scraps that can't be used in a worm farm (e.g. meat, dairy, citrus and onions)?
- Who in the household or unit complex will maintain and check on the worm farm to make sure that the worms are kept alive and healthy?
- The food waste from residents that are not using the worm farm will still need to be collected.

Counter-top fermenters

These systems are highly compact, taking up only a small amount of bench space, and can process meat and dairy, unlike household worm farms or compost bins. They require the addition of a digest-aid product. Their output product needs to be rested for six weeks before being further composted, so households need access to land or a nearby community garden or composting system to bury or further process the fermented food waste.

Compost bins

Many councils offer rebates or support for the purchase of household-sized compost bins. Some bins need to be in contact with the soil and therefore require access to a garden; others, such as mini tumbler systems, can be used on a balcony. Bins that are used in gardens or communal areas in MUDs should be reinforced with suitable wire at the base to keep rats out.

Figure 7 A compost bin is an effective way to recycle food scraps. Photo: EPA

Shared on-site composting and worm farms in MUDs

Communal compost bins and worm farms can work effectively in MUDs where:

- caretakers, gardeners or committed residents can manage them
- there are landscaped areas or communal gardens where they can be located and where the resultant compost can be used
- they can be easily incorporated into the design of communal open-space areas where there is good ventilation and sunlight to improve decomposition
- there is a ready supply of dry material (newspaper, leaves, straw, etc.) to blend with the food waste for odour-free composting
- impacts from possible odour, vermin and insects are managed.

Compost bins or worm farms should be visible and easily accessible by residents. This helps to keep the area clean and well maintained. The coordinator of the system needs to actively manage the compost bin or worm farm to ensure that:

- there is enough brown matter mixed through with the food waste
- the worms are healthy and not over-fed, too hot or too wet
- contamination is low.

The Inner West Council Compost Collective is a good an example of shared on-site composting.

Figure 8 A compost bin set up in community garden. Photo: Inner West Council

Shared community composting off site

Where there are local community gardens, some MUDs residents may be able use these gardens' composting systems to manage their food waste (see the Camdenville Paddock, Wilkins Green and Feedback Organic Recovery case studies). Gardens that will take food waste often encourage people who are dropping it off to also give some time to help maintain the composting systems.

ShareWaste is a platform that connects people who do not want to throw their food scraps in the bin with private homes that are already composting.

Regulation

Licensing by the EPA may be required for composting activities, as set out in Schedule 1, clause 12 of Protection of the Environment Operations Act 1997. In the regulated area – the parts of NSW that pay the waste levy – licensing by the EPA is triggered when more than 200 tonnes of total organics is received at any one time from off site. Outside the regulated area, the trigger is set at 2,000 tonnes of organics received from off site.

When licensing by the EPA is not required (i.e. for volumes of less than 200 tonnes per year), the responsibility generally falls to local councils. In some cases (such as for communal composting on public school grounds) it may instead fall under the jurisdiction of other departments. Check the regulatory requirements before setting up an on-site or off-site communal composting system to ensure that the environment, human health and neighbourhood amenity are all protected.

NSW Resource Recovery Framework

The NSW EPA's Resource Recovery Framework, administered under Part 9 of the Protection of the Environment Operations (Waste) Regulation 2014, enables the EPA to grant exemptions from certain laws that control re-use of wastes. This pathway facilitates lawful re-use opportunities for wastes, such as food waste, when these can be shown to be beneficial and pose low risks of harm to human health and the environment. The conditions set in Resource Recovery Orders (RRO) and Resource Recovery Exemptions (RRE) must be met for the lawful and safe re-use of wastes. For example, collected FOGO (food organics and garden organics) that is to be composted must be

processed under the Compost Resource Recovery Order and the end product used in accordance with the Compost Resource Recovery Exemption.

For more information, see the EPA's Resource Recovery Orders and Exemption fact sheet or contact the EPA directly at waste.exemptions@epa.nsw.gov.au.

FOGO inputs for households

In July 2022 the EPA released a position statement on allowable inputs for household FO and FOGO services. The position statement formalises the EPA's existing position on inputs to FO and FOGO waste streams and is consistent with the Compost Resource Recovery Order and Compost Resource Recovery Exemption.

The Position Statement states that only the following materials should be put in household FO or FOGO bins:

- food and, for FOGO bins, garden organics
- compostable plastic kitchen caddy liners that comply with Australian Standards (AS 4736-2006) for commercial composting[5]
- fibre-based kitchen caddy liners (e.g. paper or newspaper).

Visit the EPA's FOGO information for households webpage for more information.

[5] Please check with your processor to see if it will accept commercially compostable liners.

Education and engagement

The key to any successful FOGO program is positive and ongoing education and engagement with residents to ensure that they have the information and tools they need to cleanly separate and manage their food waste effectively. Socio-psychological factors affecting recycling include perceived convenience and effort, knowledge, social norms and the influence of others, moral norms, attitudes and environmental concerns, habit and system trust.[6]

MUDs have shared or communal bins. They therefore need education initiatives around food and other waste separation tailored specifically for them, rather than for houses. In MUDs, residents have less space in the home to sort food waste for recycling and often cover a greater distance from the kitchen to the waste collection point, so more effort and commitment may be required to recycle. At the bin, the recycling efforts of others is more visible, and this can influence the social norm of the building: having a building champion can be very effective in getting others on board. Residents' trust in the operators of the building (for example, cleaners, and strata and building managers) will also influence how messages are received and acted upon.[7] Education and communication must be tailored to get these stakeholders actively engaged. Building operators play an important part, as they provide new tenants with information about the organics recycling service and resources such as caddies.

MUDs encompass a range of physical and social settings: they can be high-rise or low-rise, social housing, gated communities with additional services, or flats over shops. MUDs also house diverse communities, who can be short-term renters, long-term renters and owners. WRAP UK suggests categorising buildings based on similar infrastructure and barriers to effective use of the recycling service.[8] Education and communication could then be developed for each of the categories. The Final Frontier series of podcasts provides insight into best-practice engagement for food-waste separation in MUDs and recommends tailoring the education and recycling infrastructure to the characteristics of the MUD building by first visiting the building to understand the infrastructure options and context.

Communication with residents should change as a FO or FOGO program is developed, rolled out and embedded. Initial communications should focus on the benefits of food-waste recycling and why the service is being implemented. The second stage of communication focuses on the specifics of how to use the service and the third stage reinforces the correct behaviours and the importance of a clean stream. Developing and testing of the messaging and communication methods for each stage should take into account differences between single and multi-unit dwellings. Communication resources should be readily available to people who move into the MUDs once a service has been established. Delivery should be ongoing, not one-off.

Developing your communication and education plan

There are many resources available to help develop, implement and evaluate education and engagement plans for a food-waste collection service. Below are examples specific to FOGO that can help you plan your FOGO roll out.

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[6] Knickmeyer D 2018, *Social factors influencing household waste separation: A literature review on good practices to improve the recycling performance of urban areas*. Master's thesis, Autonomous University of Barcelona. Downloaded from https://www.researchgate.net/publication/339784626_SOCIAL_FACTORS_INFLUENCING_HOUSEHOLD_WASTE_SEPARATION_Good_practices_to_improve_the_recycling_performance_of_urban_areas.

[7] City of Melbourne 2014, *High Rise Recycling Project: Final Report*

[8] Jenson et al. 2014, *Barriers to Recycling at home.* Download from https://wrap.org.uk/resources/report/barriers-recycling-home.

The Victorian Government Guide, *Introducing Kerbside Food and Organics Collection Service – A Guide for Local Government* (2018), includes social research regarding effective messaging and highlights which elements delivered positive behaviour changes in metropolitan Melbourne.

The Commonwealth Government has developed a Food and Organics Best Practice Collection Manual (2012). It covers a broad range of considerations for the implementation of effective FOGO collection programs. Fact sheets 9 and 11 provide guidance on communicating before, during and after a new collection service is started.

The NSW *FOGO Deep Dive Education Project* Social Research Report (2020) looked at FOGO collection across 26 local government areas in NSW and the awareness, understanding and attitudes towards FOGO.

WRAP UK provides a good example of a communications plan and timeline for the introduction of a new FOGO service.

Figure 9 The *NSW FOGO Deep Dive Education Project Community Survey – Stage 1* looked at FOGO collection across 26 local government areas. Image: EPA

Building managers

Depending on the size of the MUD, engagement will need to be not just with residents, but also with the strata manager, strata committee, building manager and building cleaner. Getting their contact details and developing relationships with them can be challenging. However, contact is essential for:

- gaining access to the building to assess infrastructure needs and install bins and signage
- discussing options for delivery of kitchen caddies, compostable bags and education material
- discussing the logistics of residents taking food scraps to the food-waste bins, and of emptying and cleaning bins
- helping tailor the education.

A face-to-face meeting while doing the site assessment may be a good opportunity to engage on-site personnel. You can discuss what can and can't go in the food-waste bins, the benefits of food-waste recycling, any internal communication channels the council can tap into and any concerns the manager may have about the new service. It can also be reassuring for building managers to know they will be supported during the transition period.

Signage

Signage is an important passive educational tool. In MUDs where there are many people using the same bins and potentially a high turnover of residents, signage is important to reinforce FO/FOGO messages.

No signage will be 100% effective, but there are several things you can do that will help MUDs residents correctly separate their food waste. Consider providing free posters, stickers and other signage materials for each MUD. If the council is installing the signs, consider how you will gain access and permission for installation.

When developing signage for your bin bay or MUD education program, consider the following:

- Use images or photos that reflect the food waste being generated in the MUDs.
- Images need to be unambiguous. Photographs are often the easiest for people to understand.
- Use consistent colour coding (such colours from the Australian Standards) so that labels for caddies, bin bays and on mobile garbage bins are all consistent.
- Don't overcrowd images. You must be able to see the images clearly from 1–2 metres away as this is often when people make the decision about where they will place their waste. If signage is not clear at this distance, then residents can be confused or make errors in where the food waste should go.
- Bear in mind that not all people read English or have good eyesight. Use highly contrasting colours and large images or wording to make your messages clear. This will also help if bin-bay areas are poorly lit.
- Consider if signage can be provided in a range of languages to address the different cultural and linguistic needs of MUDs residents.
- When you have drafted your signage, test it on residential groups or body corporate members. You can also get input from non-waste staff at council, such as customer service staff who have regular contact with residents. Check the artwork to pick up on inconsistencies or issues before going to the expense of printing signage.
- Be careful with technical language. Some councils, such as Penrith City Council, found through their research that the term 'organics' was poorly understood and best avoided in their education materials.
- In crowded bin-bay rooms, place signage on the wall above bin height to make it more visible, and less likely to be damaged by bins as they are moved in and out of the storage area. To be effective the wall signage needs to be close to the appropriate bin.

Figure 10 An example of a bin-bay poster from the City of Parramatta *Food Waste Recycling Trial*. Image: Council of the City of Parramatta

Face-to-face education

Face-to-face education is more time-consuming and costly than doing only online communications (such as putting content on a website) but can lead to longer-lasting outcomes. There are various ways of providing face-to-face education. Some councils have used educators to go from home to home, door knocking and inviting residents to join food-composting programs.[9] Others have provided small-group education and training for households that self-nominate their interest in composting and food-waste collections. Whichever process is used, it is important that there are plans for ongoing education. Any face-to-face interventions will be more effective if supported with written materials, video or other tutorials that residents can refer to in their own time. Collecting email addresses can aid the distribution of follow-up information, such as tonnages and contamination levels for the MUD building or for the council area more generally. In MUDs with many apartments, the high turnover of tenants may make face-to-face education less effective, thus making the need for ongoing education more important. Video guides may be helpful. Workshops or events for a large apartment complex may help build social cohesion within the housing complex, providing benefits in addition to better food-waste recycling.

Marketing

Marketing campaigns can take many forms, from the relatively simple application of a good tagline to the integration of many media channels (television, social media and print).

A clever or funny tagline is memorable and helps to cement the messages of your FOGO campaign. Examples include Bega Valley Shire Council's *WTF – Waste the Facts* campaign or Clarence Valley teaming up with Dirt Girl for its *Mission Compostable* program.[10]

Many councils have used local or national personalities to support the FOGO messaging. For instance:

- Albury City Council worked with Julie Goodwin, the former *Master Chef* winner, who headed up its TV and print-media campaign to reduce food waste.
- Shepparton Council used Dr Karl (Kruszelnicki) in a series of videos explaining the FOGO system and its benefits.
- Bega Valley Shire Council worked with ABC presenter Costa Georgiadis on its social-media-led campaign, *FOGOmentary*.

[9] Inner West Council 2018, *Compost Hut Trial*, https://www.innerwest.nsw.gov.au/about/news/media-releases/2017-media-releases/first-compost-huts-in-australia

[10] https://clarencevalleynews.com.au/dirtgirlworld-team-to-rock-the-world-of-compost-in-2016/

Figure 11 The launch of Bega Valley Shire Council's *FOGOmentary* campaign, with ABC presenter Costa Georgiadis. Image courtesy of Bega Valley Shire Council

Pledges and challenges

Pledges and challenges ask residents to commit to certain outcomes to improve recycling or reduce food waste. Challenges require self-nomination by residents, which means that the programs often target already-interested individuals who may not need additional support. Pledge and challenge programs may help to identify 'champions' for food-waste reduction within MUDs, or people who may be willing to support other food-waste reduction initiatives. Individuals or households that sign the pledge or challenge can find out about others in their apartment block or area who are also working to improve recycling and waste separation. These initiatives not only support food-waste separation but also encourage tenants to interact with each other and share ideas and support: see the Port Macquarie Hastings Council case study below for an example. A study looking at improving food-waste separation in MUDs, conducted in Holland, found that setting collective goals for the building was more effective than setting individual goals.[11]

Collateral

Collateral that supports food-waste separation in MUDs is particularly important. It is a relatively low-cost, low-intervention method that provides ongoing educational support, which is particularly useful when you are dealing with large numbers of tenants and high turnover. Posters, flyers, postcards and fridge magnets are just a few of the materials that can be distributed to large numbers of people in MUDs. The use of collateral material is more likely to be successful if it is easy to use, can be readily placed near food-waste collection systems, and is bright and engaging.

[11] VANG Household Waste (VANG Huishoudelijk Afval) 2020, Downloaded from *Improving waste separation in high-rise buildings: Increased source separation of organic waste in cities through behavioural change*, https://www.vang-hha.nl/kennisbibliotheek/@236745/improving-waste-separation-high-rise-buildings/

For example, stickers with information on source separation that fit cleanly on the lid of the bin caddy can be a constant reminder to residents about what is accepted in the food-scraps bins and what to avoid. Welcome packs for new tenants moving into a MUD environment both educate new arrivals and help to establish positive behaviours at the start. The distribution of welcome packs is best managed centrally – for example, through the body corporate.

This webpage by Bega Valley Shire Council includes artwork available for anyone to use on handout material and important information on lessons the council learned through its FOGO program rollout.

Figure 12 An engagement postcard used by Randwick City Council.
Image: Randwick City Council.

Culturally and linguistically diverse (CALD) communities

Collateral in MUDs can be more effective if it targets particular audiences. You can determine the cultural and linguistic make-up of the MUD residents by surveying residents or using Australian Bureau of Statistics data. Education programs that target particular social and cultural norms and provide materials in specific languages are more effective for CALD communities than materials in English alone.[12] Organisations such as the Ethnic Communities Council have resources that can help with waste-education messaging.

Bin-bay design

If you are intending to use a centralised food-waste collection process in MUDs, bin-bay design is important. Evidence gathered over many years shows that poorly designed MUD bin bays contribute significantly to contamination. This is largely due to the large number of bins used in MUDs and the large number and diversity of people using them. Where bins are hard to locate or access, or lighting is poor, MUDs residents will tend to use whichever bin is closest and not try to use the correct one.

To improve bin-bay design in MUDs:

- Provide clear directions to the bin-bay areas, with clear signage. Use of food-waste bins can be improved by providing a 'new tenant' welcome pack with information on correct food-waste separation and recycling in the building.

[12] City of Monash 2012, *Waste and Recycling Education for CALD communities*.

- If opting for a FOGO bin-collection service, co-locate the FOGO bins with all other bins. This makes it easier for residents to drop off all separated waste in one convenient place and reminds tenants of the FOGO collection every time they drop any waste to the central bin area.
- Try to locate all bins in a well-ventilated area and prevent odour generation by regularly cleaning in and around bin bays.
- Where bin areas are kept clean, residents tend to also contribute to keeping bin areas clean. When standards start to slip, residents tend to follow suit and contribute to mess in the bin area. Providing a communal dustpan and broom near the bin bays will help residents to clean up if there are unexpected spillages.
- Try to ensure there is plenty of room in and around the bins so that all bins are easily accessible.
- Install clear signage on walls and on bins to help residents understand which bin is used for which waste type.

Provide good lighting, preferably on a sensor, to contribute to the easy use and separation of waste. Residents are more likely to dump food waste in the closest possible bin if the area is poorly lit and they cannot easily access the correct bin. Large, coloured panels behind the bins can help residents know which bins to place their waste into.

Figure 13 An example of an internal bin-bay area. Photo: Evolving Images/EPA

Feedback loop

International experiences have shown that high continued engagement is more likely to result in good food-waste separation and lower contamination levels.[13] Monitoring contamination levels and

[13] VANG Household Waste (VANG Huishoudelijk Afval), op. cit.

feeding that information back to residents helps residents adapt to a new system and reinforces positive behaviours to encourage low contamination levels.

Feedback can be provided through existing MUDs communication channels, such as newsletters, internal digital and physical notice boards, and posters and information at the bin. A FOGO champion within a MUD building can help ensure feedback is timely and any gross contamination is removed before other residents are deterred from using the new service.

A 2020 research report from the Netherlands covered tests of the effectiveness and feasibility of ten interventions to improve source separation of organics in MUDs.[14] The three most effective interventions were found to be:

- facilitating storage at home
- setting group goals and feedback
- influencing attitudes (towards waste separation).

Other methods were not as effective in stimulating the desired behaviour for extended periods and needed to be repeated periodically until behaviour was embedded.

Figure 14 Example of feedback communications: a newsletter sent as part of City of Sydney's *Food Scraps Recycling Trial*. Image: Council of the City of Sydney

Evaluating the education

Tailored evaluation is required in MUDs as much as tailored education. Before designing and implementing a waste education and food-waste separation program, it is important to consider how you will know if the program has been effective. Building in an evaluation process from the

[14] VANG Household Waste (VANG Huishoudelijk Afval), op. cit.

beginning will help determine which aspects of your education program are most effective and what could be improved.

Often this means collecting some baseline data from MUDs residents, including their attitudes to food waste and their current approach to waste separation and recycling. An audit of the waste currently being generated will also help to establish how much food waste is available for capture. Once programs are under way or have concluded, repeating surveys and waste audits will give you valuable insight into how effective your education programs have been in increasing diversion and reducing contamination. A pilot project by North East Waste found that establishing a baseline for measuring progress in MUDs can be difficult. Throughout the pilot there were changes in the number of vacant units, new tenants moving in, the introduction of home composting systems, and variations in the availability of red and green bins, all of which affected the interpretation of data and trends.

One of the lessons from Leichhardt Council's program for food recycling in MUDs was an understanding that it isn't just that residents move, generating a continual need for education, but that the systems around the collections also change.[15] Do new council customer service and collection staff know about the food-collection systems? Do they know the dos and don'ts for MUDs? Do they know which MUDs are eligible for a food or FOGO service?

Case studies – Australia

Bega Valley Shire Council

A clever and humorous education campaign for a new FOGO service that achieved an extremely low contamination rate of 1% in the first week of the service, and 0.6% by the third week.

The council has put resource materials and insights from its FOGO service online.

Byron Shire Council

Linking FOGO to farmers who are growing sustainable produce and improving local soil quality.

Camdenville Paddock

The *Food Scrap Friday* program allows residents in and around this inner-Sydney school to drop off food scraps for composting. The waste is weighed and recorded before being added to the community-garden compost bins. This program has composted over 20,000 kg of food waste to date.

City of Casey

This Victorian local government area offers rebates to residents for compost bins, worm farms and bio-fermenters.

Clarence Valley Council

Council teamed up with Dirt Girl for its *Mission Compostable* FOGO program.

[15] Herriman et al. 2014, *Leichhardt Council Community Engagement and Participation Plan: Food recycling in multi-unit dwellings*, https://opus.lib.uts.edu.au/bitstream/10453/30510/1/Herrimanetal2014foodrecycling.pdf

Compost Revolution

Several NSW councils provide this online tutorial about composting and worm farming. Residents who complete the training often receive discounts on compost bins or worm farms from the council.

Feedback Organic Recovery – Food Cycle program

A program for the collection and composting of food waste in the NSW Hunter region. The program organisers create compost from the food waste collected and also deliver community education.

Inner West Council Compost Collective

This program supports MUD residents in setting up and maintaining their own composting systems on site. It includes access to compost bins and other tools, troubleshooting tips and provides connections to Council and other local composters.

Kempsey Shire Council

Council provided rural residents with a caddy, liners and a mobile garbage bin. It also delivered an extensive education program called *sort&save*. The service resulted in a 15% drop in waste to landfill in the first 12 months after it was introduced.

Kiama Shire Council

The municipality was divided into 10 urban-waste collection zones, allowing the service to be rolled out in stages over several years.

Leichhardt Council (now Inner West Council)

Council commissioned the Institute for Sustainable Futures (ISF) at the University of Technology Sydney to review the food-recycling service. It implemented recommendations such as quarterly delivery of slim-line compostable bags in a pack that could be posted into letterboxes and using branded signage.

Love Food Hate Waste (statewide)

Delivered by the EPA, this program has a wealth of material on helping households reduce food waste. It has a free online program, *Food Smart*, which guides households through six steps to reduce food waste.

NetWaste

Working together, Bathurst Regional Council, Forbes Shire Council and Parkes Shire Council delivered a FOGO service to all residents.

Port Macquarie Red Bin Challenge

Education program to support residents who voluntarily pledge to reduce their red-bin waste volumes.

Positive Waste

An on-demand food-waste collection service for the City of Sydney and Inner West areas. Collection is via a subscription service.

Richmond Valley Council

The council delivered education in a staged approach starting nine months before the service began.

ShareWaste

An online platform that connects people who have food waste with people in their local area who can compost that waste for them.

Shellharbour City Council

Used community events to improve education and demonstrate significant budget savings for the council.

Snowy Monaro Cooma Regional Council

Used grassroots education, including a kids' competition, to design the new FOGO truck decals.

Sydney Food Scraps Recycling Trial

This is a trial of an opt-in, food-only, kerbside-collection service for MUDs and houses. MUDs that opt in must provide strata committee approval for the building to take part. Council conducts site assessments at all new buildings and provides on-site information sessions at buildings.

Wilkins Green

A community garden attached to Wilkins Primary Public School. The garden has an active composting program that accepts food waste from the school, families, local community and local café.

Case studies – international

Milan, Italy

Mandated the closure of all waste chutes. Provided biodegradable bin liners with a vented kitchen caddy and multilingual information. Gave out free bags of the compost to residents for education.

New York, USA

New York Times article on New York food-waste collections in MUDs. Through its *Make Compost, Not Trash* program, the council encourages residents to compost food and garden waste. It runs communal drop-off sites where residents can dispose of their food and garden waste.

San Francisco, USA

A FOGO collection service focused on five factors: convenience, incentives, legislation, education and partnerships.

Seoul, Korea

Seoul implemented a user-pays system in which residents use swipe cards to allow them to drop waste to a central area. Residents are charged according to the amount of waste they dispose of.

Education guides and tutorials

Food and Garden Organics: Best Practice Collection Manual

An Australian Government guide for local councils on implementing a new garden organics or food-waste collection program.

Orange City Council

The council has a tutorial on making compost-caddy bin liners from newspaper.

The Organic Stream

This podcast explores international programs for collecting organics waste.

YouTube resources:

- Making paper bin liners
- No-scissors bin liner

Further resources

Department of Sustainability, Environment, Water, Population and Communities 2012, *Food and Garden Organics Best Practice Collection Manual*, Australian Government, Canberra, http://www.environment.gov.au/system/files/resources/8b73aa44-aebc-4d68-b8c9-c848358958c6/files/collection-manual.pdf

Environmental Research Technological Development and Innovation (ERTDI) Programme 2000–2006 (2008), *Organic Waste Management in Apartments: Final Report*, Environmental Protection Agency, Ireland, https://www.epa.ie/publications/research/waste/ERTDI-No71_WEB-final-with-cover.pdf

Herriman J, Mikhailovich N, Wynne LE, Downes J & Boyle TM 2014, *Leichhardt Council Community Engagement and Participation Plan: Food recycling in multi-unit dwellings*. [Prepared for Leichhardt Municipal Council, NSW], Institute for Sustainable Futures, UTS, Sydney, https://opus.lib.uts.edu.au/bitstream/10453/30510/1/Herrimanetal2014foodrecycling.pdf

MRA Consulting Group 2019, *Desktop Review of Food Waste Collection Systems in MUDs: A submission to the NSW Environment Protection Authority*, Drummoyne NSW, https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/managewaste/food-waste-collection-systems-in-muds.pdf?la=en&hash=70083F1AFB529EE22C85208FE808D53633074E6B

NSW Environment Protection Authority 2015, *Resource Recovery Orders and Exemptions Process*, Sydney, https://www.epa.nsw.gov.au/publications/wasteregulation/150107-order-exemptions-factsheet

NSW Environment Protection Authority 2019, *Best Practice Guide to Resource Recovery in Residential Developments*, Sydney, https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/warrlocal/19p1559-resource-recovery-in-residential-developments.pdf?la=en&hash=C29AFB3B95D416F29A6F711B684C620900174075

NSW Environment Protection Authority 2020, *Current Resource Recovery Orders and Exemptions*, Sydney, https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption

NSW Environment Protection Authority 2020, *Food Organics and Garden Organics*, Sydney, https://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/business-government-recycling/food-organics-and-garden-organics

Waste and Resources Action Programme 2009, *Household Food and Drink Waste in the UK 2009*, Banbury UK, https://wrap.org.uk/resources/report/household-food-and-drink-waste-uk-2009