

PAGE 48

Eating the invaders

Is the answer to the question of invasive species hiding in our kitchens?

PAGE 59

EVs for newbies

A bumper EV special feature, including an in-depth buyers guide and a market update

PAGE 86

Win a \$5000 Earthworker-Reclaim heat pump hot water system

From the Earthworker Energy Manufacturing Cooperative
Australian residents only

ISSUE 157

renew.

Technology for a sustainable future



OCT - DEC 2021



AU/NZ \$11.90
RENEW.ORG.AU

**On the crest
of a change**

**Can wave energy play a
part in a renewable grid?**

Going organic

From leftover fruit and veggies to, ahem, biosolids, Jodie Lea Martire investigates what happens to Australia's organic waste.

Organic waste should be a gimme to recycle, because it is by nature 100% biodegradable. It is, in fact, the future of all the planet's soils, microbes, plants, insects and animals—and as such, it should never be treated as rubbish in the first place.

If all organic waste was allowed to decompose naturally, it would generally do so aerobically—i.e. in the presence of oxygen. This process involves the waste being consumed by living organisms.

While this process does release CO₂, it is far less damaging than anaerobic decomposition, which is what occurs when organics are dumped at the tip instead of being treated properly. Anaerobic decomposition releases toxic leachate into soils and "landfill gases" into the atmosphere.

These gases are noxious-smelling and highly flammable. They're also a disaster for the atmosphere, largely because they are 55% methane (CH₄), which is an extremely potent greenhouse gas. It traps 84 to 87 times more heat than an equivalent quantity of CO₂ over a 20-year period. It degrades faster than CO₂, only remaining in the atmosphere for around 10 years, but it wreaks havoc in that time—even when their respective warming potentials are averaged over a 100-year period, methane traps 25 times more heat than an equivalent quantity of CO₂.

Methane currently comprises around 3% of Australia's greenhouse gas emissions. Each tonne of landfilled organic waste releases about 1t CO₂ equivalent, and Project Drawdown—a non-profit devoted to reducing greenhouse emissions—suggests that reducing food waste is the third-most effective way to limit global heating to 1.5°C

by 2100, and the single most effective way to limit it to 2 °C. Industry publication *Inside Waste* states that diverting organics from landfill is "one of the cheapest global-warming abatement options".

Australia's *National Waste Policy Action Plan 2019* commits us to halving the amount of organics in landfill by 2030, but we've only managed to reduce that amount by 2% since 2016-17.



The focus on consumers means that they are apportioned the majority of the blame for unused food, rather than those who create and maintain wasteful industrial processes.



The issue of food waste alone, a subset of organic waste, is so grave that the United Nations' Sustainable Development Goal 12.3 aims to "halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses".

This would address both waste management and shameful levels of global hunger: one-third of the world's food goes to waste, yet 690m people were malnourished prior to the Covid pandemic. In 2013 the Food and Agriculture Organization (FAO) reported that if food waste were a country, it would be the world's third-highest CO₂ emitter, after the US and China.

As of June 2017, Australia landfills 298kg of food per capita, with an estimated price tag of \$20 billion per year. To reach our national organic-waste goal, we need to reduce the quantity of organics sent to the tip by 2.7 Mt each year. How are we tracking on that goal, and what kinds of organic waste should be our priority?

What counts as organic waste?

Organic waste is a many-headed beast, but basically it's anything that was once alive and is now considered refuse. At home, that means food waste (fruit, vegetables, teabags, coffee grinds, oils) and garden waste (leaves, flowers, lawn clippings, branches, woodchips, bark, timber). Meat scraps, eggshells and dairy are organic waste, but need special treatment: put minimal amounts of meat in the compost, keep it very hot and reinforced to prevent vermin, and ensure it's frequently turned or aerated.

From here, organic waste gets more exotic: hair (animal, human), wool, vacuum cleaner dust, wood ash and timber. It also includes the delightfully euphemistic category of "biosolids", which are treated human excrement.

In its assessment of Australia's waste management, the *National Waste Report 2020*

makes a distinction between "core" and "non-core" waste. [Shout out one John Winston Howard, whose non-core promises also proved to be... biosolids.—Ed.] All the categories listed above comprise core waste*, which totalled 14.3 Mt in 2018-19.

The report also tallies another 28 Mt of "non-core" organic waste, including biohazards like grease-trap sludge and waste from tanneries and abattoirs (mostly composted), plus waste from fisheries, cotton gin trash and livestock manure. The sugarcane industry ditches bagasse (pulped sugarcane stalks) and sugar-mill mud.

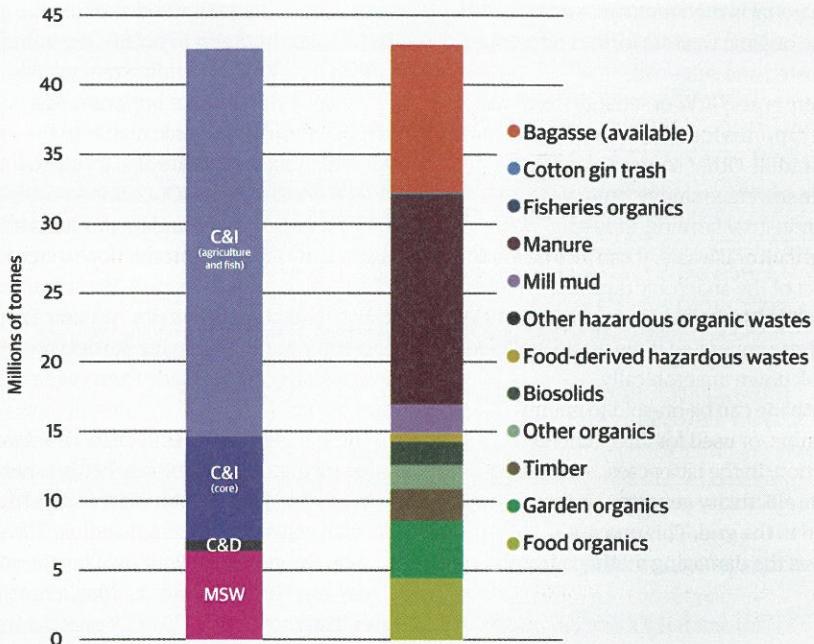
Paper and cardboard are technically organics (see *Renew* 153 for recycling details), as are plant- and animal-sourced textiles (see *Renew* 154)... and the disposal of human bodies. (We'll leave that last one for another time.)

Food organics (FO) and garden organics (GO) are often collectively termed "FOGO". At every stage of the supply chain, food is lost or wasted: one third each through our homes, farms and the food/hospitality industry. The major focus in Australia (and abroad) for food waste reduction is the consumer level—which is reasonable when you consider the outsize environmental impacts of that waste category.

However, we can also note the sickly-sweet odour of capitalist greenwashing here. The focus on consumers means that they are apportioned the majority of the blame for unused food, rather than those who create and maintain wasteful industrial processes. Agro-industrial waste creates higher piles of rubbish than FOGO: FO only contributed 5.09 Mt over 2018-19 (including hazardous waste), while GO was even less at 4.1 Mt.

By comparison, manure reached 15 Mt, while bagasse from sugarcane alone encompassed 10.7 Mt—and I've yet to see a federal campaign looking at how *they* can be better managed.

* The exact definition of "core waste" is long and unwieldy: "waste generally managed by the waste and resource recovery sector, comprising solid non-hazardous waste and hazardous waste including liquids, and generated in the municipal, construction and demolition, and commercial and industrial sectors, generally excluding primary production and including biosolids."



Generation of organic wastes by type and stream, Australia 2018-19. Note: While the MSW, C&D and C&I (core) data are considered comprehensive, the C&I (agriculture and fisheries) is not. The bagasse shown is the excess of the amount estimated as required to power an efficiently operating sugar mill.

Source: Blue Environment, *National Waste Report 2020*

How are organics recycled?

Unlike other kinds of waste, FOGO can be recycled at home. Because you're a *Renew* reader, chances are high that your food waste gets tossed in the compost, spread in the worm farm or thrown to the chooks in your backyard or property. Mixed with manure, green waste, straw or grass clippings, your compost is well on the way to returning to the earth. Adding compost to soil reduces water and fertiliser needs, improves soil health and structure, and helps repair mismanaged soils.

However, many Australians don't have or use these facilities, and rely instead on local councils to collect and compost their FOGO commercially. When processed at a larger scale, FOGO is generally decontaminated to remove steel, plastic, glass, bricks and other waste, then shredded and stacked into long, heaped mounds called "windrows". These are kept moist and turned regularly over the course of four or five months.

This is "aerobic windrow composting": a

process that involves adding wood chips or paper to the mounds and allowing them to brew in the presence of oxygen, microbes and heat (50°C to 70°C). This breaks down FOGO, weeds and pathogens, and generates organic nutrients.

Once the process is complete, the resulting product is screened and sorted into different sizes and categories—these include compost, mulch, potting mix, soil fertilisers and soil conditioners, which are sold for use in horticulture, agriculture, landscaping and garden centres.

Alternatively, composting can take place "in-vessel", where the process is monitored, highly controlled and gives quicker results. This process is on the rise as it deals with liquid mess and nasty smells, creating liquid fertiliser which can be injected into soil. In Australia, commercial compost is graded by the Australian Standard for Soil Conditioners and Mulches (AS4454); check for quality by buying certified products showing the

Compost Australia Leaf Mark.

Another method is mechanical-biological treatment (MBT), where organics and other waste are injected into a rotary drum (called a "bioreactor"), spun and heated to 60°C to 70°C. This shreds the waste, and also stabilises and homogenises the organics. As in compost, microorganisms ferment the organic material and water evaporates. The material is then removed and screened, and the organic waste is further fermented, composted and screened.

There is also EfW or "energy from waste", which captures the methane-rich gas emitted from landfill. Other sources of methane include sewerage sludge, animal waste from industrial farming, industrial waste and agricultural waste. It can also be a side-product of the anaerobic digestion processes for FOGO, although in far smaller quantities than those generated if the waste is allowed to break down anaerobically.

Methane can be on-sold to energy generators, or used for direct energy extraction; in the latter case, it is burned and the electricity generated is then sold on to the grid. This process removes the damaging methane from

our atmosphere, and optimistic predictions by the International Energy Agency claim it could reduce 20% of the world's demand for gas.

This approach is also known as "biomethane", "biogas", "green gas" or "renewable gas"—but beware! The Climate Council acknowledges the benefits of electrifying our methane waste, but notes that its benefits are limited and that the gas industry promotes it to bolster the industry's role in transition to genuine renewables.

Despite the fact that humanity has happily returned organic matter to the earth for millennia, people are also trying to find new ways to recycle FOGO. British company BIOHM reuses waste and by-products from agriculture and food production to create sheets or moulds of a wood-like substance called ORB (an acronym for "Organic Refuse Bio-compound")—imagine particle board, but in gorgeous colours made from vegetables and plants.

Researchers at the University of Tokyo, meanwhile, have gone one better and made vegetable-based materials that are stronger than concrete, but remain edible. If you've ever wanted to eat your own house, you may soon be able to do so. What a time to be alive.

What are the benefits of recycling organics?

Apart from the hitherto unexplored benefits of edible structural materials, recycling organic waste shows respect for natural systems. It also reduces carbon emissions and cuts down on wasted food and money. Between 2010 and 2016, the IPCC reports that food loss and waste created 8% to 10% of greenhouse gas emissions and cost USD \$1 trillion per year.

In Australia, that means 7.3 Mt of food wasted per year across the growing, selling and eating cycle, resulting in 5% of our greenhouse gas emissions and costs of \$1026 per year per household. Project Drawdown has calculated that halving food waste in the next 30 years would avoid 10Gt of carbon emissions. And remember—these are just the stats for food, not for all kinds of organic waste.

Are there drawbacks to recycling organics?

One drawback to the strong "don't waste your food" messaging is that it ignores the perfectly responsible reasons to not eat every skerrick of food in your home—it may be wilted, mouldy, smelly, or way past its use-by date. You may not be certain about freezing and reheating certain foods, or reusing them past a certain age. There's no blame in wanting to cook and eat healthy food for you and your household, and there's no use in trying to impose unrealistic goals and then castigating people for failing to meet them.

Organics can also be difficult to deal with because they degrade as soon as they are harvested, killed or produced, making them messy, smelly and potentially a biohazard. Not surprisingly, the waste industry calls organic waste "wet waste", alongside oils, fats, grease and other discarded liquids.

How do we recycle organic waste in Australia?

In terms of using council-level FOGO recycling, only 49% of Australians have access to kerbside systems. In 2018-19, local governments collected 1.4 Mt organics in designated bins—but organics remained the second-largest waste category sent to the tip, at a total of 5.6 Mt. (Thankfully, an estimated 60%–7.0 Mt to 7.5 Mt—of core organic waste was recycled.)

Of the total organics disposed of, 5.6 Mt became compost or mulch and 1.42 Mt were converted to biosolids and applied to land. Another 0.31 Mt were incorporated in fuels or anaerobically digested and 1.28 Mt were recovered through landfill "biogas" from over 130 tips (that's 42% of landfill gas generated). The Australian Organics Recycling Association (AORA) estimates that their members' work saved 3.8 Mt CO₂ equivalent of greenhouse gases in 2018-19.

Getting caned

Part of the problem with recycling organic matter is the emphasis on recycling at all costs in order to cut greenhouse gas emissions. While recycling is laudable, it's also important to think through the details of the original source of the product being recycled, along with the recycling process and the new products' life cycle.

The situation with bagasse or sugarcane pulp (remember: 10.7 Mt in 2018-19) provides good insight into some abiding issues. In the first place, sugar itself is a discretionary food product that we over-consume: the Australian Dietary Guidelines repeatedly warn consumers off eating "added sugars" because of the related health conditions of obesity and diabetes (to name just two).

Sugarcane also produces a huge amount of straw waste, known as bagasse, which is typically burned on-site in canefields. This is a process as wasteful as it is environmentally damaging, because bagasse can also be used to generate ethanol biofuel: one hectare's worth of bagasse can provide 9600 L of ethanol biofuel, equivalent to 29 barrels of oil.

The bagasse burned in power sugarmills is considered a "renewable energy source"; it fuels 28 power stations with a joint capacity of 538 MW. The Clean Energy Regulator reports that it reduces our greenhouse gas emissions by 1.5 Mt per year, but doesn't mention that bagasse still emits CO₂ when burnt. So while bagasse may be renewable, burning it sure ain't clean.

Sugarcane waste can also be converted to packaging materials that can be used instead of plastics (e.g. Biopak). If you've finished with it and it's clean, you can recycle sugarcane packaging with cardboard, plus it's suitable for home or commercial recycling. Sugarcane waste can also become compostable cutlery, which makes us feel better than using plastics. But it's no help whatsoever that landfill bins at markets, festivals and food halls are now overflowing with biopackaging and biocutlery.

Without easily accessible and publicly available sites for commercial composting, all that repurposed sugarcane waste will just end up rotting away at the tip, releasing methane into an overloaded atmosphere.



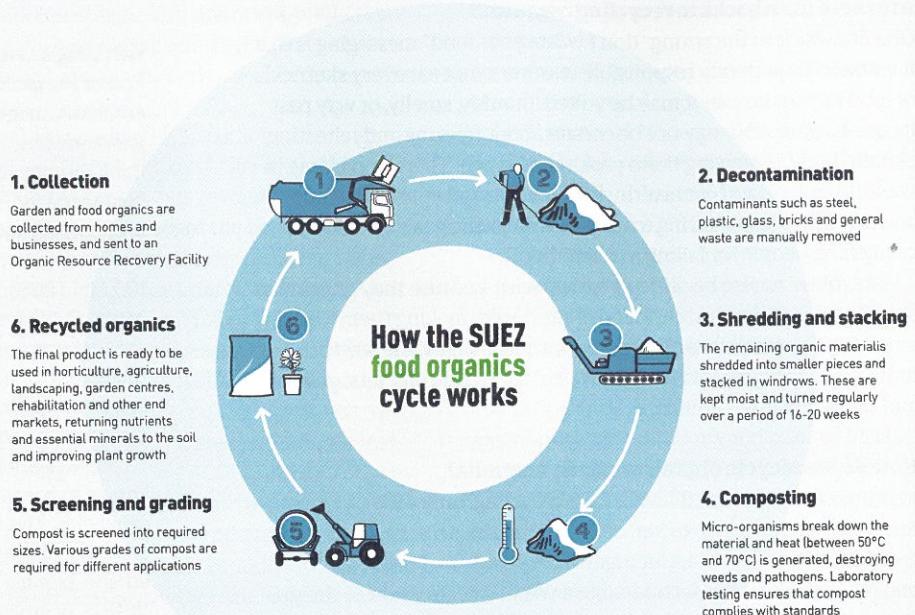
Each Australian state and territory addresses FOGO in their waste strategy or related documentation, and for many it ranks as a priority. Source-separated FOGO collections are expanding in NSW, Tasmania, Victoria and Western Australia, and other regions are looking to expand their "biogas" capabilities (e.g. Queensland and NSW). Not every strategy extends to 2030, so it's unclear if our combined efforts will halve food waste as the Australian Government has committed. Victoria and NSW, however, have planned for that in their latest waste strategies.

In lieu of kerbside food-waste collections, businesses and community-based systems are stepping into the breach Australia-wide. Melbourne's Compost Depot has drop-off points in the city's northern suburbs where apartment dwellers. Bokashi users who can't use their compost themselves (see *Renew* 154) can leave their food scraps for composting gardeners, while Canberra's Capital Scraps Composting cycles by to collect food waste from homes. In Brisbane, there are 25 composting hubs across the city with 7000 registered users. Other programs like Waste Ninja (in Sydney and Melbourne) collect scraps from restaurants, and spaces like schools, offices and community gardens all play a valuable role. You can also check out app-based compost-sharing systems (e.g. ShareWaste), which connect local eaters and gardeners.

In addition, other groups, charities and NGOs aim to reduce food wastage on the supplier side, collecting unsold fruit, vegetables, bread and produce from farmers, markets, supermarkets and shops across Australia. Many of us will have eaten a Food Not Bombs meal at a gig or seen Food Bank or Oz Harvest minivans providing food to those who need it. "Food rescue" organisations collected 64 kt of food in 2018-19 (Oz Harvest has also experienced a 46% increase in demand since March 2020).

How can Australia improve?

In comparison to other nations, Australia's amount of kerbside FO in landfill (over 65%) is similar to the EU's waste stream (68%). However, our approach to FOGO is slower and less rigorous than in Europe and elsewhere. Nova Scotia in Canada banned FOGO in landfill in 1998 and South Korea in 2005. France outlawed food wastage from supermarkets in 2016 and Denmark has reduced its food rubbish by 25% compared to five years ago. Japan, The Netherlands, Scotland and Sweden have all had circular economy legislation in place since at least 2014, while the US state of California



This diagram, from NSW-based waste management company SUEZ, explains how organic matter can be recycled in a consistent, cyclical manner.

Image: SUEZ Australia and New Zealand

has mandated residential and business composting from 2022. The scope of all these laws is far beyond any that of any proposals currently on the Aussie table.

Our aim as a nation (and as earth-born beings, eating earth-grown food, looking for an earth-bound future) should be to keep all organics out of landfill by composting them and returning them to gardeners and farmers. The first part of this process can be achieved through mandated rubbish separation at source, landfill bans, taxes on FOGO sent to the tip, and subsidised composting facilities and collection systems for domestic, retail and industrial use.

It appears that the will is there: recent research indicates that 82% of Australians would be willing to use a free, council-supplied food-waste bin, and 51% would also be willing to do so if they had to pay a small increase in rates. Ideally, kerbside FO collection would be made as simple, efficient and mess-free as possible—for example, by supplying households with biodegradable bags.

Our collection systems also need to reduce contamination between FOGO and other recyclables in order to increase recovery rates across the board. Australian councils reported in 2018 that FO was in the top three

contaminants in recycling bins, and 25% of them considered FOGO the biggest recycling issue they had to deal with. We also need to develop stronger markets for compost, plan better when siting organic recycling facilities, and enforce nationally consistent standards on compost outputs. Plus, establishing pipelines of organic products back to our farmers and growers.

The AORA estimates that if we reach an organics recycling rate of 95% it will save 3.2 Mt of greenhouse gas emissions, provide 4094 more jobs and generate \$1.6 bn in supply chain opportunity. Ideally, we should be extracting every iota of nutrients and energy possible from organic waste, rather than treating it like landfill dirt. 

AUTHOR:

Jodie Lea Martire

Jodie is a writer and editor who lives in Brisbane. She is currently studying a Master of Communication in Social Change. Her website is at jodiemartire.net.

RESOURCES:

Australian Organics Recycling Organisation
aora.org.au

Department of Agriculture, Water and the Environment guidance on organic recycling
bit.ly/3knjCyy



Case study: Green P Community Farm

Image: Courtesy of Green P Community Farm

It's not often that you find yourself talking to an urban gardener about compost, only to be interrupted by a horse whinnying in the exercise yard behind you—but that's exactly *Renew*'s experience at Green P Community Farm, which is located on 3000 m² of land inside Deagon Racecourse in Brisbane's northern suburbs. By an agreement between Racing Queensland and a community organisation that goes by the impressive acronym SANDBAG ("Sandgate and Bracken Ridge Action Group Incorporated"), since 2012 the racecourse has been home to a community farm for refugees and new arrivals.

Today, Green P has 72 plots, which are worked by 57 members and their families. The majority of its farmers have been in Australia for between four and 10 years, and include representatives of the Karen people of Burma, along with others from Tanzania, the Solomon Islands, and Bhutan (via Nepal). Many of these people were subsistence farmers in their respective countries of origin, and Green P provides opportunities for self-sufficiency, community and some local food sales. There are also plans to set up an "embassy garden" with local Indigenous communities.

The farm is funded by Brisbane City Council grants, receives community

donations of goods, and works in collaboration with SANDBAG's social enterprise SEED, which helps employ people who have had trouble getting work because of illness, disability or life circumstances.

And this is where the compost comes in—SEED workers provide gardening services, and bring their lawn clippings, tree branches and other green waste to Green P for the farmers to mulch. The farm also collects food scraps and coffee grounds from nine local restaurants and cafes, providing around 13 buckets of food scraps (each bucket is 20L), along with three buckets and 10 hessian sacks of coffee grounds. All this material is combined with hay and horse manure from supportive local stables (eight hessian sacks, three times a week). Green P has six to eight mounds of "ingredients" at the ready, and trainees from the Skilling Queenslanders for Work Program are building three wooden bays for a progressive composting system.

The compost takes four to six weeks to ripen, and every Wednesday is a farm-wide working bee to turn the piles as the waste breaks down. Once the compost is ready, each plot receives two wheelbarrows' worth. This simple system has reduced conflict over a vital resource.

Renew visited the farm in early August 2021 and spoke to several of its members, all

of whom shared fascinating insights into the project and how it has been able to enrich their lives. Speaking through Bhutanese interpreter Rishita Adhikari, Asmaya Rai said she enjoyed meeting others in the garden and being able to feed her family and friends. Fellow member Ganga Rai explained how she'd only used food and vegie scraps in her composting previously, which was more difficult than Green P's method, while Saharman Rai enthused about being able to feed about seven people from his harvest, while still sometimes having leftovers to sell; he has appreciated learning new techniques through being part of the farm. Tanka Maya Battaray particularly liked being able to grow saag (mustard greens), one of her region's staple foods, while Kesher Rai—speaking in English—explained that he comes from a family of farmers in Bhutan, on 15 to 20 acres of land ploughed by oxen. He feeds 10 people from his family's five plots at Green P, which grow produce to sell at Nepali and Indian shops in the city.

Green P Community Farm is using its compost to grow a rich crop of food and relationships, and if the delicious produce they shared with me is anything to go by, it's also providing excellent nourishment to new arrivals in Brisbane's north. — *Jodie Lea Martire*