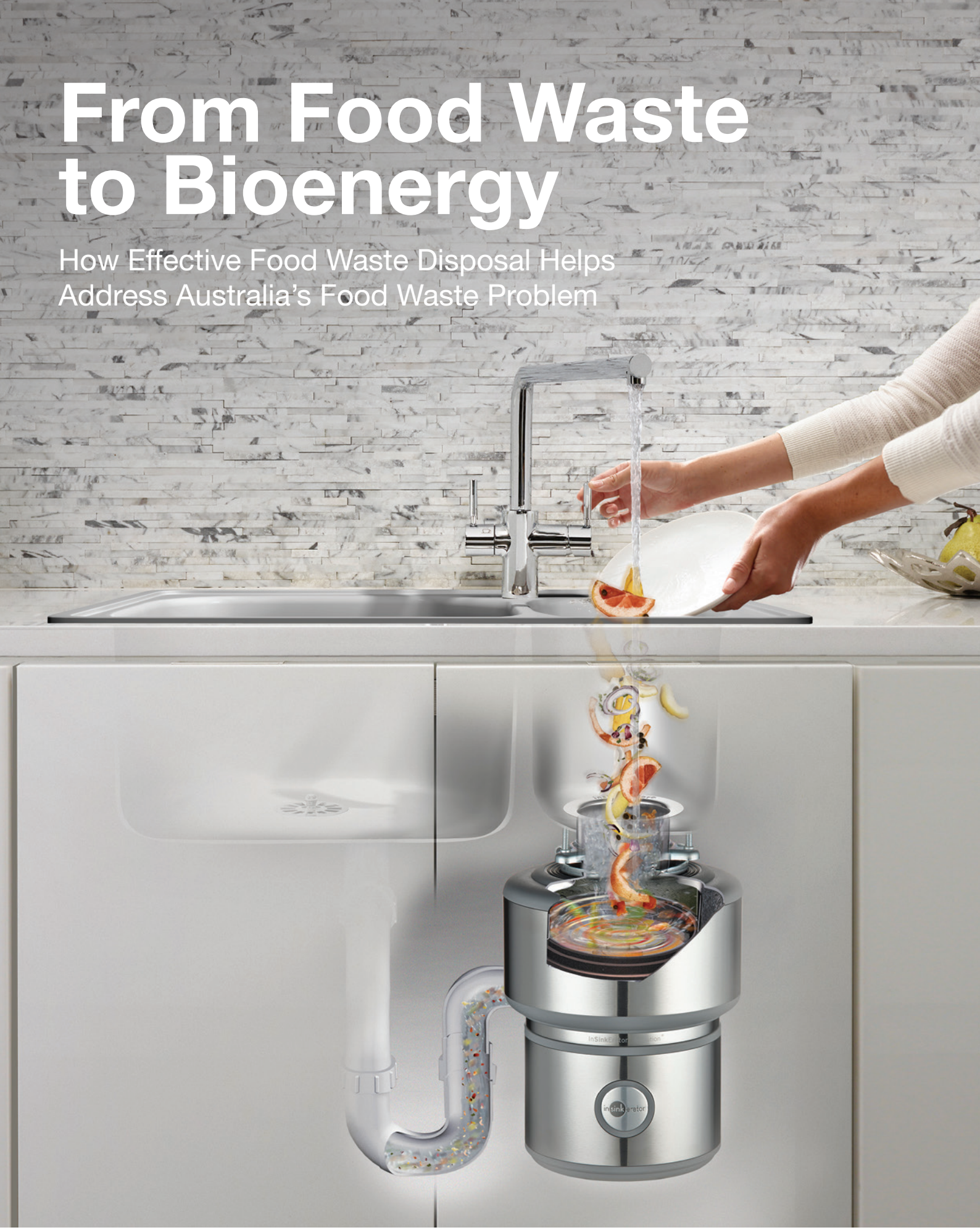
From Food Waste to Bioenergy

How Effective Food Waste Disposal Helps Address Australia's Food Waste Problem



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Introduction

Across the globe, far too much food that is produced for human consumption is lost or goes to waste. One third of the world's food is wasted, costing the global economy nearly USD$940 billion each year.[1] Australia is among the biggest contributors with 7.3 million tonnes of food lost or wasted every year at a cost of AUD$20 billion.[2] In fact, among most developed countries, Australia has the highest food waste generation per capita household.[3]

Food waste has significant environmental effects. The natural resources and energy needed to produce food that goes to waste cannot be recovered. Food waste typically ends up in landfills, one of the major contributors to global greenhouse gas emissions. The environment and its resources are under stress from over-exploitation, so more solutions are needed to address food waste disposal on a global scale.

Reducing food waste is a complex challenge as there are a multitude of food types, long supply chains and diverse regulatory frameworks that focus on food safety and waste disposal. Changes to the way we buy, consume and dispose of food needs to occur at every level.

In the context of building design and construction, designers and specifiers can specify food waste disposers for home builds to address the problem at a smaller scale. Often misunderstood and overlooked, food waste disposers can play a vital role in reducing the environmental impact of food waste. In addition to their practical benefits, food waste disposers not only divert food waste from landfills, they enable capable wastewater treatment plants to reuse food waste to produce biogas – a sustainable alternative to fossil fuels.

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Food Waste: A Growing Australian Problem

In Australia, food waste is a growing at an alarming rate, particularly at home. Australian households account for the greatest proportion of the country's total food waste with 2.5 million tonnes of edible food thrown away each year – this equates to 300kg of food per person. The average household sends 4.9 kilograms of food waste to landfill every week.[4]

The food waste problem in developed nations like Australia and the global hunger crisis are interconnected. While more than enough food is produced around the world to feed the global population, more than 690 million people still go hungry.[5] It is estimated that USD$1 trillion of food is lost or wasted every year; reversing this trend would preserve enough food to feed two billion people.[6]

World hunger aside, food waste also has devastating global environmental effects. In Australia, 3.2 million tonnes of food waste ends up in landfill, 75% of which comes from households.[7] Food waste decomposing in landfill produces methane, a greenhouse gas that traps heat efficiently in the atmosphere and is 21 times more potent than carbon dioxide.[8] Across the globe, food waste generates the equivalent of 485 million metric tonnes of CO_2 per year.

This does not even account for the energy and emissions associated with transporting and disposing of waste, or the natural resources that are wasted to produce food. For example, 1,460 gigalitres of water is used annually to grow Australian produce. Each orange thrown away, represents 50 litres of wasted water.[9]

The overall carbon footprint of food waste is estimated at 3.3 gigatonnes of CO_2 equivalent. Australia alone is responsible for 15 million tonnes of CO_2 equivalent emissions every year from food waste.[10]

A Complex Problem, A Multi-Faceted Solution

Reducing food waste requires a new approach across all stages of the food chain. Better food storage, processing, transport, retailing and preparation all can contribute to minimising food waste. It is also important to find new ways to reuse surplus food, such as finding secondary markets for unwanted or unused food.

For most, addressing the food waste problem starts at home. A combination of consumer behaviour, lack of communication, and poor food storage and preparation leads to excess levels of food waste. More conservative food buying means that less food will go bad or go uneaten. Ensuring food is stored correctly increases the shelf life of food, increasing the chance it will be consumed. Food should also be reused where possible, such as the basis for another meal.

However, even if all food buying, preparation and storage practices are optimised, there will always be some level of waste. Accordingly, a key component of addressing the food waste problem is ensuring that food waste is diverted from landfill and/or productively reused once it enters the post-consumer waste stream.

New technology has enabled organic waste to be converted into renewable forms of energy through anaerobic digestion. Such processes allow capable wastewater treatment plants to recover biogas, a fuel that has been produced from living matter, from food scraps. However, wastewater treatment plants manage waste from the existing sewer infrastructure, so how can food scraps be safely and responsibly converted into a form suitable for disposal through the wastewater network? A solution: food waste disposers.

Why Food Waste Disposers Are Essential

Common Misconceptions

A food waste disposer is a modern kitchen appliance that offers a convenient way to dispose of food. Installed beneath the kitchen sink, a food waste disposer grinds food waste into a liquid slurry, allowing it to be transported via existing sewer pipes to the same place toilet waste is treated.

In the past, designers, specifiers and property owners may have been reluctant to specify food waste disposers due to several misconceptions:

- **Performance.** Many recall the food waste disposers from the 1980s and 90s, which were loud and had issues managing odours. Modern solutions effectively minimise odours, run quieter than ever and can manage all food types.
- **Blade concerns.** Modern food waste disposers do not contain blades, instead they have small lugs on a spinning plate that act like a hammer effect breaking down the food. Once ground down fine enough, the food waste is then passed through the small holes in the stationary grind ring through to the sewerage system.
- **Cost and maintenance.** Modern food waste disposers are designed for continuous use so they are reliable, and require no maintenance. They are also relatively cheap to run, costing approximately $3.50 per year in electricity costs.

Diverting Food Waste From Landfill to Renewable Energy

The key benefit of food waste disposers is that they enable food waste to be safely transported through the sewer network and treated at wastewater treatment plants. This diverts food waste from landfills, thus reducing pollution and greenhouse gas emissions from decomposing waste. As food waste is composed of 70% water,[11] wastewater treatment plants are better equipped to responsibly manage food waste with fewer adverse environmental effects than if it were added to landfill.

Food waste disposers also enable a change in mindset – reframing “food waste” as “liquid resource”. After being ground by a food waste disposer, food waste can be sent to capable wastewater treatment plants to be converted into biogas. Anaerobic digestion is a biochemical process that breaks down organic matter present in wastewater sludge and converts it into biogas for electricity. Biogas contains a mixture of gases, specifically methane, some carbon dioxide and other gases such as hydrogen sulfide.[12] Once the hydrogen sulfide is filtered out, the resulting biogas can be burned as an energy source.[13]

The biogas industry provides a sustainable alternative route for food waste treatment and is quickly growing in Australia. In 2017, there were 242 biogas plants in Australia with the majority (up to 50) associated with municipal waste treatment facilities.[14] There are numerous examples of anaerobic digestion plants across the country.

Sydney Water has several Sydney Water anaerobic digestion plants and a long history of utilising biogas to generate power. As a sign of further progress, the Australian Renewable Energy Agency recently announced $5.9 million in funding to Jemena to trial injecting biomethane into the natural gas network in New South Wales.[15]

Victoria is also investing in building waste-to-energy facilities to process food waste into clean, renewable energy. Melbourne Water’s Eastern and Western Treatment plants use biogas to meet electricity needs, the former generating 70,000 megawatt hours of renewable electricity every year.[16] The waste-to-energy facility in Wollert, to the north of Melbourne, has been operating since May 2017.

Other anaerobic digestion plants processing food waste include the TPI/Veolia digestor at Camellia, the biogas plant at Richgrow in Perth, the AnaeCo anaerobic digestion facility at Western Metropolitan Regional Council in Shenton Park in Western Australia, and more.

Food Waste Disposers and Composting

Composting and food waste disposers share a common goal: ensuring food waste does not end up in landfills. Compost is a mixture of ingredients used to fertilise and improve the soil and is made by decomposing plant and food waste and recycling organic materials. Food waste disposers complement composting as there are food types that normally do not go into the composting bin. Meat, fish, and dairy products should not be composted as such items can harbor dangerous bacteria like Salmonella and E. coli.[17] These items can be put into a food waste disposer and safely eliminated without sending them to landfills.

There is also concern that, in dense urban areas, the available garden space and issues with odour management make home composting a less practical solution.[18] Further, the decomposition process that is fundamental to composting occurs slower during colder months whereas food waste disposers can be used to safely dispose of food scraps all year round.

Benefits for Australian Households

Food waste disposers offer a convenient and effective food management solution for the home. It improves the general hygiene of the kitchen and food preparation, reduces the cost of purchasing plastic bags and bin liners, and reduces the amount of organic waste in garbage bins that can attract pests and emit bad odours.

Australians are being forced to make changes to how they handle food waste at home with bin collection changes being imposed by local councils. Fortnightly pick-up and reduced bin sizes mean households need to separate general waste from food waste, with the latter now going into their green waste bin as a requirement. Some Victorian councils adopted this model as early as 2019.[19] Meanwhile, in New South Wales, the State government is making it mandatory for councils to provide a separate green bin for food and garden waste in a push to divert organic waste from landfill.[20]

For multi-level residential living, food waste disposers make it easier for occupants and building management to handle food waste. Apartments have limited space for storing food scraps, and access to outside bins can be an inconvenience. Space for large bin collection areas are required, and there are several costs associated with dealing with food waste, including exhaust fans to manage food waste odours, and cleaning rubbish chutes and common areas soiled with food residue. Food waste disposers can reduce all these costs while also minimising exposure to vermin. They also reduce the hassle of storing food scraps within small kitchen areas and taking rubbish to outside bins.

In a three-year study across five major cities in the United States, the viability of using food waste disposers as a municipal tool to manage food waste was confirmed.[21] In each major city, neighbourhoods were selected to conduct the study, with each participating household receiving a complimentary disposer and installation. Experts examining data collected during the study estimated that in the course of a week, discarded food waste decreased by about 30% in the areas measured. At that rate, a full years' worth of food waste would be kept out of landfills after a 3-year period of disposer use.

The study also highlighted significant social and quality of life impacts. Participants were overwhelmingly happy with their disposers, reporting that the use of disposers reduced food waste disposed, made kitchen clean up easier, reduced odours and smells in the house and neighbourhood, and limited vectors and pests.

The wider city community can also realise significant benefits when its residents use a disposer to manage organic waste. Monetary benefits include a reduction in transport and tipping fees and the potential for increased biogas generation at treatment plants. Social benefits include cleaner, more pleasant cities largely free of odorous waste and pests. Widespread use of disposers also has the potential to decrease greenhouse gases due to less transported waste in landfills.

InSinkErator® Evolution 200 and 250

A simple and environmentally-responsible food waste management solution

The InSinkErator® Evolution 200 and 250 are the company's quietest and most powerful food waste disposers. These high-performing food waste disposers are designed for home use, grind most food types and enable the responsible disposal of food scraps while making food preparation and hygiene easier and more convenient.

We continue to invest in the technology we invented as testament to our commitment to food waste management, the environment and simplifying kitchen clean up time.

"Anaerobic digestion is a biochemical process that breaks down organic matter present in wastewater sludge and converts it into biogas for electricity."

About InSinkErator

InSinkErator is the world's largest manufacturer of food waste disposers. InSinkErator disposers are made in the USA and remain committed to continually improving the technology they originally invented. This commitment has culminated in the premium performance of the Evolution Series®. With advanced MultiGrind® technology, these units reduce food waste into liquid slurry in seconds with noise virtually eliminated.

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All information provided correct as of September 2021

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