

Waterless toilets

Toilets that use no water for flushing can have even lower environmental impacts than water efficient toilets and wastewater recycling systems. Waterless toilets or 'dry sanitation' systems do not use water to treat or transport human excreta. If appropriately designed, they conserve precious water resources and keep effluent and pollutants out of waterways and the general environment. They can also save money on your water bill.

Waterless toilets are a genuine, minimum energy, on-site alternative to centralised reticulated systems that transport the problem downstream. They can also reduce the site restrictions, and pollution and nutrient problems, of systems such as septic tanks.

They are often preferable to conventional toilets in environmentally fragile or water-scarce areas. For example, in the mid-north coast region of New South Wales, councils recommend householders install waterless toilets rather than conventional septic tank systems.

The most common type of waterless toilet, the 'composting toilet' (CT), has come a long way from the original pit latrine. The CT doesn't smell if used and maintained correctly and can, in fact, be an elegant addition to a modern bathroom.

The composting toilet has come a long way from the pit latrine.

All CTs require a volume of space under the toilet floor which may necessitate the construction of either a pit or an elevated platform. They generally work best when kept warm so are ideally located on the sunny side of a house.

Waterless toilets can produce fertiliser if sufficient time is allowed and correct treatment conditions have been maintained. However, seek advice on its end use.

The CT often does more than the process that occurs in your garden compost heap. Decomposition in the holding tank or container of a CT takes place through a complex biochemical interaction of factors such as temperature, pH, desiccation and digestion by invertebrates, all taking place over an extended time period.



Photo: Stuart White, ISF

Waterless toilets conserve water and keep pollutants out of the environment.

Types of composting toilets

The many designs of CTs can be divided into three main types with characteristic advantages and disadvantages. Designs include commercial off-the-shelf units and owner-built systems that can be constructed using readily available materials.

Continuous composting toilets

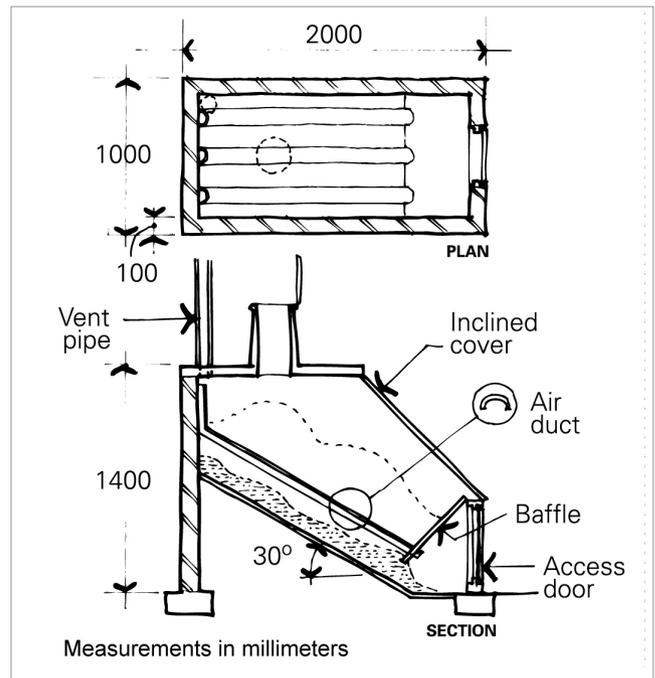
These single container toilets receive excrement which decomposes as it moves slowly through the container and is removed as compost from the end-product chamber. Well-known designs with prefabricated models available for installation have health department approval in most parts of Australia. They may also be constructed by owner-builders.

Single containers are fitted under a bathroom and can easily replicate a flush toilet with little physical or social adjustment.

The container is permanently fitted under the toilet seat, and never has to be fully emptied as the compost can be gradually removed when it reaches the end-product chamber.

A disadvantage of the continuous system is that it may allow fresh material and pathogens (disease causing organisms) deposited on the top of the pile to contaminate the successfully decomposed end-product at the bottom of the pile.

Another drawback is that, if a problem occurs with the toilet, the system can be out of order until the problem is fixed because there is only one container. Sometimes the pile does not actually move down the slope of the container and can become compacted and very difficult to remove.

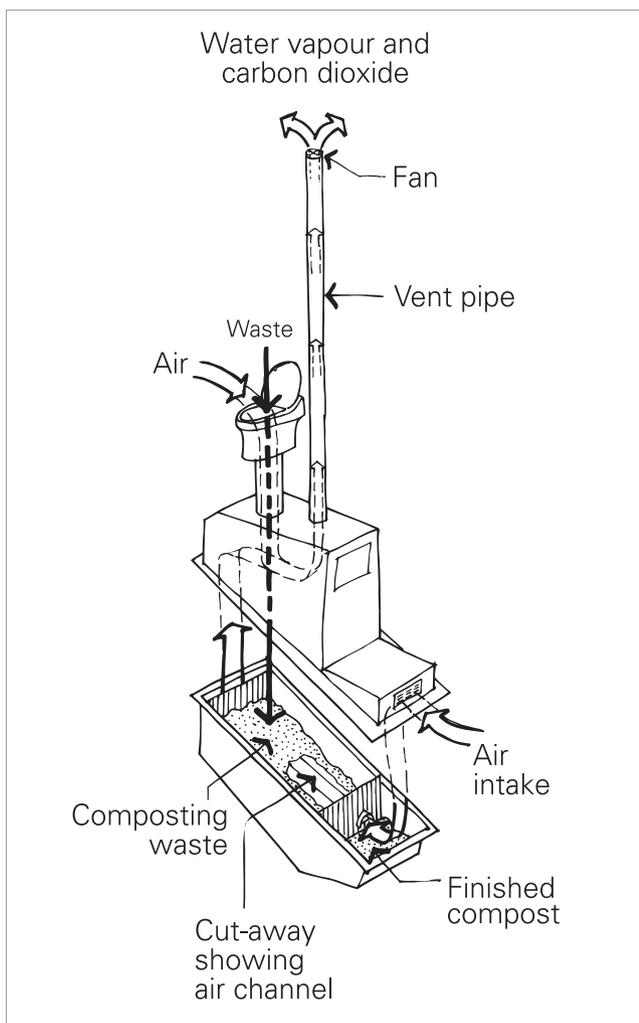


Plans for continuous composting toilet.

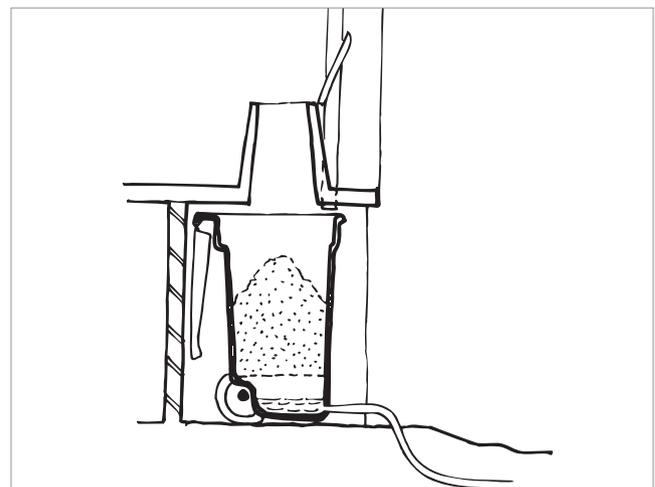
Batch composting toilets

Batch CTs consist of two or more containers that are alternated so that the active container is being used while the pile in the fallow container has time to compost without the addition of fresh excrement and the potential for recontamination.

An example of an owner-built batch CT is the 'wheelie-batch'. Containers are alternated underneath the toilet seat, and a perforated false floor is used to separate and drain off the liquid.



Continuous composting toilet.



The owner-built wheelie-batch CT alternates containers underneath the toilet seat.

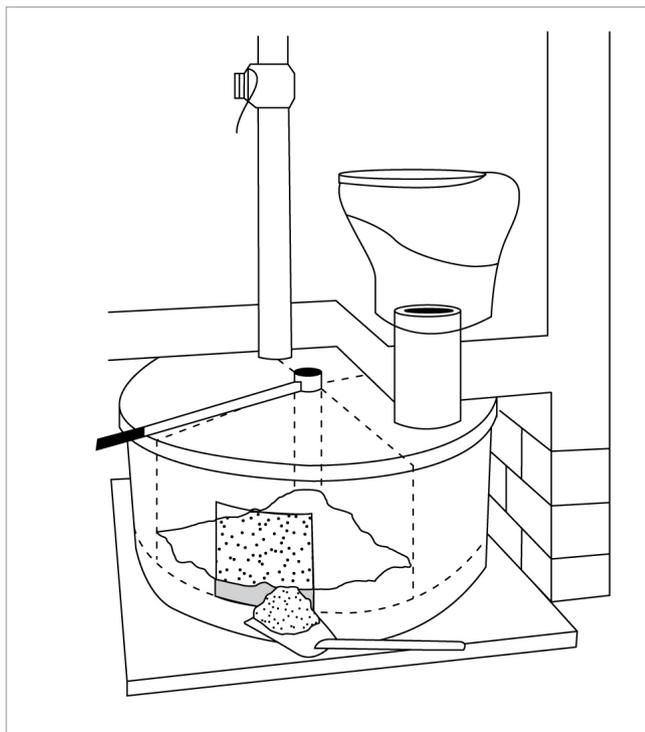
Water

Waterless toilets

The fixed chamber batch is another example. Two containers are permanently in place and the seat is moved when the time comes to change containers.

The full containers in the batch system need to be replaced by an empty container. They must be disconnected from under a toilet seat or the seat moved over a new container. Batch systems can therefore take up more space in the bathroom or under the house.

Some commercially available batch CTs, including an Australian-made system, have approval for use in most parts of Australia. Some models have removable containers mounted on a turntable beneath the toilet for collecting waste, which saves space and simplifies container changeover.



The Windblad batch CT has removable containers mounted on a turntable beneath the toilet.

Self-contained composting toilets

Self-contained CTs are available for use where a composting chamber can't be installed beneath the floor, such as an existing on-ground concrete slab. They are usually fitted with a small heater and fan to facilitate waste decomposition, and have the capacity to serve only households with a maximum of 3–4 people.

Self-contained composting toilets can be installed on an existing concrete slab.



Photo: Nature Loo

A self-contained composting toilet fits neatly into the modern bathroom.

Maintenance of composting toilets

The CT is relatively simple technically but requires more attention than a flush toilet.

Add some carbon-based material or bulking agent, such as dry leaves or softwood shavings, frequently to the container, preferably daily or with each use. This gives the proper carbon–nitrogen mix, helps aerate the pile and prevents compacting. Some commercial suppliers say this is not necessary for their design if their directions are followed but experience indicates the addition of bulking agent helps produce good compost.

A composting toilet that is working well and correctly maintained does not smell.

A CT that is working well and correctly maintained does not smell. Offensive odours usually indicate that something is wrong and trouble-shooting directions need to be followed. Often adding bulking agent in greater quantities or more frequently removes the smell.

The pile in a CT needs to be well drained. Diverting urine away from the compost can aid the composting process by reducing moisture levels and potential odours. Liquid runoff is often treated in a sealed evapotranspiration trench or a solar evaporating tray. If the liquids have been in contact with faeces, they must be evaporated, sterilised or otherwise treated before they can be recycled as fertiliser.

Council or health department regulations require appropriate drainage and disposal for residual moisture.

Vent pipes aerate the pile and can work passively using convection. Fans are not essential but are often included in off-the-shelf systems to aid ventilation and minimise odours. Check fans occasionally to ensure they are not choked with dust or insects.

The end-product or compost needs to be removed from the container when it is sufficiently decomposed. The frequency of removal depends on the size of container, how often the system is used and local climatic conditions. The minimum 'fallow' period should be six months. Depending on the design and usage, the container needs to be emptied every six months to three years.

Use the compost as fertiliser dug into your garden or dispose of it according to local council regulations.

CTs do not deal with greywater from showers, kitchen and laundry so a separate greywater collection and treatment system is needed. (see *Wastewater reuse*)

Some safety precautions

It is safest to assume that the composted end-product contains residual disease-causing pathogens. The degree of decomposition and pathogen destruction is sensitive to a range of ambient conditions in the composting mass (such as temperature, moisture and pH levels) that are difficult for the toilet owner to monitor and control.

- Always use protective clothing such as gloves and mask when handling the composted end-product.
- Bury the compost under at least 10cm of soil.
- Do not use the compost for cultivating vegetables.

Choosing a composting toilet

For an off-the-shelf unit contact several suppliers. Tell them about the building, where the toilet will be located, how many people will be using the toilet and whether it will be on a continuous basis or only occasionally, such as in a holiday house. Ask them to recommend a suitable system for your needs and provide a quote. The cost can vary significantly depending on the design and features. Some suppliers also assist with greywater treatment systems.

Check if the supplier gives after-sales support. Ask if they have any customers with whom you could meet and discuss their experience with the CT. The cycle of usage and production of compost or end-product can take a couple of years. It is important to know that all stages of the process work satisfactorily.

Check with your local council and/or the supplier to confirm that CT design has approval in your area. Council attitudes and regulations vary, but common off-the-shelf units have state health department approval. Owner-built designs are usually cheaper to install and have been used widely for many years but often have not gone through the required approval process.

Avoid complicated designs. Simple passive systems with minimum moving parts are usually easier and cheaper to build, monitor and maintain. Designs that have more moving parts may require less maintenance if the system is working well. But if there is a problem, the more complicated designs can be more difficult to fix.

There are many types and applications of CTs. The published literature and manufacturers' websites have more information and contacts for commercial units and owner-built designs.

References and additional reading

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Authors

Principal author: Leonie Crennan

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