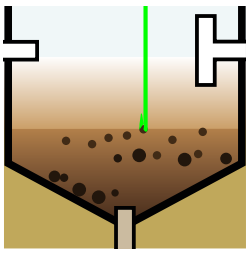
World Health Organization



The treatment plant capital cost and operation and maintenance cost will depend on the technology chosen and the energy required to operate it. These costs can be signi□cantly reduced where brownwater treatment can be combined into an existing plant; however, where a new dedicated plant is required then the costs could be considerable.

Overall, this system is most appropriate when there is a high willingness and ability to pay for the container-based service, where there is an appropriate facility for the brownwater treatment and a demand for the end use products.

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Toilet and containment (cartridges): Container-based urine-diverting toilets are generally prefabricated, modular units that connect directly to the cartridges into which they discharge. They are often made from □breglass or rigid plastics, which are relatively light in weight, portable, durable and easy to clean.

A separate system is required for stormwater and greywater, neither of which should enter into the cartridges. The toilets should be designed to prevent rain or stormwater from entering the cartridges.

This system is suitable for cleansing water inputs, and easily degradable dry cleansing materials can be used. However, rigid or non-degradable materials (e.g., leaves, rags) could block the system and should not be used. In cases when dry cleansing materials are separately collected from the toilets, they should be collected with solid waste and safely disposed of, for example through burial or incineration.

Conveyance: As the untreated brownwater is full of pathogens, human contact and direct agricultural application should be avoided. The (ideally) sealed containers should be transported to a dedicated treatment facility using either manual or motorized transport.

Treatment: Treatment of brownwater will produce both e□uent and sludge, which may require further treatment prior to end use and/or disposal. For example, e□uent produced from dewatering could be co-treated with wastewater in waste stabilization ponds or in constructed wetlands.

End use/disposal: Treated brownwater can either be used in agriculture as a soil conditioner or used as a solid fuel or as an additive to construction materials.

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Toilet and containment (cartridge): The toilet, containment and conveyance steps are commonly operated by a private company (service provider) who is responsible for providing the user with a toilet, cartridge(s) and instructions on their operation and maintenance.

The user is responsible for cleaning the toilet and maintaining the toilet cubicle. At shared toilet facilities, a person (or persons) to clean the toilets and carry out other maintenance tasks (e.g. repairs to superstructure) on behalf of all users needs to be identi□ed.

Conveyance: The provider's service will also include regular (either demand–based or □xed interval-based) replacement of a full brownwater cartridge with a clean, empty cartridge and the removal and transport of the full cartridge to treatment. Where urine is stored in a cartridge, the service may also include removal and transport of a full urine cartridge and replacement with an empty one. The service provider will be responsible for cleaning of all cartridges and maintenance of all transport equipment.

Treatment: Functioning, properly maintained treatment technologies are a key requirement. In most situations these are managed at the municipal or regional level. In the case of more local, small-scale systems, operation and maintenance of the collection and transport service and the treatment plant, is managed and organized by private service providers at the community level. All machinery, tools and equipment used in the treatment step will require regular maintenance by the relevant service provider.

End use/disposal: Farmers and the general public will be the main end users of the treatment products and will be responsible for maintenance of all tools and equipment they use ens (e -5.4 (e-6.6 (l)-4.32.3 (g (a)3 (Tw 0 -17 (a)4.1(s)-1

dures. For instance, the wearing of boots, gloves, masks and clothing that cover the whole body is essential, as well as washing facilities and good hygiene practices [2].

Treatment: In order to reduce the risk of exposure of the local community, all treatment plants must be securely fenced to prevent people entering the site, and to safeguard workers' health when operating the plant and carrying out maintenance to tools and equipment, all treatment plant workers must be trained in the correct use of all tools and equipment they operate, wear appropriate personal protective equipment and follow standard operating procedures [2].

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