

## Washing machine

A modern washing machine requires about 50 liters of water per wash. In the case of the MODO machine, (Mobiles Ökotech-Demo-Objekt) this water is not disposed of following usage, but is cleaned and used again for washing. To achieve this, the dirty water is filtered so that small particles, such as clothing fibers, are removed. At the same time, excess detergent is foamed up and removed.

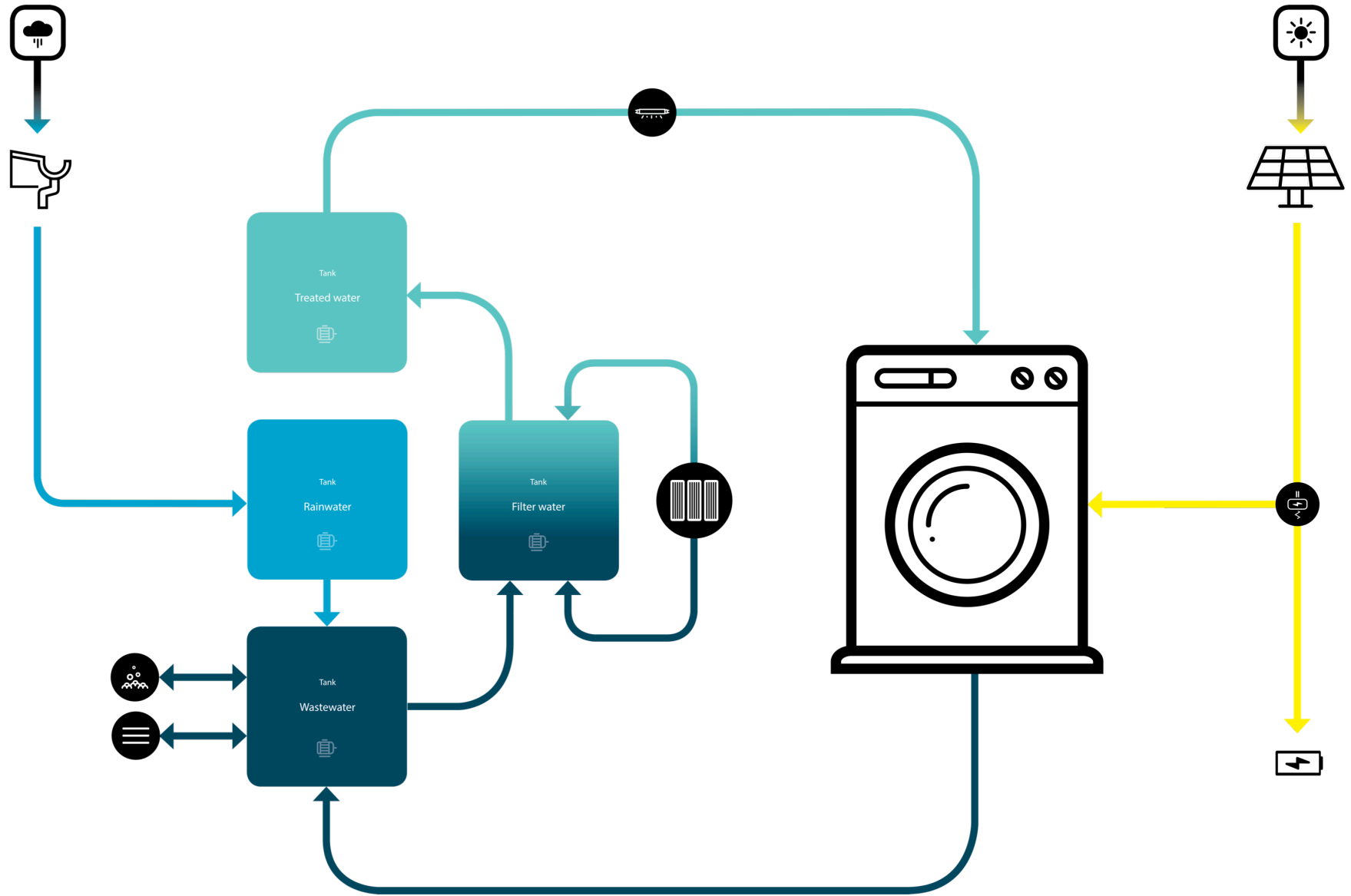
After this, the water is biologically cleaned in three filter columns. This means that billions of bacteria and other microorganisms degrade and partially absorb the solutes (organic carbon, nitrogen and phosphorus compounds). This is similar to the process undertaken in a sewage treatment plant or - a little more slowly - in a lake or river.

With each wash, some water is lost; a small amount when foaming during cleaning, and a larger amount because the laundry is still wet when taken from the machine. This small loss is replenished by rainwater from the roof, so connection to the usual water supply is not necessary. The energy also comes from the roof; a photovoltaic system coupled with a battery provides electricity.

Researchers are currently in the process of checking whether the laundry is properly cleaned and whether unwanted substances or odours are accumulating. Furthermore, how much water and energy are really needed, how the filter columns can be further improved and how this cycle can be optimally controlled is also being investigated. Ideally, a system such as this could also be used to wash clothes in remote, dry locations such as the Alps or even on the edge of a desert.

- Treated water
- Rainwater
- Wastewater
- Electricity

- Skimmer
- Solids filter
- UV Lamp
- Biological filters
- Inverter
- Precipitation
- Solar radiation
- Solar panel
- Roof gutter
- Pump
- Battery



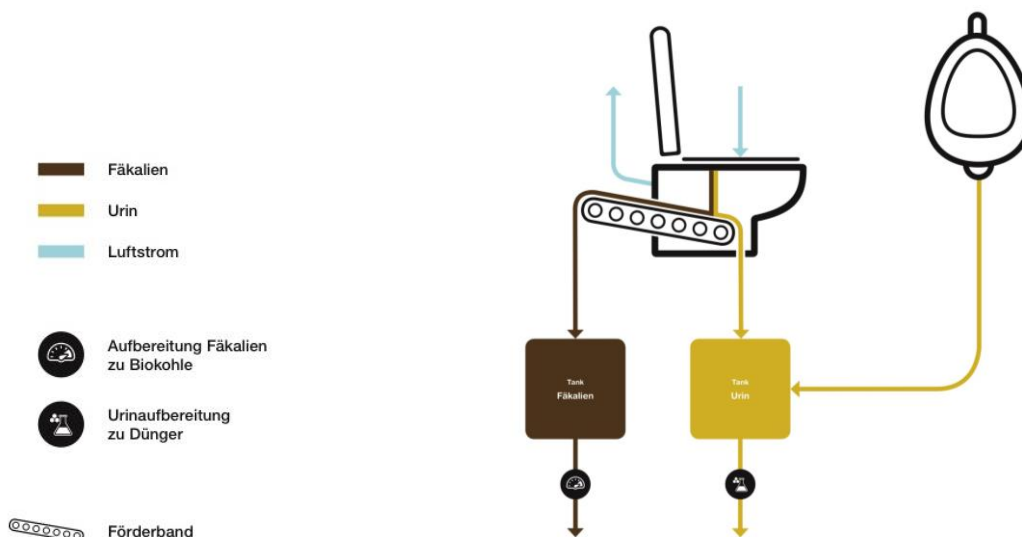
## Dry separating toilet

In the dry separating toilet, urine and faeces are collected separately. The urine goes directly into a tank under the unit. It can be processed later and used, for example, as a fertiliser. The faecal matter is transported by a conveyor belt operated by a foot pedal into a container situated in the space behind the toilet. Since the fecal matter in the air flow dries very quickly, any unpleasant odours can be controlled and contained.

Outside the container, biochar is produced from the faeces at high temperatures of more than 300 ° C. In this way, possible pathogens, such as B. noro- or rotaviruses, cholera bacteria or roundworm eggs, are all killed. Subsequently, the biochar can be used as a fertiliser in agriculture and help to improve the soil quality of barren soils.

The dry toilet is also suitable in areas with a lack of water since, unlike a conventional toilet, it does not need water to work.

It is already known that this principle works. Researchers are now investigating how human faeces can be processed safely and how they can be used effectively as fertilisers.



Faeces, Urine, Air flow, Processing of faeces to biochar,  
Processing of urine to fertiliser, conveyor belt