

Decentralised treatment

In the Netherlands, decentralised treatment technologies are generally only used to treat rainwater in order to drain it directly into surface water or to treat wastewater from areas situated far from the sewer system, such as farms.

In other countries, though, it is more common to treat household wastewater at decentralised locations and sometimes recycle it. In the framework of a circular city focusing on re-use, treated wastewater will be used increasingly more often. This is already common in industry and greenhouses, for example. In Singapore most of the wastewater is treated using membrane filtration and reused as process water.

The drawbacks to standard centralised treatment lie in the long distances over which the wastewater has to be transported, the amount of energy required, in particular for aeration, and the large volumes of sludge that have to be processed.

Old sewers often have leaks, through which the groundwater becomes contaminated. If the distances over which the water has to be transported and the volumes of water to be transported are large, the diameter of the pipes must be bigger and the pipes themselves have to be laid deeper in the ground. This pushes up costs, making it considerably more expensive to lay these sewers.

Principles of treatment

Three methods exist for treating wastewater: physical, chemical and biological. Every treatment system is based on a combination of these treatment methods. Physical treatment involves sedimentation or filtration of wastewater. Chemical treatment means binding substances to force them to settle, for example phosphates, which can be bound to calcium or iron. With biological treatment, the waste materials are broken down by bacteria and/or the pollutants are absorbed by the plants in the installation.

Several different types of decentralised treatment systems exist. This section deals with the types in which vegetation plays an important part in the treatment process. An exception is membrane filtration, however, which is an exceptionally sustainable technique that can easily be combined with other natural technologies such as Living Machines.

The advantage to decentralised biological treatment systems is that they do not produce any sludge or require the use of chemicals. The level of energy consumption is much lower and the operating, management and maintenance costs are no more than 20-25% of the corresponding costs for conventional sewer water treatment installations. If sufficient space is available, helophyte filters can easily be placed in the surroundings or realised on flat roofs.

Possible applications

In the Netherlands, decentralised systems are very rarely used in urban environments. The uses in outlying areas are obvious: a compact treatment system can serve as an alternative to an expensive connection to the sewer system. However, reasons also exist for considering a compact decentralised solution in urban environments.

Urban green-blue grids

- If a town or city expands or increases the density of its buildings, decentralised facilities can be used to prevent capacity problems with existing sewer water treatment systems. Not only greywater can be treated in such situations, but black wastewater, too.
- If the water contains a specific type of waste: For example, polluted runoff from roads can be treated in decentralised facilities with dimensions geared toward the specific waste load and inflow frequency. Once the water has been treated, it can be returned to the water cycle by allowing it to infiltrate into the ground, draining it off into surface water or even recycling it for low-grade purposes such as flushing toilets or irrigation.
- Wetlands designed to match the landscape near open water or natural banks can be used to treat runoff from roads and car parks or even the surface water itself.



Statutory provisions

In the Netherlands, towns and cities have a duty to ensure the capture and transport of all wastewater within their municipal boundaries.

Using the systems described here for treating household wastewater requires dispensation from the provincial authorities. At present, that dispensation may only be granted if the property in question is situated outside the built-up area or if the built-up area comprises fewer than 2000 PEs (population equivalents or pollution units). No dispensation may be granted if connection to a sewer is possible (within 40 metres for connections of up to 10 PEs or within 1500 metres for connections of up to 100 PEs). Another factor is the vulnerability of the water system into which the treated wastewater is to be discharged. It follows that under the current regulations it is virtually impossible in the Netherlands to use helophyte filters to treat household wastewater in urban environments. However, possibilities sometimes exist if the treated water is recycled, as evidenced by the Dutch projects described in the section on Measures below. [Ecofy, 2011]

Other forms of decentralised treatment also exist, such as biorotors. Although these are not discussed here, they can be used in towns and cities.