

Aquifer Storage and Recovery (ASR) to enable water reuse by greenhouse horticulture

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The continuous availability of freshwater of very good and reliable quality is a precondition for modern intensive greenhouse horticulture. For Dinteloord, the Netherlands, a 260 hectares greenhouse area under development, the freshwater availability was not self-evident. Although the water needs are largely satisfied through the collection of rainwater and its storage in surface basins, serious shortages arise during drought periods.

To guarantee the supply of irrigation water at all times, an advanced sustainable freshwater supply was realized. Effluent from the neighboring sugar factory is converted into large volumes of high-quality irrigation water in 3 treatment steps: rapid sand filtration, ultra-filtration, reverse osmosis. Aquifer storage and recovery (ASR) is applied to balance the availability of this reuse water in Autumn and Winter with the demand for additional irrigation water by the local farmers in Spring and Summer.

The ASR system has been in full operation since February 2018 and provides local farmers with 300.000 m³ of freshwater, in addition to the rainwater that is already harvested and stored in aboveground reservoirs. This additional freshwater is stored underground using eight ASR wells. The sugar factory, farmers and the ASR system are connected by a 5km distribution loop, guaranteeing a maximum supply of 200m³ of fresh irrigation water per hour during dry spells. Consequently, farmers enjoy a year-round supply of sufficient high-quality irrigation water, without the need for a heavy load on the already minimal above-ground space. As well as delivering irrigation water to farmers, water is also re-distributed to the sugar factory.

The system is an example of hybrid grey and green infrastructure, demonstrating how the underground can contribute to water reuse in the circular economy: farmers grow their tomatoes and egg plants on reuse water from sugar beets. The system is collectively owned by greenhouse farmers and costs are covered by a pay-per-use system.

