Case study factsheet

Nieuw Prinsenland, Netherlands

Last update on 2023-03-20

Project ULTIMATE

Perzikenlaan 11, 2691 JP 's-Gravenzande , **Netherlands**

Description

Coöperatieve Tuinbouw Water Zuivering de Vlot is a wastewater treatment facility located at 's-Gravenzande treating 160 hectares (60 companies) of wastewater from greenhouses mainly growing ornamental crops. Exploring water and nutrient reuse oppurtunities for their facility, they are optimizing their system for internal symbiosis within their own facility and external symbiosis with neighbouring greenhouses and industries. De Vlot has ambitions to reach zero liquid discharge and provide symbiotic internal and potentially external reuse of water and nutrients from greenhouse wastewater (approx. 10% of the total water input). The system to treat and reuse drainwater from 60 greenhouses (160 ha) is laid out maximum capacity of 60 m3/h but the expectation is that the majority of the time, 40 m3/h is sufficient (for one out out 3 treatment streets to be in maintenance if required). In this setup, recycling would be provided internally for the greenhouses in the summer and in the winter months the excess recovered water and nutrients can be reuse in nearby industries or a central water bank.

In the case study the following technologies are investigated:
1) use of electrodialysis for treatment of greenhouse wastewater - specifically selective sodium removal - to produce a water quality fit for irrigation purposes
2) feasibility of high-temperature aquifer thermal energy storage (HT-ATES) to balance heat supply and demand across the year.

Outcome of assessments

Feasibility of using a high temperature Aquifer Thermal Energy Storage (HT-ATES)

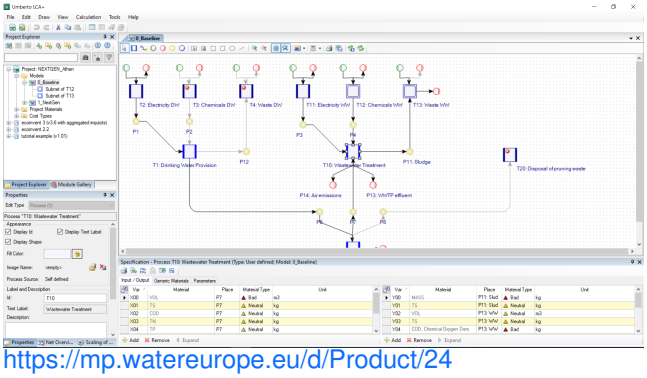
As part of the Case Study, the feasibility of using high temperature Aquifer Thermal Energy Storage (HT-ATES) system to balance the seasonal imbalance between heat supply and demand in the greenhouses was assessed. The potential to use HT-ATES to store excess heat from a geothermal plant during the summer and recover it to supplement the heat supply from this source during the winter was characterised by analysing the actual supply and demand, studying the geohydrology at the site to determine the suitability of the subsurface for HT-ATES and predict the performance, assess the financial feasibility and map the local governance situation with regards to permits. This assessment concluded that the aquifer present is very suitable for installation of HT-ATES wells and that there is potential to increase the efficiency of sustainable heat delivery from the geothermal wells to the greenhouses in a cost efficient manner. The full report can be accessed here.

Applied technologies

- **Aquifer Thermal Energy Storage**
- **Electrodialysis**

Applied product

NEXTGEN + ULTIMATE Life Cycle Assessment



https://mp.watereurope.eu/d/Product/24

Publications and references

- Bloemendal, M., Beernink, S., HT-ATES feasibility for TRIAS Westland, Project report, *ULTIMATE,* 2023
- Naves Arnaldos, A., van den Broeke, J., Guleria, T., Bruni, C., Fantone, F., Touloupi, M., Iossifidis, D., Giménez Lorang, A., Sabbah, I., Farah, K., Baransi-Karkaby, K., Pidou, M., Reguer, A., Kleyböcker, A., Jährig, J., Vredenbregt, L., Thisgaard, P., D1.9 Start-up and intermediate results of plant operation from all case studies, Project report, *ULTIMATE,* 2023
- Sajjad Al-Amshawee, Mohd Yusri Bin Mohd Yunus, Abdul Aziz Mohd Azoddein, David Geraint Hassell, Ihsan Habib Dakhil, Hassimi Abu Hasan., Electrodialysis desalination for water and wastewater: A review, Scientific paper / Journal, *Chemical Engineering Journal,* 2020

Scale

Operational scale of this case study related to the application of tools and technologyies

- Local scale

Challenges

Challenges that are addressed through the application of tools and/or technologies to the case study

- Limitations to water reuse due to high salinity/nitrates
- Need for reuse and recovery schemes for wastewater & sludge

Related tags

synergies | aquifer | electrodialysis | greenhouse horticulture | industrial symbiosis | selective separation

Contact data

Contact person

Joep van dan Broeke (KWR), Joep.van.den.Broeke@kwrwater.nl; Tavishi Guleria (KWR), Tavishi.Guleria@kwrwater.nl

Involved organisation

1. KWR Water Research Institute