

Initiatives and Projects at Nijhuis Industries

The increase of pharmaceutical residues in water and how to remove them

Nijhuis Pharmaceutical Residues Removal Solutions

Over the past few years more and more researches have been conducted on our water-quality and the organic substances that are present in our surface- and drinking water. Due to the recalcitrant nature of some of these substances (such as pharmaceutical residues), the concentration is increasing in our wastewater.

Nijhuis Industries is working with several partners to develop local solutions for decentralised and centralised facilities to remove pharmaceuticals residues from wastewater to follow-up on upcoming changes in local environmental and water regulations, like for example in the EU Water Framework Guideline. For future water reuse application purposes it is going to be a small step to combine for example existing advanced oxidation technologies with direct nano filtration technology to provide high-quality water. Here below are some of our latest technology examples we have been working on, which are currently in construction or which will be executed in the near future.



Aarle-Rixtel, Municipal Water Treatment Plant in the Netherlands (Water Authority Aa & Maas)

Technology: Ozone



Hospital in the Netherlands (City of Winterswijk)

Technology: Ozone + UV



Winterswijk, Municipal Water Treatment Plant in the Netherlands (Water Authority Rijn en IJssel)

Technology: Ozone + UV



Horstermeer, Municipal Water Treatment Plant in the Netherlands (Water Authority Amstel, Gooi en Vecht)

Technology: Ozone + Granular activated carbon



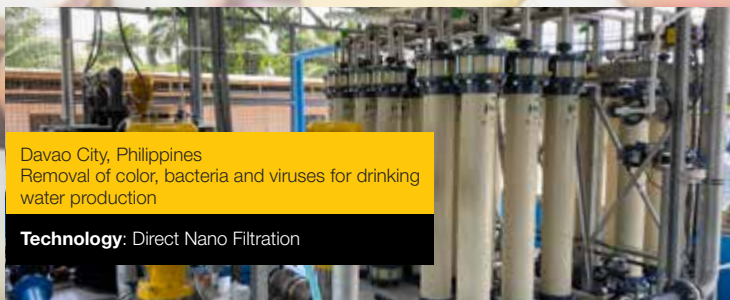
Pharmaceutical producer in the Netherlands

Technology: Screening + Ozone + H₂O₂



Pharmaceutical producer in Germany

Technology: Ozone



Davao City, Philippines
Removal of color, bacteria and viruses for drinking water production

Technology: Direct Nano Filtration



Treatment at the Source | MediOxi

The potential of ozone technology in combination with UV to disinfect water and reduce the impact of (antibiotic-resistant) bacteria and viruses.

To anticipate on the upcoming changes in local environmental and water regulations (like for example the EU Water Framework Guideline), more and more researches have been conducted on our water-quality and the organic and an organic substances, that are present in our surface- and drinking water. Due to the recalcitrant nature of some of these substances, the concentration is increasing in our wastewater. For example, the increase of antibiotic resistant bacteria, micropollutants, medical residues and viruses in the wastewater. In some cases, when these substances are not removed completely, this can harm aquatic life and in some cases are already affecting human and animal health.

How to remove bacteria, viruses and micropollutants before they enter the sewage treatment plant?

Treatment at the source, instead of at the sewage treatment plant, is a very interesting approach to disinfect and remove bacteria, viruses and micropollutants and to help reducing the effect of these difficult biodegradable substances on the environment. Multiple technologies, comprising filtration, ad-/absorption processes, biological processes and (chemical) oxidation processes, have been successfully used to do so. By combining these technologies in a smart way, not only micropollutants can be removed but can also contribute in the removal of antibiotic resistant bacteria and their genetic materials, difficult biodegradable bacteria and viruses before they enter the sewage treatment plants.

How can I help to make a positive social, environmental and local impact?

Since treatment of the large volumes at a large-scale centralised installations are logically costly (they utilize for example energy and chemicals), Nijhuis Industries has therefore focused on the development of a solution for decentralised treatment: the MediOxi. Whether you have a hospital or industrial facility, you can make social, environmental and local impact by implementing a permanent or temporary, mobile, Nijhuis solution to disinfect your wastewater before it enters the sewage pipeline. By doing so hospital specific medicines or other harmful or infective organic micropollutants, which are not or hardly discharged from households, can be removed separately at the source.

Step 1 - A Nijhuis Audit & Feasibility

We first investigate the local situation and (can) analyse your water to determine the matrix of pollutants. The Nijhuis team has extensive experience undertaking to analyse all types of wastewater, feasibility and consultancy work. Audits are needed to identify opportunities for sustainable water use, in compliance with the local environmental legislation. After the audit, a decentralised (MediOxi) solution can be chosen to effectively disinfect and remove viruses and bacteria.



Step 2 - Implement the Nijhuis MediOxi Solution

(in cooperation with Van Remmen UV Technology)

The MediOxi solution of Nijhuis Industries is a **treatment-at-the-source** focused solution for **bacteria, viruses and micropollutant** removal. It uses different filtration and separation techniques and a combination of oxidative technologies (**Ozone and UV**) to convert substances into biological degradable molecules. Using a specific dosing for the specific removal requirements and smart combination of techniques, it is possible to reach significant reduction of bacteria, viruses, remove medical residues or convert them so they can be further degraded inside a conventional wastewater treatment plant. The solution can be completely **containerized** and placed at sources like hospitals, elderly homes, or pharmaceutical companies.

To meet an even higher water quality, **Direct Nano Filtration technology** can be added as technology building block to have the possibility to **reuse water**.



Client benefits / Nijhuis impact

- ▶ Effectively disinfects and removes micropollutants from your wastewater and has the potential to remove antibiotic resistant bacteria and difficult biodegradable bacteria and viruses before it is discharged from the sewer system.
- ▶ By applying MediOxi at the source, specific medicines that are only discharged at hospitals and not at households, are removed.
- ▶ Make the difference: social, environmental and local impact by helping local water authorities to keep our water clean from bacteria, viruses and micropollutants and have the possibility to reuse water
- ▶ Feasibility of oxidation solutions at different locations: hospitals, elderly homes or care centres.
- ▶ Prefab modular and containerised set-up of a Nijhuis installation, reducing on-site installation work and emissions of NO_x and CO₂ on site.



Contact Eddie Broeders, MediOxi expert at Nijhuis Industries, to consult you during these challenging times:

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Or contact your local Nijhuis Industries Water Professional via the website to see how we can support you in your local language and region: **www.nijhuisindustries.com/contact**

#ItsAllAboutThePeople

Note on COVID-19

Research from the Dutch KWR found out RNA traces of COVID-19 virus in the raw wastewater from sewage treatment plants. Luckily, no traces were found in the treated effluent wastewater that they had analysed. Municipal Wastewater treatment plants are dealing with a high number of viruses all the time, over the course of the year and they can treat viruses known to be more resistant than Covid-19.

Learn more: <https://www.kwrwater.nl/en/actueel/update-covid-19-sewage-research/>