



Terneuzen

In Terneuzen, The Netherlands, Dow collaborated with Evides (a water treatment company and local water supplier) and the District Water Board (the regional water manager) to use local wastewater for industrial purposes. This collaboration was the first major-scale application of industrial water reuse from municipal effluent. The collaboration has resulted in 300 m³/h net (or 2.5 million m³/year) water reuse, a 96.5% reduction in energy consumption and lower maintenance costs.



The city of Terneuzen with Dow's industrial site in the background

THE STORY

Dow Terneuzen, Dow's largest industrial site outside of the United States, is situated in one of the world's largest chemical-industrial centers, which is also a freshwater-scarce region. Growing populations and industries are increasing the strain on water sources.

As the demand for freshwater increases in the agriculture and horticulture industries, the risk of salinization is also increasing, especially at vital freshwater inlet points. These threats are further worsened by climate change as rising seawater levels prompt salt intrusion into freshwater.

Dow Terneuzen used to rely on a combination of desalinated water by energy-intensive, multi-stage flash technologies and freshwater transported by truck from Biesbosch, more than 120 km away, to supply water for its operations. The freshwater is part of the drinking water supply for the growing city of Rotterdam and may not always be available for industrial use.

In the early 1990s, Dow Terneuzen began to explore solutions to improve the efficiency of its water sourcing. The site quickly realized that if it worked with other partners, it could create a better solution that would be more meaningful to the broader community and environment – and more sustainable in the longer term.

WIN-WIN-WIN

By collaborating, we succeed in ways no single partner could deliver alone.

ENVIRONMENT/SOCIETY

Less fresh water withdrawal from the local watershed. Reduced CO₂ emissions associated with energy generation. Continued growth of the Terneuzen and Rotterdam communities.

DOW

Secure local water supply and reduced energy costs enables expanded operations and responsible water stewardship.

DISTRICT WATER BOARD AND EVIDES

Optimized resources by turning an effluent into a high-value industrial application.

RESULTS

Every liter of water is used three times (by the local community, Dow's manufacturing plants, then cooling towers)



96.5% reduction in energy consumption (compared to original desalination)

Lower maintenance costs; reduced operating costs by 50%



Use of existing infrastructure

2.5 million m³ of wastewater is reused each year – directly replacing intake from freshwater sources



50% reduction of chemicals used in process and reduction of environmental emissions to local water body

Dow worked with the Water Board Scheldestromen, the City of Terneuzen and Evides to come up with a sustainable solution using municipal wastewater from Terneuzen. Each partner had a role in the solution and saw the benefit:

1. The City of Terneuzen supplied the residential wastewater, which was a byproduct of people using the municipal water in their everyday lives. The water savings would help address the city's growth ambitions and avoid additional competition between industrial and residential water use.
2. The Water Board Scheldestromen treated the wastewater and then piped it only 12 km to Evides. The Water Board was able to reduce the municipal water discharge to the environment and keep the region cleaner and more sustainable.
3. Evides upgraded their existing infrastructure to clean the wastewater to industrial-usable standards (going from multi-stage flash desalination to reverse osmosis desalination). Then, over time, reverse osmosis technology was converted for brackish (municipal) water, resulting in overall energy savings of 96.5% compared to the initial multi-stage flash desalination option. By signing a long-term contract with Dow Terneuzen, Evides was assured that the investment in the new plant and technology was worth the capital expenditure.
4. Once treated, the water then was piped to Dow Terneuzen, where it was used two more times in the site's manufacturing and cooling tower processes. Dow was able to reduce its operating costs and environmental footprint, while securing a more stable and local water source for its operations.

Dow Terneuzen also worked with members of Parliament and the National River Authority to confirm that the variations in discharge were allowable. This led to an amendment to the law to allow the discharge from municipal wastewater reuse to not incur additional fees, and therefore incentivized the development of this sustainable solution.

This collaborative solution was the first of its type done by a chemical company at such a large scale and was made possible by working with local partners. These partners recognized the clear benefits of a long-term collaboration that would create a sustainable and scalable solution to a shared perceived risk.

But this is not the end of the journey. Dow Terneuzen intends to cease importing any freshwater by 2025, instead using only locally sourced water. Dow is continuing to innovate with local water users, suppliers and governments to do this.

Working with its partners at E4Water and the Water Nexus Program, Dow continues to look for additional ways to preserve water in its local watersheds. This includes exploring methods to capture and process local water sources such as rain water or other industrial streams currently discharged to the river, as well as expanding its usage of Terneuzen municipal wastewater. Not only would the usage of these additional sources eliminate the need for water from remote sources for Dow's industrial usage, but it could secure an additional 6-8 million m³/year of water for use by various sectors such as agriculture or industry. Dow's goal is to have the technology ready by 2020 and fully implemented by 2025, in line with Dow's 2025 Sustainability Goals.

The technology and infrastructure developed in this partnership can be applied to other companies and in other regions, particularly in communities in urban and delta areas where industry and residents risk competing for water sources.

Neither government nor industry can solve the problem of freshwater scarcity alone. This integrated water management collaboration demonstrates that public-private partnerships can result in stronger outcomes, both environmentally and economically, and can act as a model for engagement between industry and public entities.

RECOGNITION

This collaborative model has received wide recognition, including the Environmental Award of the Province of Zeeland (Zeeuwse Milieuprijs), the Dutch VNCI Responsible Care Award, the European Cefic Responsible Care Award, and the ICIS Award for the most innovative Corporate Social Responsibility project.

PARTNERSHIPS

Through a partnership with [E4Water](#), a collaborative effort among Europe's chemical industry and the EU government, Dow led the case study on mild desalination technologies and determined that nanofiltration and electro dialysis reversal were best to make brackish water streams fit for reuse in industry and agriculture.

In the [Water Nexus](#) program funded by the Dutch government, Dow works with partner companies and universities to develop new solutions for water supply in freshwater-scarce coastal regions in The Netherlands and abroad.