



NX Filtration Recognized for

2021

New Product Innovation

Global Water and Wastewater
Treatment Membrane Industry
Excellence in Best Practices

Best Practices Criteria for World-Class Performance

Frost & Sullivan applies a rigorous analytical process to evaluate multiple nominees for each Award category before determining the final Award recipient. The process involves a detailed evaluation of best practices criteria across two dimensions for each nominated company. NX Filtration excels in many of the criteria in the water and wastewater treatment membrane space.

AWARD CRITERIA	
<i>New Product Attributes</i>	<i>Customer Impact</i>
Match to Needs	Price/Performance Value
Reliability	Customer Purchase Experience
Quality	Customer Ownership Experience
Positioning	Customer Service Experience
Design	Brand Equity

NX Filtration: Leading Provider of Water and Wastewater Treatment Membrane Solutions

Founded in 2016 in Enschede, Netherlands, NX Filtration developed an outstanding reputation by offering a unique hollow fiber nanofiltration (NF) product portfolio that combines sustainability, efficacy, and cost-efficiency. By leveraging its novel NF membrane technology expertise and maintaining an excellent position among its clients in the municipal and industrial (amongst others food and beverage, power plant, and textile industries) markets, Frost & Sullivan analysts observe how the company outpaces its competitors in the water and wastewater treatment membrane market. Notwithstanding harsh competition and a challenging economy, NX Filtration advances its NF membrane technology, facilitating its position in the market and bringing advanced NF membrane technology to customers around the globe.

“Founded in 2016 in Enschede, Netherlands, NX Filtration developed an outstanding reputation by offering a unique nanofiltration (NF) product portfolio that combines sustainability, efficacy, and cost-efficiency.”

**- Maksym Beznosiuk,
Best Practices Research Analyst**

Since 2016, NX Filtration has had expansive commercial operations from the Netherlands to several other European countries (amongst others Spain, France, Switzerland, and Belgium), North America (US and Canada), and Asia (amongst others Indonesia, India and Singapore). The company is working to grow its team globally to support its fast-growing customer base across other emerging (the Asia-Pacific region) and

developed (Europe and North America) markets. Moreover, in July 2021, NX Filtration announced plans to erect a high-tech megafactory for nanofiltration membrane production in Hengelo, Netherlands, in the next two to three years.¹ In this respect, the company will build up a total capacity of approximately 80 thousand membrane modules annually. Frost & Sullivan believes that this step will help NX Filtration advance the commercialization and implementation of its cutting-edge NF membrane technology across various industry verticals, such as food and beverage, textile, power energy, and attracting new potential customers worldwide. At the same time, in June 2021, NX Filtration announced an initial public offering on the Amsterdam Euronext Stock Exchange, raising approximately \$196 million, positioning itself to further accelerate its growth strategy and investment in fast-track innovation and new manufacturing facilities.² This offering represented a Green labelled IPO, externally certified by CICERO Green. Over 95% of NX Filtration's revenue and investments have been awarded the 'Dark Green' label, their highest green ranking corresponding to the long-term vision of a low carbon and climate resilient future.³

Moreover, NX Filtration builds successful partnerships with various technology companies around the globe. For instance, in 2020, the company partnered with Okotek, a Turkish water treatment company, installing a pilot project to recycle industrial and municipal wastewater in Turkey.⁴ Namely, NX Filtration's installation of its recycling system utilizing its nanofiltration technology helps to eradicate micropollutants and other organic matter from the municipal wastewater stream and color from the industrial, primarily textile, wastewater stream. Thus, users can reuse purified water in textile factories, reach sustainability objectives, and lower pressure on the availability of municipal drinking water. The company's partnerships with Novozymes, a global biotechnology company, and Grundfos, one of the world's leading water technology companies, work towards developing novel and reliable ways to remove pesticides and pharmaceutical residues from drinking water sources.⁵ NX Filtration supports collaboration by enabling its novel nanofiltration technology that can remove small organic compounds like pharmaceutical residues and other contaminants from freshwater sources in the production of drinking water.

Frost & Sullivan recognizes that NX Filtration meets customers' needs and exceeds their expectations as multiple clients and partners value the top-performance and business impact of its NF membrane solutions.

¹ <https://nxfiltration.com/knowledge-base/publications/nx-filtration-secures-land-for-high-tech-megafactory-for-nanofiltration-membrane-production-in-hengelo-the-netherlands/>

² <https://www.euronext.com/en/about/media/euronext-press-releases/nx-filtration-lists-uronext-amsterdam>

³ <https://nxfiltration.com/knowledge-base/download/?file=1653>

⁴ <https://nxfiltration.com/pilot-with-nx-filtrations-nanofiltration-membranes-for-wastewater-re-use-in-turkey/>

⁵ <https://www.dutchwatersector.com/news/nx-filtration-joins-danish-collaboration-on-water-treatment-using-enzymes>

“With NX Filtration’s technology we are able to turn a local river into a valuable source of drinking water for the city of Dumai. A series of pilot tests quickly showed us that NX Filtration’s nanofiltration technology would enable us to produce excellent water quality, which could not be achieved with conventional treatment methods. Important additional benefits are that this can be done in one single step, without pre-treatment and avoiding the use of a significant amount of chemicals. We see great potential to introduce this technology at similar locations throughout the region.”⁶

- EO at PT. Bayu Surya Bakti Konstruksi

“Earlier this year we piloted with NX Filtration’s unique hollow fibre direct nanofiltration membranes, which impressed our customer KKCL with the superior water quality that we could produce. An additional benefit is the compactness and ease of operation of this solution, which can easily be integrated in their operations. The system based on dNF technology enables the direct treatment of the wastewater without intensive pre-treatment and can lead to over 95% recycling of the wastewater stream.”⁷

- Director of Aquarius H2O Dynamics

Providing Companies with Cutting-edge NF Membrane Solutions

Climate change today leads to increasing water scarcity and water contamination. Freshwater becomes a rarity and depleted resource, adversely influencing the wellbeing of local consumers and economics in both developing and developed regions. As such, players in the public and private sectors look for filtration tools to effectively purify water and make it safer for consumption by their communities.

NX Filtration leads the way by providing a suite of NF membrane solutions that allow clients to achieve improved sustainability, cost-efficiency, and reliability unmatched by the competition. Frost & Sullivan’s own research confirms that they company’s NF membrane technology provides several competitive advantages, including:

- **Quality and novelty.** At the core of the company's Direct Nanofiltration (dNF) product portfolio are dNF40 and dNF80, innovative solutions that comprise hollow fiber NF membranes made of modified engineering thermoplastic polyethersulfone. This polyethersulfone ensures high chemical and thermal stability and allows the production of a small pore size that is narrowly distributed throughout the membrane. At the same time, NX Filtration utilizes a Layer-by-Layer technology to produce these innovative membrane solutions, ensuring precise control of the selectivity properties of the membranes at a nanoscale (depending on the selected polyelectrolyte multilayer).
- **Resilience.** Due to its durability and stability, the company's dNF membrane does not require an elaborate pre-treatment system compared to competitive spiral wound NF or reverse osmosis (RO) membranes. In this respect, NX Filtration's solution typically requires only a minimum 150-micrometer strainer, which substantially lowers all connected chemical and energy

⁶ <https://nxfiltration.com/nx-filtration-selected-to-supply-hollow-fiber-nanofiltration-membranes-for-drinking-water-plant-in-dumai-indonesia/>

⁷ <https://nxfiltration.com/nx-filtration-selected-to-supply-hollow-fiber-nanofiltration-membranes-for-drinking-water-plant-in-dumai-indonesia/>

requirements. Also, unlike the competitive RO membranes, the usage of NX's dNF membrane solutions entails a lower cost of ownership as they do not require high operating pressure and are not prone to fouling, which contributes to an increase in energy consumption and overall chemical costs. The company's dNF solution can last up to five years under normal operating conditions due to low fouling and strong resistance to damage. In this regard, the company's dNF40 and dNF80 membranes are highly resilient to any chemical impact, demonstrating strong tolerance to the extreme potential of sodium hypochlorite or hydrogen peroxide. Thus, such resilience makes them suitable for potentially high fouling operations, as users can apply them for treating extremely acidic or caustic streams and easily clean them.

- **Efficiency.** The company's NX Filtration membrane solutions effectively remove various microorganisms, viruses, and bacteria from polluted water at wastewater treatment plants. At the same time, the company's solutions also enable users to remove emerging micropollutants (PFAS, residual medicines, pesticides, etc.), ions, and colors from ground or surface water effectively. In this regard, NF membranes are highly suitable for this objective as they can remove synthetic dyes and organic matter while also removing the multivalent salts, which lead to hardness.
- **Sustainability.** Unlike other competitive membrane materials that utilize toxic or flammable components with adverse environmental impact, NX Filtration relies on modified polyethersulfone made of non-toxic, fluor-free plastics with the support of biodegradable solvents to produce its highly sustainable hollow fiber NF membrane. During operation, the company enables the avoidance of flocculants and coagulants in the pre-treatment and needs a very low chemical cleaning frequency. The company's coating process for nanofiltration membranes relies on water-based chemistry (rather than solvent-based coating processes). At the same time, NX Filtration utilizes a unique in-line polymer mixing concept for its membrane spinning process, which requires less energy for membrane development.

Frost & Sullivan appreciates how the company's NF membrane solutions possess highly effective and resilient properties that allow users to achieve high management of the selectivity properties of the membranes at a nanoscale. At the same time, these solutions demonstrate strong resistance to damage as users can apply them under extreme conditions such as acidic streams. By utilizing the company's membrane solutions, companies can achieve higher sustainability and efficiency unmatched by the competition.

Best Practice Examples Confirm High-performance and Ultimate Reliability

Frost & Sullivan lauds NX Filtration for the high-quality performance and efficiency of its NF membrane solutions, as the following use cases demonstrate.⁸

Best Practice Example 1. NX Filtration helps the Forsmark power plant in Sweden to ensure that an adequate water system removes colors and treats surface water from a local lake that the client uses, like drinking and processing water at its facilities. Specifically, the client utilizes NX Filtration's dNF40 membranes to eliminate viruses, bacteria, organics, including color from the lake water. As a result, NX

⁸ <https://nxfiltration.com/solutions/>

Filtration's solution helps the client improve the removal of micropollutants, organics, and other contaminated elements with more than 95% removal rates. In addition, the application of the solution helps the client avoid the application of chemicals in pre-treatment and achieve clean water for drinking and usage at the Forsmark power plant.

Best Practice Example 2. NX Filtration assists the wastewater treatment plant in Enschede, Netherlands, with removing micropollutants from municipal wastewater.⁹ The client sought a solution to remove micropollutants from the wastewater effluent before discharge into the local water stream. NX Filtration applied its dNF40 nanofiltration membranes in wastewater after biological treatment and settling tanks. As a result, the NX Filtration solution helps to achieve over 80% rejection of micropollutants and other toxic substances in the water stream.

"Thus, the company's NF membrane solutions possess highly effective and resilient properties that allow users to achieve high management of the selectivity properties of the membranes at a nanoscale."

*- Maksym Beznosiuk,
Best Practices Research Analyst*

Frost & Sullivan believes that NX Filtration provides industry-leading NF membrane solutions to its clients, enabling them to achieve improved sustainability, efficiency, and reliability. Moreover, Frost & Sullivan finds that NX Filtration is well-positioned to capture even higher water and wastewater treatment membrane market share in the foreseeable future.

Conclusion

Today, companies in the public and private sectors seek filtration solutions that can effectively clean water and make it safer for consumption at their facilities and by local communities.

NX Filtration leads the way by providing industry-leading NF membrane solutions that enable clients to achieve sustainability, cost-efficiency, and reliability unmatched by competitors. Its NF membrane solutions possess properties that ensure high chemical and thermal stability and are based on modified polyethersulfone made of non-toxic, fluor-free plastics with the support of biodegradable solvents to produce its highly sustainable hollow fiber dNF membrane.

With its unrivaled expertise, high-performance NF membrane solutions, and customer-centric approach, NX Filtration earns the 2021 Frost & Sullivan Global New Product Innovation Award.

⁹ <https://nxfiltration.com/solutions/removal-of-micropollutants-from-municipal-wastewater-after-biological-treatment/>

What You Need to Know about the New Product Innovation Recognition

Frost & Sullivan's New Product Innovation Award recognizes the company that offers a new product or solution that uniquely addresses key customer challenges.

Best Practices Award Analysis

For the New Product Innovation Award, Frost & Sullivan analysts independently evaluated the criteria listed below.

New Product Attributes

Match to Needs: Customer needs directly influence and inspire product design and positioning

Reliability: Product consistently meets or exceeds customer performance expectations

Quality: Product offers best-in-class quality with a full complement of features and functionality

Positioning: Product serves a unique, unmet need that competitors cannot easily replicate

Design: Product features an innovative design that enhances both visual appeal and ease of use

Customer Impact

Price/Performance Value: Products or services provide the best value for the price compared to similar market offerings

Customer Purchase Experience: Quality of the purchase experience assures customers that they are buying the optimal solution for addressing their unique needs and constraints

Customer Ownership Experience: Customers proudly own the company's product or service and have a positive experience throughout the life of the product or service

Customer Service Experience: Customer service is accessible, fast, stress-free, and high quality

Brand Equity: Customers perceive the brand positively and exhibit high brand loyalty

