KOVALUS Separation Solutions™

CASE STUDY

Carré de Réunion Wastewater Plant

Overview

Located within sight of the iconic Palace of Versailles, the Carré de Réunion wastewater plant stands as one of Europe's largest and most advanced membrane bioreactor (MBR) facilities. Serving as a centralized treatment hub for the surrounding region, its role has become increasingly critical, as smaller, local plants have been progressively phased out to streamline wastewater operations. This regional consolidation has brought with it significant challenges, most notably, the need to expand treatment capacity while upholding strict effluent quality standards. These upgrades had to be realized within a tightly constrained footprint, ensuring that the facility remains virtually invisible, not to disrupt the visual harmony of the neighboring palace garden.

In response, Kovalus Separation Solutions, in cooperation with the EPC contractor, successfully realized a compact, high-performance MBR solution that ensures scalability and operational reliability. Since its commissioning, the upgraded MBR facility has consistently fulfilled the region's growing treatment needs, all without disrupting the experience of the 8.3 million annual visitors to the Palace of Versailles.

The Challenge

To expand hydraulic capacity and improve the effluent quality of the existing conventional activated sludge (CAS) treatment plant within the limited existing footprint without negatively impacting the nearby Palace of Versailles.

Key Highlights

Reliable MBR performance in a highly sensitive landmark environment.

1. Largest PURON MBR plant in Europe, in operation for more than 10 years
2. Portion of treated wastewater reused for irrigation at a nearby educational farm
3. Treated effluent discharged into the sensitive "Ru de Gally" bioreceptor

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Solution

In close cooperation with the operator, Kovalus provided an expansion strategy leveraging the benefits of PURON® MBR technology.

With the ability to operate at higher mixed liquor suspended solids (MLSS) concentrations, the PURON MBR nearly doubled the treatment capacity of the conventional wastewater treatment plant within the same footprint.

By incorporating the MBR into the plants available space, the operator, and Kovalus were able to keep the system discreet and unnoticeable to visitors of the palace. Additionally, the visible components of the system were housed in a building with architecture similar to the surrounding area.

“Our green plant is discreetly placed in the plain of Versailles, as a protective oasis for our living environment,” said Mr. Daniel Higoin, former director of SMAROV. The treatment plant has a “refined and elegant architecture, integrated into one of the most beautiful landscapes.”

In addition to facilitating plant expansion, the PURON® MBR ultrafiltration membrane acts as a physical barrier which completely retains suspended solids within the bioreactor. As a result, the upgraded MBR produces higher quality effluent than the existing CAS system and is less affected by biological upset events.

One of Europe’s Largest MBR in the heart of Versailles

Designed to meet increasing capacity demands and improve regional wastewater management, Carre de Reunion has undergone several upgrades since its initial commissioning in October 2015.

System Configuration and Expansion Timeline

The facility was designed with 10 filtration trains in operation, along with two additional trains, ensuring scalability for future capacity increases.

	2015 (Start-up)	2018 (Extension for more Redundancy)	2023 (Extension)
Average Design Flow	72,000 m^3/day	72,000 m^3/day	96,000 m^3/day
Peak Hourly Flow	6,000 m^3/h	6,000 m^3/h	6000 m^3/h over 24 hours
Membrane Area	162,000 m^2	180,000 m^2	216,000 m^2
# of Modules	90	100	120
# of Trains	10	10	12
Module Type	PSH 1800	PSH 1800	PSH 1800

Conclusion

With progressive expansions in 2018 and 2023, the Carré de Réunion plant has continued to set new benchmarks in MBR technology across Europe. Its modular and scalable design, expansive membrane surface area, and built-in (N-2) redundancy (since 2018) not only provide operational resilience but also guarantees consistently high effluent quality.

This is particularly critical because the treated effluent is discharged directly into the Ru de Gally creek, which flows from the historic gardens of the Palace of Versailles before eventually reaching the Seine River. Maintaining high water quality is therefore not only a technical challenge but also an environmental and cultural responsibility.

While the unbreakable PURON® MBR Membranes have consistently delivered reliable filtration performance since its commissioning, Kovalus Separation Solutions remains committed to supporting the plant's operators through continuous optimization efforts. A dedicated team of Kovalus process engineers and field service technicians has been actively involved, conducting regular on-site visits and offering remote monitoring services to fine-tune plant operations if necessary.

Product Overview

Kovalus supplied 120 PURON PSH 1800 submerged membrane modules for the Carré de Réunion MBR.

PURON MBR utilizes a virtually unbreakable reinforced hollow-fiber membrane. Kovalus' unique manufacturing process results in an ultrafiltration membrane with tight pore distribution, and as Mr. Higoin pointedly stated, "this membrane is at the very heart of the [water] purification process."

PURON MBR's patented single header design and central aeration system allows the robust hollow-fiber membrane to consistently produce the high-quality effluent required at Carré de Réunion with minimal energy consumption. Furthermore, the free-floating fibers at the top of the PURON module eliminate the build-up of hair and fibrous material.

KOVALUS
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