Fluence's MABR Technology: An Innovative Solution for Water Reclamation

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富朗世MABR技術 再生水創新解方

獲California Title 22認證 節能、省空間、降低製水成本 實現污水再利用最高價值

【台北訊】隨著全球水資源短缺問題日益嚴重，加上環保法規日趨嚴格，水資源管理效率的提高已成爲當務之急。再生水水源不僅成本低，還能穩定供水，增加水資源的多元利用及降低缺水風險。

美商富朗世集團（Fluence）由美國與以色列的兩家知名水務公司於2017年合併成立。結合兩家公司超過35年的管理和技術經驗，以及20多項技術專利基礎，Fluence如今已在全球12個國家設立分公司或辦事處，成爲全球知名的水資源管理和回收再利用企業。

膜曝氣生物膜反應器（MABR）技術以其突破性的處理效能，以及節能、省空間的優點，爲水資源回收及再生水利用開闢全新的道路，提供創新解決方案，大幅降低再生水的製水成本，擴展其應用領域。

Fluence耕耘MABR技術超過10年，在全球不同環境及水質條件下，完成超過410個各種規模的工程項目，包括目前全球最大的MABR新建架構污水處理廠。在再生水應用方面，Fluence的MABR技術在與史丹佛大學合作的MABR中水回用專案中，獲得美國最嚴苛的水資源回用要求–California Title 22認證。且經MABR處理後的放流水也滿足以色列農業再利用要求，爲當地農業提供多水源的選擇。

Fluence的水處理技術也展現在再生水的工業應用領域，包括爲以色列某半導體製造商設計、製造和安裝日處理超過1.5萬立方米的再生水處理廠；在埃及爲EGAT鋼鐵廠提供日產1萬噸的再生水解決方案；在巴西爲ArcelorMittal開採工地提供日產1.2萬噸的再生水解決方案；以及爲可口可樂阿根廷廠增設水優化項目中的水循環再利用設施等。

在台灣，Fluence參與桃園北區水資源回收中心再生水廠案，日產超過4萬噸的高質量再生水用於工業，這個項目不僅是台灣再生水利用的一大里程碑，更是Fluence在亞太地區業務拓展的重要標誌。

在民生污水再生流程中，生物處理系統與除鹽系統雖看似前後兩端的獨立處理流程，但彼此密不可分。高效、穩定的生物系統可提升再生水流程中RO系統的效率，避免有機物造成薄膜污堵及系統風險、維運成本大增等問題。

Fluence技術總監陳曦表示：「在Fluence我們珍惜每一滴水，並制定水復原力戰略，我們和MEB Energy攜手在南非跨祖魯–納塔爾省安裝Aspiral試點項目。經Aspiral的前期處理，出水水質已符合再利用標準。在2022年8月，在Aspiral設備後端加裝Niroflex系統，經該流程處理後的出水水質可達當地飲用水標準，實現污水再利用的最高價值，達到環境與經濟共存目標。」

Fluence與都市共同進化的污水處理系統，是城市發展的保障。社會、環境和經濟的生存發展取決於水的安全和永續性，未來，Fluence將繼續致力於提升水資源管理效率，推動全球水資源的可持續利用，爲實現全球水資源的永續發展而努力。（劉靜君）

Fluence和MEB Energy在南非祖魯–納塔爾省將民生污水處理為飲用水試點項目。 Fluence／提供

As global water scarcity intensifies and environmental regulations become increasingly stringent, improving water resource management efficiency has become an urgent priority. Reclaimed water not only offers a low-cost solution but also provides a stable water supply, enhancing the diversified use of water resources and reducing the risk of water shortages.

Fluence Corporation, a U.S.-based company, was established in 2017 through the merger of two well-known American and Israeli water companies. Combining over 35 years of management and technological experience and more than 20 patented technologies from both companies, Fluence has now established branches or offices in 12 countries worldwide, becoming a globally recognized leader in water resource management and recycling.

The Membrane Aerated Biofilm Reactor (MABR) technology, with its breakthrough treatment efficiency, energy-saving, and space-saving advantages, has opened up new pathways for water resource recovery and reclaimed water use, offering innovative solutions. It significantly reduces the cost of producing reclaimed water and expands its application fields.

Fluence has been developing MABR technology for over 10 years and has completed more than 410 projects of various scales under different environmental and water

quality conditions worldwide, including the world's largest greenfield MABR-structured wastewater treatment plant. In the field of reclaimed water application, Fluence's MABR technology has received California Title 22 certification, meeting the strictest water reuse requirements in the U.S., through its collaboration with Stanford University on the MABR reclaimed water reuse project. The effluent treated by MABR also meets Israel's agricultural reuse requirements, providing multiple water source options for local agriculture.

Fluence's water treatment technology is also demonstrated in the industrial application of reclaimed water, including designing, manufacturing, and installing a reclaimed water treatment plant with a daily capacity of over 15,000 cubic meters for a semiconductor manufacturer in Israel; providing a daily reclaimed water solution of 10,000 tons for the EGAT steel plant in Egypt; offering a daily reclaimed water solution of 12,000 tons for the ArcelorMittal mining site in Brazil; and installing water recycling facilities as part of a water optimization project at the Coca-Cola plant in Argentina.

In Taiwan, Fluence participated in the Taoyuan North District Water Resource Recovery Center's reclaimed water plant project, where more than 40,000 tons of high-quality reclaimed water are produced daily for industrial use. This project is not only a significant milestone for reclaimed water use in Taiwan but also an important marker of Fluence's business expansion in the Asia-Pacific region.

In the municipal sewage reclamation process, the biological treatment system and UF/RO system, though seemingly independent processes at either end, are closely interconnected. A high-efficiency, stable biological system can enhance the efficiency of the RO system in the reclamation process, preventing organic matter from causing membrane fouling, system risks, and significant increases in operation and maintenance costs.

Fluence's Technical Director, Xi Chen, stated: "At Fluence, we value every drop of water and have developed a water resilience strategy. We have partnered with MEB Energy to install an Aspiral pilot project in KwaZulu-Natal Province, South Africa. The preliminary treatment by Aspiral has already met reuse standards. In August 2022, the addition of the Niroflex system at the back end of the Aspiral equipment allowed the treated effluent to meet local drinking water standards, achieving the highest value of wastewater reuse and meeting the goal of environmental and economic coexistence."

Fluence's evolving wastewater treatment systems are the foundation for urban development. The survival and development of society, the environment, and the economy depend on water security and sustainability. In the future, Fluence will continue to strive to improve water resource management efficiency, promote the sustainable use of global water resources, and work towards the sustainable development of global water resources.

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