



**Continuous-flow granular sludge process** for wastewater treatment. A compact & efficient solution for increasing capacity and enhancing biological nutrient removal.



# BeFlow® AGS is the solution to the major challenges facing the wastewater treatment plants of the future: shrinking footprints and boosting treatment capacities

Capable of handling high and variable flow rates, including peak flows, and a wide range of influent types, **BeFlow® AGS** offers a competitive alternative to current biological treatment by significantly reducing the footprint of bioreactors and settling tanks.



*Particularly well-suited to increasing the capacity of existing wastewater treatment plants, the reconfiguration of the aeration basins is a key element of the BeFlow® AGS process, allowing to double treatment capacity*

In conventional treatment plants, aeration and sedimentation processes require large footprints because of the poor settling properties of most activated sludge. At the same time, expansion of existing plants is often hampered by a lack of land availability, which makes it difficult to keep pace with population growth, tightening permits or increasing peak flows.

Since the 90s, researchers have worked to develop new, more efficient and compact solutions, all while improving effluent quality.

John Cockerill Environment's BeFlow® AGS is a sustainable, compact, and energy-efficient 100% biological treatment solution that can be applied to both new and existing process trains. This new technology combines and integrates decades of granulation and densification research to produce a continuous-flow intensification process for the treatment plants of today and the recovery facilities of tomorrow.

## BeFlow® AGS is applied:

- at municipal wastewater treatment plants with a minimum flow rate of 1,500 m<sup>3</sup>/d (0.4 MGD) and a pollutant load of 1300 lbs BOD\*/day \*Biochemical Oxygen Demand.
- at industrial wastewater treatment plants with loads > 2000lbs COD\*/day \*Chemical Oxygen Demand.
- at new installations (greenfield)
- at existing installations (legacy plants): retrofittable to increase capacity (flow and load) using existing tanks
- to a wide range of influent types
- for high and variable flow rates
- for overloaded plants or plants seeking improved BNR performance

## The key benefits of aerobic granular biomass



Enhanced performance: excellent removal efficiency for carbon, nitrogen and phosphorus



100% biological process: no chemicals



Low energy consumption (efficient aeration) & reduced carbon footprint



2x more compact: small footprint, no equalization needed



Minimal CAPEX and reduced operating costs



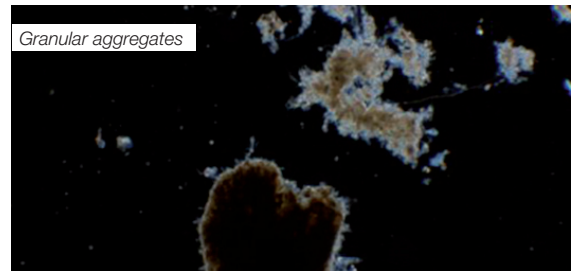
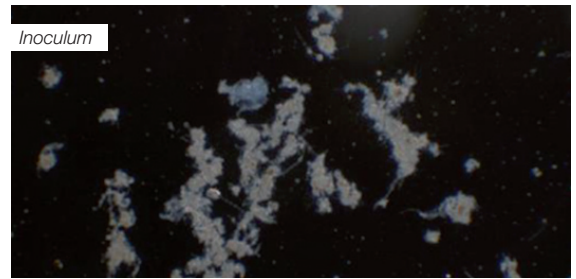
Thanks to our combined solutions, local production of:

- green energy via anaerobic digestion & biological methanation (**LysoThane™**)
- Liquid ammonia fertilisers produced by stripping (**Ayra™** Val Ammonia)

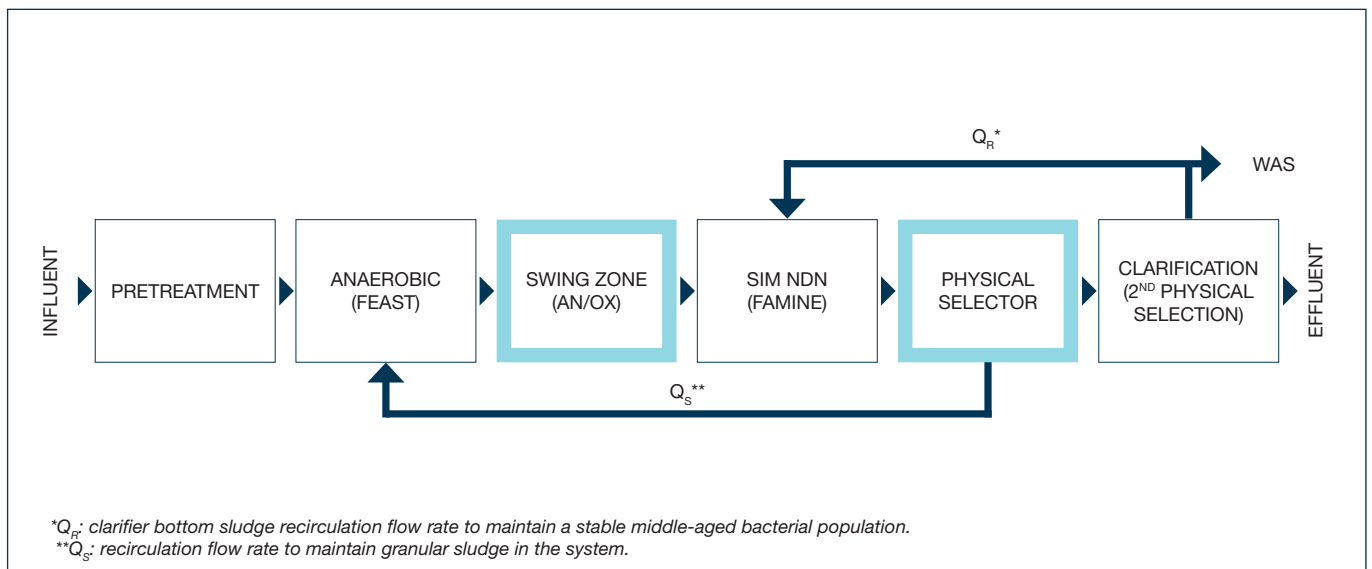
# BeFlow® provides all the advantages of granulation in a continuous-flow process, allowing for increased loading, higher peaking factors, and more compact footprints

BeFlow® AGS is a wastewater treatment process based on granulated biomass.

This granular biomass is formed by bacterial communities that are naturally present in wastewater. Through a combination of biological and physical selection, these micro-organisms are allowed to develop and form granules of 0.2 to 4 mm. **The advantage of these dense, compact granular cultures is that they settle at much higher speeds than conventional activated sludge**, enabling significantly higher biomass concentrations to be maintained in the biological reactors and thus **considerably reducing the size of process trains**. What's more, this innovative continuous flow process is capable of handling **high and variable flow rates, allowing it to process peak flows, and can be applied to a wide variety of influents** for both municipal and industrial installations.



Some bacteria can agglomerate into microspheres up to a millimetre thick. This agglomeration technique, which requires no additional coagulant, doubles the MLSS (Mixed liquor suspended solids) in the treatment process while increasing sludge settling characteristics such that no additional secondary clarifiers are required.



## Treatment performance

<p>A sludge settling rate</p> <p><b>10 to 15 times higher</b></p> <p>than conventional sludge</p>	<p>A biomass concentration (MLSS) of</p> <p><b>8,000-10,000 mg/l</b></p> <p>in the reactor</p>
<p>Exceptional settling speed, with an</p> <p><b>SVI &lt; 50 ml/g</b></p> <p>(Sludge Volume Index)</p>	<p>Effluent phosphorus</p> <p><b>&lt; 2 mg/l</b></p> <p>without the use of iron or aluminium salts</p>

## 4.0 Smart monitoring & process management through advanced data analytics

An integrated smart monitoring system provides real-time data and insights for process control and equipment management. This helps the operator to maintain maximum efficiency and water quality at minimal cost. At the same time, the smart monitoring system also enables John Cockerill to develop predictive models based on artificial intelligence, letting you know where your process is *and* where its going.



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## John Cockerill's solutions cater to the ecological transition and circular economy

Firmly anchored in our experience, our solid technological know-how and our bold innovation in the treatment of water, air and waste, our **Water Business Line** offers highly performant and modular solutions for the efficient treatment of industrial and municipal wastewater, the production of process water and REUSE, as well as optimized renewable methane production.

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