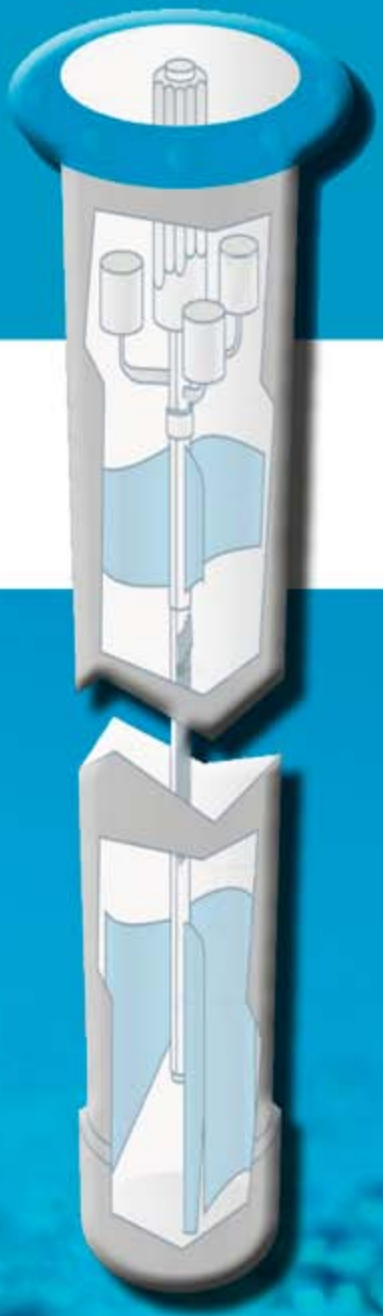
VRT© 4.0



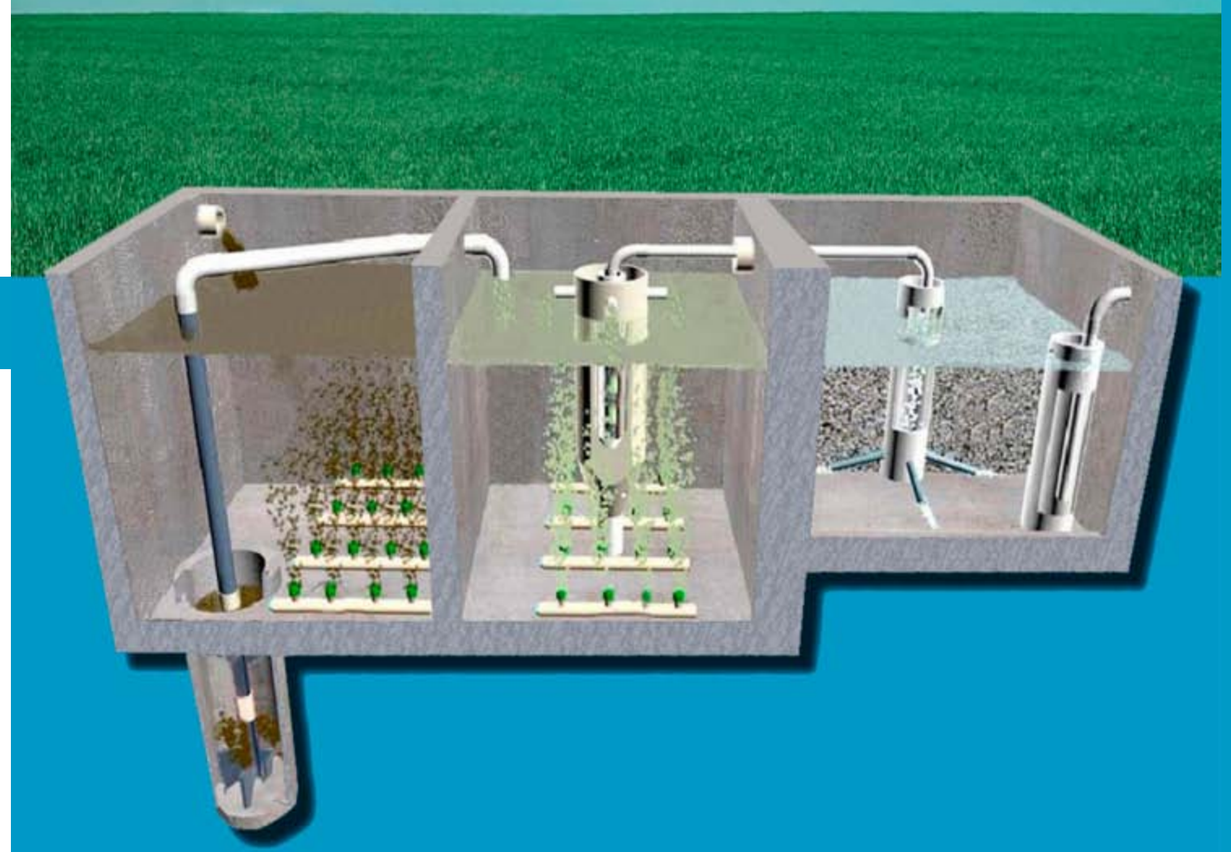
acqua-e

modular aerobic biodigestor
for recovery and valorization
of biodegradable effluents

VRT© 4.0 technology

Henry's Law:

"At a constant temperature, the amount of a given gas that dissolves in a given type and volume of liquid is directly proportional to the partial pressure of that gas in equilibrium with that liquid"



Secondary & Tertiary treatment with Biological Nutrient Removal

(NDN + EBPR chemical-free processes)

Less is much More

We offer a **groundbreaking low-cost high-profit Aerobic Biodigestor Solution**, suitable for **recovery and valorization of** urban and industrial **biodegradable effluents**.

The core of VRT© 4.0 technology is a **continuous underground aerobic vertical biodigestor** that combines principles and benefits of time-tested technologies, with the **most advanced CFD modelling and simulation tools**.

Our VRT© 4.0 technology is also suitable for **Waste Activated Sludge (WAS) digestion, reduction and stabilization of primary and secondary WAS** produced on conventional Water Resource Recovery Facilities (AKA Wastewater Treatment Plants).

Our state-of-the-art process guarantees an outstanding performance, offering **great advantages** when compared with conventional active sludge and alike wastewater treatment technologies.

SIGNIFICANT SAVINGS

CAPEX	OPEX
Surface area required → up to **75% less**	Class A biosolids production → up to **75% less**
Biosolids drying equipment → **70% less**	kWh consumption → **up to 50% less**
Construction time frame → **75% less**	Operation Staff → **75% less**
Comissioning period → **75% less**	Regular maintenance cost →75**% less**

ENVIRONMENTAL BENEFITS

Irrelevant landscape impact | 100% odors-free process | Very low GHG → up to 95% less

100% WATER REUSE

RESILIENCE + ADAPTABILITY

Upgrades/Expansion of WRRFs | New WRRFs | Tailor-made solutions

ON-SITE WAS REDUCTION / REMOVAL

HIGHEST PROFITABILITY (*)

IRR_{min} → 25% | Payback Period < 5 years | NVp > 0

(*) 30 years BOT contract

applications

URBAN



New WRRFs - expansions - upgrades - **final biosolids reduction / removal (on-site WAS digestion)**

INDUSTRIAL



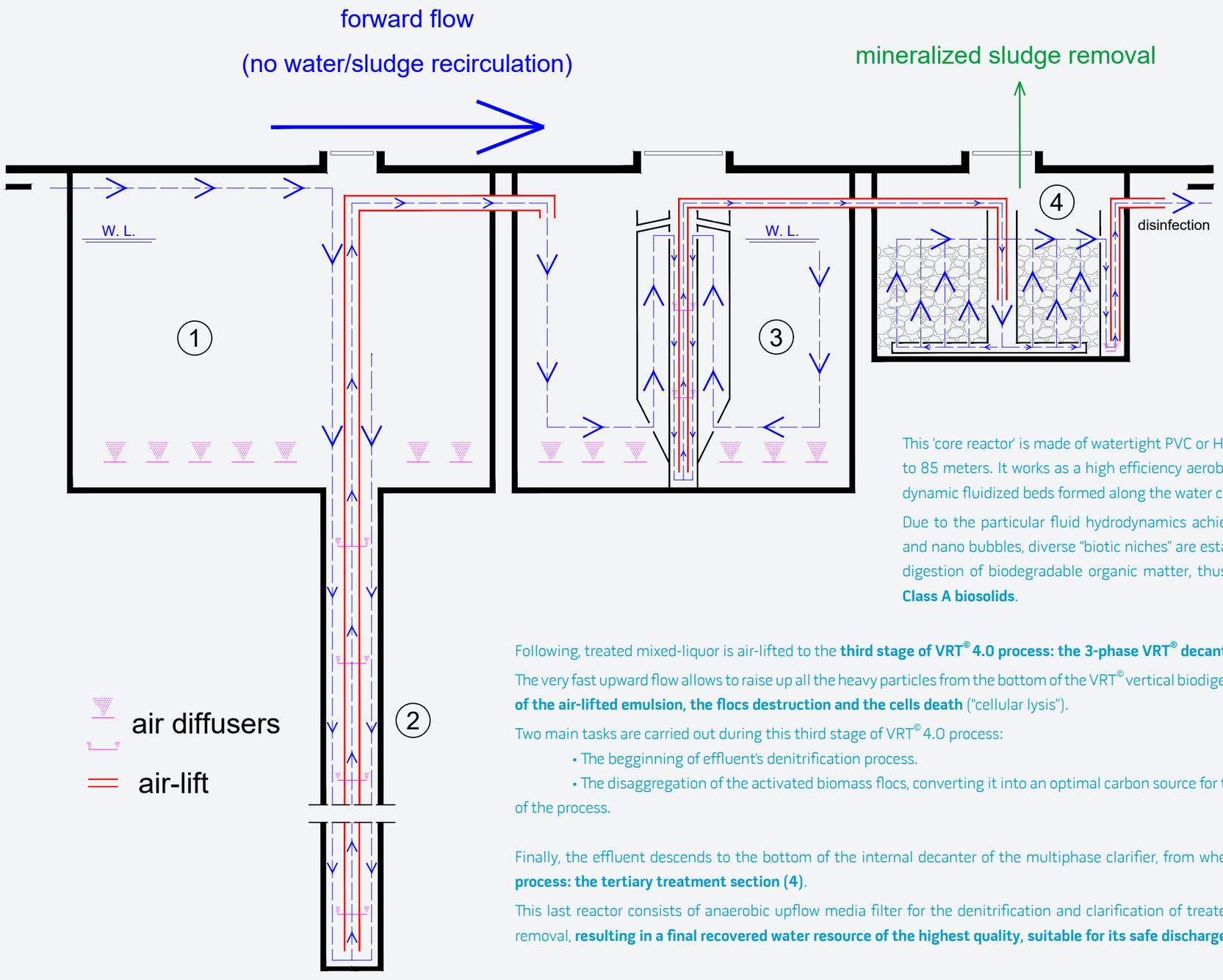
agrifood - slurry - leachates - textile - paint & coatings - chemical - cosmetics - pharmaceutical - petrochemical...

OTHERS



shopping malls - real estate developments - hotels - touristic resorts - ports & marinas - environmental remediation...

VRT© 4.0 process flow chart



The influent from preliminary treatment gets into the **first stage of VRT© 4.0 process: the homogenization-equalization reactor (1)**.

This is a **mixing and buffering tank** with a bottom grid of air diffusers, designed to:

- Prevent sedimentation of suspended solids and activate the incoming sludge.
- Prevent the formation of aggregated flocs.
- Buffer unexpected increases of flow / pollutant loadings, avoiding malfunctions in subsequent stages.

Next, the mixed-liquor goes into the **second stage of VRT© 4.0 process: the VRT© vertical biodigestor (2)**. The mixed-liquor moves downward by gravity and by the suction effect caused by the operation of the inner riser (air-lift).

This 'core reactor' is made of watertight PVC or HDPE, with diameters from 30 to 80 cm, and depths from 60 to 85 meters. It works as a high efficiency aerobic biodigestor, thanks to the simultaneous action of several dynamic fluidized beds formed along the water column.

Due to the particular fluid hydrodynamics achieved through the controlled injection of counterflow micro and nano bubbles, diverse "biotic niches" are established at different depths carriying out a selective aerobic digestion of biodegradable organic matter, thus **guaranteeing a very low production of high-mineralized Class A biosolids**.

Following, treated mixed-liquor is air-lifted to the **third stage of VRT© 4.0 process: the 3-phase VRT® decantation-clarification reactor (3)**.

The very fast upward flow allows to raise up all the heavy particles from the bottom of the VRT© vertical biodigestor (mineralized sludge), accomplishing the **decompression of the air-lifted emulsion, the flocs destruction and the cells death** ("cellular lysis").

Two main tasks are carried out during this third stage of VRT© 4.0 process:

- The begginning of effluent's denitrification process.
- The disaggregation of the activated biomass flocs, converting it into an optimal carbon source for the denitrifying organisms present in the next and last stage of the process.

Finally, the effluent descends to the bottom of the internal decanter of the multiphase clarifier, from where is air-lifted to the fourth and last stage of the **VRT© 4.0 process: the tertiary treatment section (4)**.

This last reactor consists of anaerobic upflow media filter for the denitrification and clarification of treated flow. The filter is designed to achieve on-demand N & P removal, **resulting in a final recovered water resource of the highest quality, suitable for its safe discharge and/or agriculture reuse.**

premio impresa ambiente

innpulso
Red de ciudades de Ciencia e Innovación

European Commission
Horizon 2020
European Union funding for Research & Innovation
SEAL OF EXCELLENCE

LIFT

THE Water Research FOUNDATION

ENGINEERING HQ
C/ Fermín Caballero, 54, S.S. 1-1
28034 · Madrid, Spain

M & L HQ
Av. Primero de Mayo, 18
46017 · Valencia, Spain

BRASIL HQ
Av. 17 de Agosto, 2666, Apto. 504
CEP 52061-540 · Monteiro (Recife)

T (+34) 6889-ACQUA [6889-22782] - info@acqua-e.com

www.acqua-e.com