Municipal Wastewater
creating value in water through innovation, creativity and expertise

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A New Global Force in Water

As society and the global economy demand more and more from water, there is a growing requirement for ever more specialist applications to manage clean water, to create specialist process waters, to treat wastewater, to extract energy from wastewater and to champion the reuse of water.

The 2010 merger of Eimco Water Technologies, Enviroquip, Aqua Engineering and Christ Water Technology plus many smaller specialist firms allows Ovivo to offer a unique combination of advanced solutions, probably the most significant application knowledge base in the world and some of the best brains in the business.

Ovivo aims to become the water partner of choice for clients in the public and private sectors and the leading source of water expertise for engineers and consultants across the globe.

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Ovivo - bringing water to life
Our Role in your Industry

The treatment of wastewater is integral to the protection of fresh water resources. Treatment uses a combination of mechanical, biological and chemical processes to remove particles and suspended solids, organic pollution, nitrogen and phosphorous. Mechanical processes comprise screening and sedimentation for solids removal, and biological treatment removes organic pollution and nitrogen. The remaining sewage sludge must be treated before disposal, but is also a source of energy via anaerobic digestion.

At Ovivo, we continually seek to formulate new methodologies to assure extremely high levels of plant performance. We also work to develop and supply economic, efficient and environmentally friendly wastewater treatment technologies. Having considered the best technical solutions available, we can take full responsibility for supply, or provide equipment and solutions for the individual elements of wastewater treatment.

Ovivo is one of the world’s leading suppliers of high performance separation technologies for wastewater treatment, a position we attained through resolute concentration on technical development of consistent, high quality outputs. As the demand for domestic water continues to rise, there is a growing need to find innovative and cost-effective recycling solutions. As a global developer and supplier of water and wastewater treatment technologies, we have a thorough understanding of the challenges inherent in municipal wastewater treatment, and continually strive to provide the most economic, environmentally friendly and effective process solutions for our municipal clients.

Sludge is an unavoidable end-product of wastewater treatment, and its treatment and disposal is a significant consideration in the design of effluent treatment works across the world. A number of technologies are available to stabilize dewater and recover energy from sludge and the selection of the most appropriate is dependent on a range of factors, including consideration of end-quality and routes of disposal. Ovivo is well placed to assist or advise on this.

Our wastewater management concepts are essentially based on combinations of different process solutions built from Ovivo’s key technologies - screens, clarifiers, biological treatment and membrane filtration - and combined with other world-class technologies within our portfolio. Using many decades of experience, we are committed to the development and supply of improved water treatment technologies.

With thousands of water industry installations worldwide, our experience and expertise enables us to add value to client processes by improving reliability and fulfilling environmental requirements.

Treatment of wastewater to achieve a final effluent quality suitable for safe discharge direct to a water course presents a variety of challenges. With over 100 years of combined experience in this market Ovivo has the expertise to offer practical, effective and cost-efficient solutions in all areas of your wastewater treatment plant.

Creating Value

“At Ovivo, we are delivering solutions today that meet the wastewater challenges of tomorrow. One area which we can generate further drinking water supplies is in the processing of wastewater.”
In-house Products

Combined Sewer Overflows
Emergency overflows or discharge points are incorporated along the length of a sewerage network to overcome excessive surging in of the network. These are called Combined Sewer Overflows, or CSOs, and are designed to allow excessive stormwater flows to spill into open/surface water courses. Ovivo has developed a range of CSO screening solutions to prevent unsightly debris entering receiving water courses under storm conditions.

Primary or Preliminary treatment
Primary treatment covers the removal of bulk solids that could cause problems in the downstream biological processing step. It includes screening, and grit and grease removal and the removal of settleable solids.

Headworks
Effective headworks screening is essential to the efficient operation of any municipal wastewater treatment plant. Most machinery breakdowns are the result of contaminants that should be removed at an earlier stage. Effective grit handling and screening are essential to the overall treatment process to ensure cost-effective operation and to prevent the incidence of ragging and floatables.

Screening & Screening Handling
The first treatment stage for most municipal wastewater is screening and our world class solutions for this part of the process (using the proprietary technologies of Brackett Green, Copa Tomkinson and Jones+Attwood) to remove solids and ensure efficient operation of the plant.

Our J+A Washpactor™ products are specifically designed to improve screenings handling. Our thorough washing and dewatering systems assure safer handling and enable environmentally friendly disposal of waste products.

Grit Removal & Handling
We manufacture several types of grit removal systems, each designed to provide a grit-free stream of organic influent and clean, washed grit for disposal, so prolonging the life of rotating machinery. Grit removal products include the Detritor® Grit Collector, the Aerated Grit Chamber and the Jeta® Grit Trap. Each can be supplied with close coupled grit washing classifiers of the rake or screw type. Concentrated grit streams are fed to rake and screw classifiers for efficient grit concentration and washing. Our well proven designs provide reliable low-maintenance operation to deliver a drier grit with less organic content. Ovivo specializes in retrofits for existing grit removal systems with customized designs for specific processes. We can offer:

- Efficient separation of grit from organics.
- Cost-effective designs.
- Low power consumption.
- Proven equipment with long track records.
- Years of reliable service in the harshest of environments.

For the headworks of small plants, our J+A CIS Combined Inlet System is specifically designed to handle all aspects of screening and grit handling in a single skid mounted plant.

Sedimentation
The design and manufacture of mechanical systems for sedimentation is one of Ovivo’s particular strengths. A large portion of our engineering capabilities are devoted to the design of gravity separation equipment, which is well known for its reliable low-speed, high torque drive mechanisms for sludge removal. Any unsightly floating scum which forms a blanket on the surface of settlement tanks is typically removed by surface blades to prevent problems in the downstream biological treatment process; surface blades guide the scum to a peripheral removal device.

Circular Clarifiers and Thickeners
For maximum cost-efficiency in standard applications, we manufacture pre-engineered clarifiers and thickeners in many different designs: centre drive bridge-supported mechanisms for basins up to
15 meters in diameter, column-supported designs for basins from 9 to 31 meters in diameter and peripheral, traction drive units are custom-designed to specification. Component clarifiers are available for primary or secondary service, and a number of accessories offer a wide range of options and facilitate adaptation of the basic mechanisms for specific requirements or situations.

**Sedimentation Drives**
We are the world's largest supplier of industrial sedimentation drive devices. Convenient, economical service is a design priority; with routine maintenance, many of our drives are still operating after 40 years of continuous service, with their original gears and bearings still in place.

**Rectangular Basins**
Ovivo produce various scrapers and systems for the removal of sludge and cleaning of rectangular settlement tanks and basins which are employed in some cases. These include rectangular tank scrapers that are mounted on traveling bridges, chain and flight type scrapers and tipping buckets. These units are generally designed to suit and are, as with all equipment designed to be robust with reliability, operability and lowest running costs in mind.

**Secondary Treatment**
Secondary treatment removes dissolved and suspended biological matter, and is typically performed by indigenous, water-borne micro-organisms in a managed habitat. Most municipal plants treat sewage liquor using via suspended or attached growth systems.

**Attached Growth**
Under this system, the biomass grows on a physical carrier within a film with oxygen supplied by natural exposure; this type of system is ideally suited to smaller, unmanned or part-manned works.

**Trickling Filter**
Rotating center assemblies are available with circular pipe or rectangular arms, with variably sized orifices and flow spreaders positioned to ensure uniform distribution. Normally, hydraulic energy provides the driving force for rotation, but electric drives with speed sensor and slip-clutch arrangements or constant speed drives are also available.

**Rotating Biological Contactor (RBC)**
Environmentally friendly and extremely cost-effective when compared to alternative treatment solutions, our range of RBC systems meets exacting discharge quality requirements and removes soluble, biodegradable, organic materials from sewage, achieving high quality effluent that is safe for discharge.

**Suspended Growth Systems**
In these systems the biomass is mixed with the sewage and oxygen supplied by external methods. Suspended growth systems occupy a smaller space than attached growth systems, and treat the same amount of wastewater. These activated sludge type systems can be developed to provide biological nutrient removal.

**Cleartec® Technology**
IFAS (Integrated Fixed-film Activated Sludge) is an economical solution for the upgrade and expansion of existing activated sludge systems.

IFAS is particular to plants where (due to limited space or budgets) additional aerations basins cannot be accommodated. IFAS combines attached biological growth with suspended biological growth. A solid support media is immersed into a basin in which biological growth also takes place in suspension. The media then provides a surface for the growth of attached biomass. This combination of attached biological growth and suspended biological growth is a more efficient wastewater treatment system because there is an increase in the overall active biomass volume for a given system. Ovivo is an equipment partner of the Cleartec® System to provide updates for an IFAS system with robust textile media.

**EWT™ FlooBed® MBBR Bioreactor**
The FlooBed® MBBR is a high-loaded biological treatment system that uses an advanced carrier element and optimized EWT™ aeration and mixing. Micro-organisms form a biofilm on the surface of carriers and remove organic compounds and nutrients. These carriers are suspended in the reactor, and are efficiently mixed through aeration. FlooBed MBBR designs are flexible to suit each application. The filling ratio of carriers can therefore be adjusted according to flow, load and environmental requirements. Existing processes can be easily upgraded with the FlooBed rebuild process.

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Copa® HBNR
The Copa® HBNR Hybrid Biological Nutrient Removal process offers a proven, economical, reliable treatment of wastewater where low effluent concentrations of nitrogen and phosphorus are required. Denitrification not only reduces the level of nitrogen in the effluent, but provides additional process stability by preventing nitrogen de-gassing and resultant sludge flotation during the clarification phase. Over 600 Copa HBNR units are now operating worldwide.

Conventional Activated Sludge
The overall wastewater treatment process includes primary treatment for the removal of particulate solids before the use of activated sludge as a secondary treatment to remove suspended and dissolved organic solids.

The conventional activated sludge process has been the mainstay of sewage treatment for over 100 years. It is an aerobic (oxygen-rich), continuous-flow, biological treatment of wastewater, which comprises an aeration basin - with air as the oxygen source - where soluble organic materials are absorbed through the cell walls of micro-organisms to be broken down and converted to more micro-organisms, carbon dioxide, water and energy. Insoluble (solid) particles are adsorbed on the cell walls, transformed to a soluble form by enzymes secreted by the micro-organisms, and absorbed through the cell walls to be digested and used by the micro-organisms in their life-sustaining processes.

The micro-organisms stick together to form floc, which settle and grows by colliding with insoluble organic materials, the micro-organisms digest these adsorbed materials, thereby opening sites for more materials to stick.

The aeration basin is followed by a secondary (settling) tank where the flocs settle out; a portion of the settled flocs, called sludge, is recycled to the aeration basin to maintain an active population of micro-organisms and an adequate supply of biological solids for adsorption of organic materials. Excess sludge is piped away.

Clarification
A further clarification process is used to separate the treated water from the sludge after biological processing. The design of this final clarifier is critical to ensure quality treated water. Sludge has to be removed rapidly and effectively to prevent floating sludge and septic conditions.

Ovivo offers several methodologies to ensure rapid extraction of sludge. These include: duct type suction clarifiers which remove settled solids via a rotating suction header located at the bottom of the clarifier; pipe type suction clarifiers which deliver sludge to a central hopper or radial trough; logarithmic spiral blades which ensure sludge is quickly raked to a central header.

Enhanced Clarification
Enhanced clarifiers reduce effluent solids and BOD with optimized mechanisms that handle peak hydraulic and solid loads. They feature enhanced flocculation, rapid solids transportation and higher underflow concentrations. Coupled with reduced effluent solids, this can result in reduced capital costs and operating expenses.

Tertiary Treatment
Further purification is achieved during the tertiary treatment phase.

Tertiary treatment is where treated water is sometimes disinfected - chemically or physically - prior to discharge into a stream, river or wetland, or used for irrigation. If the treated water is sufficiently clean, it can also be used for groundwater recharge or for agricultural purposes.

Tertiary Filtration
Ovivo’s Low Head filters are often a suitable system for this with their low head loss design and integral backwash means that they can often be fitted into the gravity flowsheet. Therefore, no additional pump station or backwash holding tank is required. They are low profile (and so have minimal visual impact) and fully automatic (thus require minimum operator attention).
**Disinfection**
The ultimate aim of disinfection is to provide a water which is free from any pathogenic micro-organisms; in sewage disinfection, destruction of pathogenic micro-organisms in wastewater is achieved by physical or chemical means.

**Membrane Bioreactors (MBR)**
Membrane Bioreactors offer high quality, sanitary effluent in compact systems without the need for secondary clarification or tertiary treatment.

The MBR Technology process is shaping the way we view wastewater treatment and water conservation around the world. The process produces a high quality discharge permeate to meet the most stringent of discharge requirements. Water re-use is possible by employing simple, flat sheet membrane panels housed in stainless steel units and a coarse bubble aeration system below each unit. A series of these membranes are submerged within an activated sludge treatment tank; the aeration generates an upward cross-flow over the membranes, which is essential for minimizing any fouling of the filtration surface. Hydraulic flow determines the required number of membrane units. Treated effluent is removed from the membrane units using gravity head or pumped suction.

The MBR Technology system features a number of inherent advantages. The process requires no secondary settlement stages and no additional tertiary treatment or UV stages to achieve a very high disinfection quality: typically better than 5:5:5 (BOD:Suspended Solids:Ammonia).

Experience of operating our MBR plants has shown consistently high effluent quality that is generally independent of variations in feed strength; disinfection of bacteria and viruses exceeds global limits for bathing water or recreational water standards.

**Aerobic Digestion**
Aerobic digestion is the decomposition of organic matter in sewage sludge by micro-organisms into carbon dioxide and water in the presence of oxygen, and is achieved via our Enviroquip Pre-thickened Aerobic Digestion (PAD) processes.

**Anaerobic Digestion**
Anaerobic digestion is the biological treatment of wastewater without the use of air or elemental oxygen. Our EWT EIMIX Mechanical Sludge Mixer, LM Mixer and UltraStore gas holder and steel digester covers product range use anaerobic micro-organisms to convert organic pollutants into a gaseous product with the potential for reuse and energy generation.

**Sludge Dewatering**
There are a number of methods for sludge dewatering.

**Drying beds**
These are shallow rectangular beds, divided into small compartments with porous materials in their bottoms; sludge is poured and drainage occurs through the bed. Finally, the sludge is collected and removed.

**Filter Press**
In a filter press, sludge is fed at high pressure into filter cloths mounted between frames where the dewatered sludge collects and is periodically removed on a batch basis. A variety of designs of plate, frame, opening mechanisms, shifters and special designs (including a membrane squeeze) are available to suit the most demanding of conditions.

**Belt Press**
Thickened sludge is fed between two filtering belts which are subsequently passed between a succession of rollers to dewater the sludge. In the event that thickened sludge is not available a gravity drainage belt can be provided on top of the press. This continuous process is automatic and requires minimal operator involvement.

**Centrifuge**
Thickened sludge is passed to a high speed decanter centrifuge where the water is forced out by centrifugal force. This continuous process requires the minimum of operator involvement and delivers excellent sludge dryness.
CINETIK®
CINETIK® systems use electricity and controlled mechanical pressure to extract further water from mechanically dewatered sludge cake. Applying an electrical field across the sludge induces electro-osmosis, pulling on the water molecules instead of pushing on the sludge.

Our Turnkey Capabilities
When it comes to water, being conservative makes good sense. From an initial evaluation of the best technical solutions through to commissioning and beyond, Ovivo can deliver a combination of wastewater treatment strategies that will save money and extract the maximum possible value from water.

We are a client-focused solutions provider committed to being the preferred partner for each of our clients, seamlessly bringing together our extensive portfolio, process know-how and project management expertise to provide the most economical and environmentally friendly.

With project management, design, process, mechanical, electrical and chemical engineering skills, the Ovivo team can provide solutions across a wide variety of contractual arrangements, from equipment supply to partnerships to full turnkey contracts. The global experience of our project managers allows us to minimize project risks and to deliver our projects on time and on budget.

Whether you require new equipment, rebuilds, retrofits, upgrades or optimizations, our engineers will work with you to understand your problems, needs and motivating factors so that we can determine the best solution for you.

Being strongly disciplined in planning, organization and the management of resources and with specialist knowledge of wastewater treatment, Ovivo consistently achieves all project goals and objectives while honoring project constraints.

We respect our global environment and recognize that clean water is a limited resource. Encompassing all aspects of water management, we use the best available technologies in our solutions, from intelligent water intake to purification - returning clean water back to nature, ready for reuse.

Our complete process solutions offer excellent performance characteristics and a range of ongoing operational support contracts, from service agreements through process optimization services and maintenance contracts. Combining our own in-house technologies with other world-class equipment, our engineers take pride in finding the most economical, efficient and environmentally friendly solutions for your application.

Project Management
Our integrated solutions include:
• Feasibility Studies.
• Process & Engineering Design.
• Project Management.
• Construction.
• Installation.
• Commissioning.
• Operation & Service.

Following installation and commissioning, our aftermarket team provides a range of on-going operational support contracts from service agreements through process optimization services to full operational and maintenance contracts.

Global Support
In addition to providing a complete line of process equipment, Ovivo is your source for everything necessary to meet the total needs of your project.

Flowsheet Capabilities
Our engineers can help you with the design of your total flowsheet, ensuring that all your equipment will work together for optimal performance and ease of operation.

Tankage and Erection
We take the hassle out of coordinating an independent contractor who may not be familiar with all the details necessary to install your thickener or clarifier. Our experienced tankage and erection crews can save you money and time by doing all your field work and turning over to you a troublefree machine.

Upgrades and Retrofits
Wastewater technology is constantly advancing. Let us show you how you can incorporate state-of-the-art design improvements into your existing equipment. Many upgrades can pay for themselves in a matter of months and help increase capacity as well as improve performance.
Case Study Wastewater Treatment Plant
J.P. Vodovod Kanalizacija d.o.o., Ljubljana, Slovenia

Brief
As the main contractor, to deliver the turnkey contract for the design, supply and erection of electrical and mechanical equipment, instrumentation and start-up for the 103,500 m³/d Ljubljana Wastewater Treatment Plant.

Solution
Key to the award was the fact that our proposal offered the best life cycle cost for the municipality.

We provided project management and contract administration for the new works at Ljubljana and supplied the mechanical process plant of wastewater and sludge treatment as well as providing commissioning services, training and 12 months operation.

Influent initially passes through primary and then fine screening, then sand and grease removal, aeration and secondary clarification. Sludge is pre-thickened before entering the digester, and is then post-thickened before dewatering and drying, reducing the volume for and cost of disposal. The biogas produced is then used for heating the plant.

Outcome
Ljubljana Wastewater Treatment Plant handles mixed municipal and industrial wastewater streams, with a capacity of 103,500 m³/d (a Population Equivalent of 360,000). Effluent quality exceeds SS: 35 mg/l, NH₄-N: 10 mg/l, BOD 20 mg/l, COD 100 mg/l.

How we created value
- Delivered comprehensive equipment package.
- Provided effective systems for industrial and municipal wastewater treatment.
- Acted as main contractor for WWTP with a capacity of 103,500 m³/d.
Our Municipal Wastewater offering

Discover the ways we can help you with your wastewater challenges and help save you money.
Anaerobic Digestion

Sludge Handling

Hybrid Biological Nutrient Removal (HBNR)

Tertiary Filtration

Ultra Violet Sterilizer

Reverse Osmosis

Membrane Bioreactor (MBR)

Submerged Aerated Filter (SAF)

Conventional Activated Sludge

Ultra Filtration

Discharge to Bathing Waters

Reuse for Irrigation

Treated Water Discharge

Municipal Wastewater

Ultra Filtration

Sludge Handling

Anaerobic Digestion

Tertiary Filtration

Hybrid Biological Nutrient Removal (HBNR)

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Case Study
Municipal Wastewater Treatment Barcelona, Spain

Brief
ACA (Agencia Catalana del Agua-Catalan Water Authority) wished to expand the Terrassa Wastewater Treatment Plant, just north of Barcelona. The contract for the works was awarded to FCC Castruccio. The Terrassa expansion used Ovivo’s Integrated Fixedfilm Activated Sludge (IFAS) system, becoming the world’s largest IFAS reference site.

Solution
Ovivo’s IFAS system improves effluent quality, removes nutrients and increases the existing plant’s capacity by introducing extra biomass growing surfaces into the bioreactors. Additional surface area comes from numerous polypropylene biotextile curtains submerged in fine bubble-aerated zones in four bioreactors. Each bioreactor has forty-two IFAS cages installed on rails over a gliding system, so cages can be moved for maintenance without removing them. This reduces costs and disruption at the site, whilst increasing the plant capacity by 25% from 60,000 to 75,000 m³/day. Three 43 meter-diameter secondary clarifiers have been totally refurbished to improve secondary settlement and achieve better effluent parameters.

A full-scale module showed how the polypropylene biotextiles worked and permitted oxygen transfer tests. A small pilot biotextile cage was used to run performance trials.

Outcome
The plant is able to treat 75,000m³ of wastewater per day. Pilot trials during the installation, showed the new plant exceeding required results before becoming fully operational in summer 2010.
Prolonging the efficient life of your assets

Ovivo recognizes that for any partnership, service is a key requirement of our clients.

Through just a single point of contact, you can access not only our proven technology and process solutions but also excellent aftermarket support. We boast a worldwide network of certified technicians committed to the provision of a high quality service including after sales client support.

Ovivo technicians can ensure that all aspects of health and safety certification are in place and are thoroughly trained on our complete range of equipment. They can also provide product and service support for complete customer care.

Our service division takes pride in carrying out complete installations, maintenance and repair services in a professional, friendly and customer focused manner.

We offer:
• Full life cycle service commitment.
• Professional installations undertaken by specially trained engineers.
• Commissioning carried out by fully qualified in-house electrical / mechanical departments.
• Operations training.
• Spares supply.
• High quality refurbishments, offering substantial operations and capital expenditure savings.
• Year-round 24 hours a day, 7 days a week support.
• Emergency cover around the clock for peace of mind.
• Planned service schedules.
• Emergency call-outs.
• Extended warranties on request for excellent value added service.

Prolonging the efficient life of your assets
## Applications and Solutions

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