

NEW GENERATION



WASTEWATER TREATMENT PLANTS

HISTORY



1990

Establishment of the Company.



1991

Development of the ERSH® package type wastewater treatment plants based on the method of immobilisation of microorganisms with a synthetic ERSH® filling.
Registration of patents for technologies and equipment for wastewater treatment.

2005

Launch of production block-modular type treatment plants.

2006

Launch Projects in Saudi Arabia.
ISO 9001 Standard certification of the company.



2010

Start of new innovative Megapolis Project — zero emission biological treatment plant.
Establishment of an ECOS Branch in Saudi Arabia (Riyadh).





2011

Establishment of our own design institute (South Design Institute). Establishment of a GRP vessel factory. Collaborative study, in cooperation with the Vinogradsky Institute of Microbiology, Russian Academy of Sciences, of anammox bacteria application in treatment of low concentration wastewater.

2013

Launch the Project “Up-grading of Manfouha WWTP” in Riyadh, Kingdom of Saudi Arabia.



2014

Completion of the first Zero Emission WWTP Megapolis® with a capacity of 18000 cbm/d for the Skolkovo Innovation Centre.

2015

The research team under the leadership of Company’s founder Dr M. Zubov is awarded the Russian Government Award in Science and Engineering for developing the scientific basis and implementation of a new biochemical technology of wastewater treatment using anammox bacteria.

2016

Part of the Rostec Corporation.



INNOVATION

Development of new optimal solutions, elaboration of science intensive ideas in environmental engineering and its implementation in practice have always been ECOS advantages.



Among the most important results in this direction are studies of ANAMMOX bacteria and its role in treatment of low-concentrated wastewater. This study was conducted in cooperation with the famous State Institute of Microbiology named after Vinogradskiy of Russian Academy of Sciences. The joint studies were carried out in ECOS Biochemical Waste Water Treatment Plants ERSH® series. Results of this work - new patents for invention and utility models.

By today this method has been implemented in a new process chart developed by ECOS.

The research team is awarded the Russian Government Award in Science and Engineering.



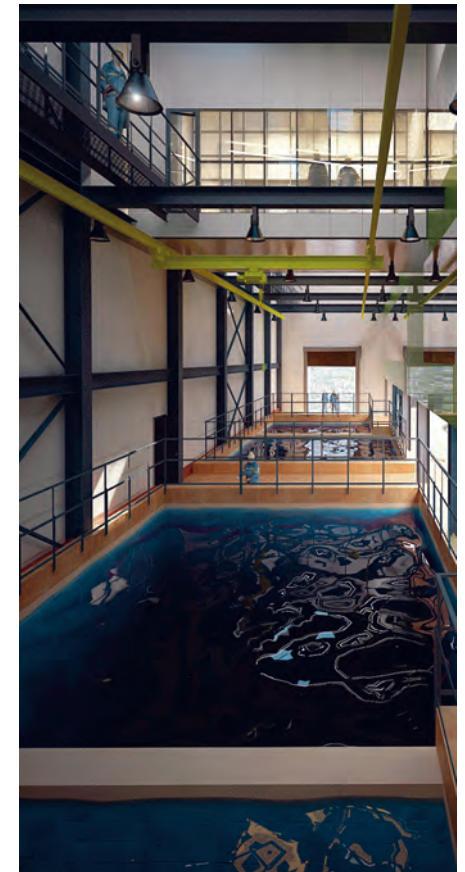
KEY TECHNOLOGICAL ADVANTAGES



- Economic efficiency
- Energy efficiency
- Water reuse
- Space saving



- The prime cost of 1 cbm of treated wastewater by ECOS technology is cheaper than membrane technology.
- ECOS technology allows to reuse wastewater after purification for irrigation and industrial purposes.
- Sanitary protection zone is decreasing in 5-6 times compared with conventional design WWTP.



WWTP ON TURN KEY BASIS

We are ready to undertake complete responsibility on the project, starting from setting its clear targets and finishing with project operating and maintenance.

We can suggest three basic forms of cooperation. Customer can choose to allocate us for any of the following parts of the project.

BASIC DESIGN » DESIGN & BUILD » B.O.T.



BASIC DESIGN

We develop basic design for reconstruction or new construction project in accordance with Client's RFP.



At this stage all key engineering solutions and our branded know-how are being included in the design. Detailed drawings are elaborated by specialized construction company to be brought by Customer. Our obligations also include testing and commissioning of WWTP Facilities.

DESIGN & BUILD

Detailed design of project's, mechanical and electrical components.

ECOS scope:

- develop basic and detailed design, perform civil works;
- supply and install equipment;
- provide equipment's testing and commissioning;
- hand-over of improved or newly constructed.

Customer scope:

- development of RFP;
- financing of works;
- supply of wastewater for commissioning.

B.O.T.

B.O.T. – is a form of cooperation based on real partnership with Client. This business model is well known and successfully implemented all over the world.

B.O.T. includes design, procurement, construction, testing and commissioning and project operation during the contracted period of time followed by project hand-over to Client. In this case we are responsible for project financing and cost efficiency.



WWTP DESIGN & CONSTRUCTION

Our Company's key competence is process engineering.

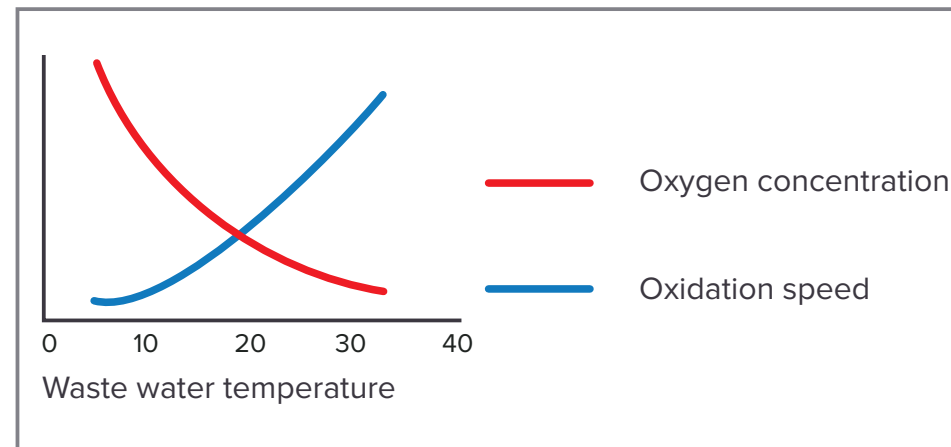
We deeply understand treatment process and always take local conditions into consideration.

There are plenty of various process solutions offered on the water treatment market. Many of them standardized and successfully applied in different parts of the world. At the same time we must pay attention to some specific local conditions, especially in hot climate regions.

This leads to correction and adaptation of process charts to guarantee high efficiency performance of treatment plants and reduction of operation and maintenance cost. Among specific factors we must point out high temperature (up to 35°C) of influent wastewater and deficit of sweet water sources.

Results of wastewater temperature increasing are:

1. Increasing of oxidation speed of impurities.
2. Decreasing of dissolved Oxygen concentration.



Many countries are suffering from deficit of pure water sources. This situation increases their demand to process solutions enabling reuse of treated wastewater for agriculture or industrial purposes. Usually filters with granular filling are used for final treatment.



ECOS has developed and successfully implemented its own ERSH® technology with synthetic filling. It provides higher treatment efficiency (up to 70%) for Suspended Solids (SS) comparing with conventional granular filling (up to 50%).

ERSH® filter systems provide SS concentration in treated effluent 5 mg or less. It has advantages, such as bigger dirt capacity (longer period of time between backwash operations compared with granular filters). ERSH® filling serves many years without replacement, it does not require big quantity of backwash water.



WWTP IMPROVEMENT

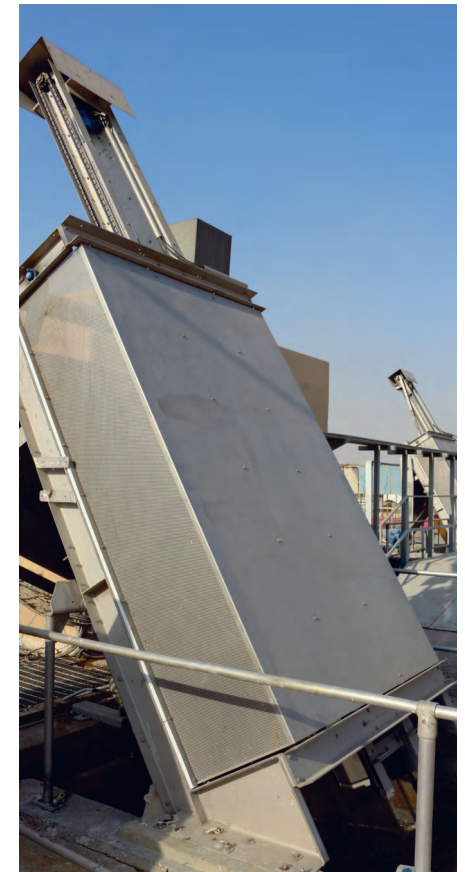
Advanced up-to-date technologies and modern energy-efficient equipment, innovative solutions, sufficient experience.

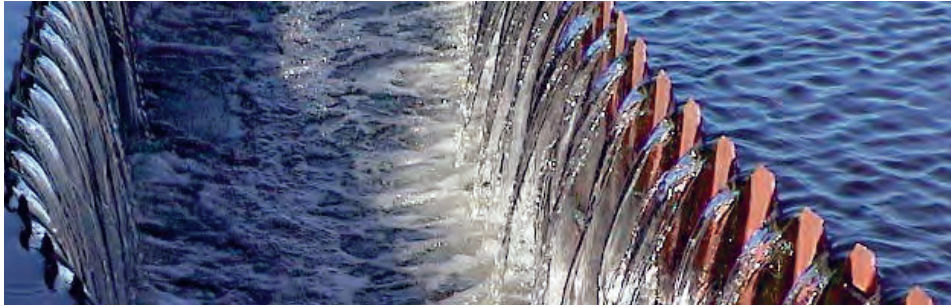
**ENGINEERING » IMPROVEMENT » DESIGN » PROJECT
INSPECTION TARGETS IMPLEMENTATION**



Most of the currently operating municipal treatment plants need reconstruction. In many cases WWTP are rather old and doesn't meet today requirements in respect to:

- treatment quality,
- O&M costs,
- economic efficiency,
- possibility of reuse the treated water,
- sludge,
- other by products and services.





ENGINEERING INSPECTION

Any upgrading of the WWTP starts with comprehensive inspection of all treatment facilities, analysis of quantity and quality of influent raw sewage.

Based on inspection results our Specialists develop technical requirements for design of stage-by-stage rehabilitation and upgrading without stopping WWTP operation.

IMPROVEMENT TARGETS

As a rule, the basic targets of WWTP improvement project are described as follows:

- upgrading WWTP capacity without increase of its area;
- upgrading operational reliability;
- simplifying of operation and maintenance works;
- process control automation;
- improvement of treatment quality;
- reduction of operating cost.

DESIGN

We offer new process methods and equipment only when we are sure in solution. All our innovative improvement solutions are well tested and efficiency is confirmed by practical experience. For any new method we propose Customer to test it on experimental unit.



PROJECT IMPLEMENTATION

ECOS professional experience gained from implementation of integrated improvement projects in Russia and other countries. The experience we have make us absolutely confident together with our Customer in successful performance and achievement of project goals and tasks.

SOME REFERENCES

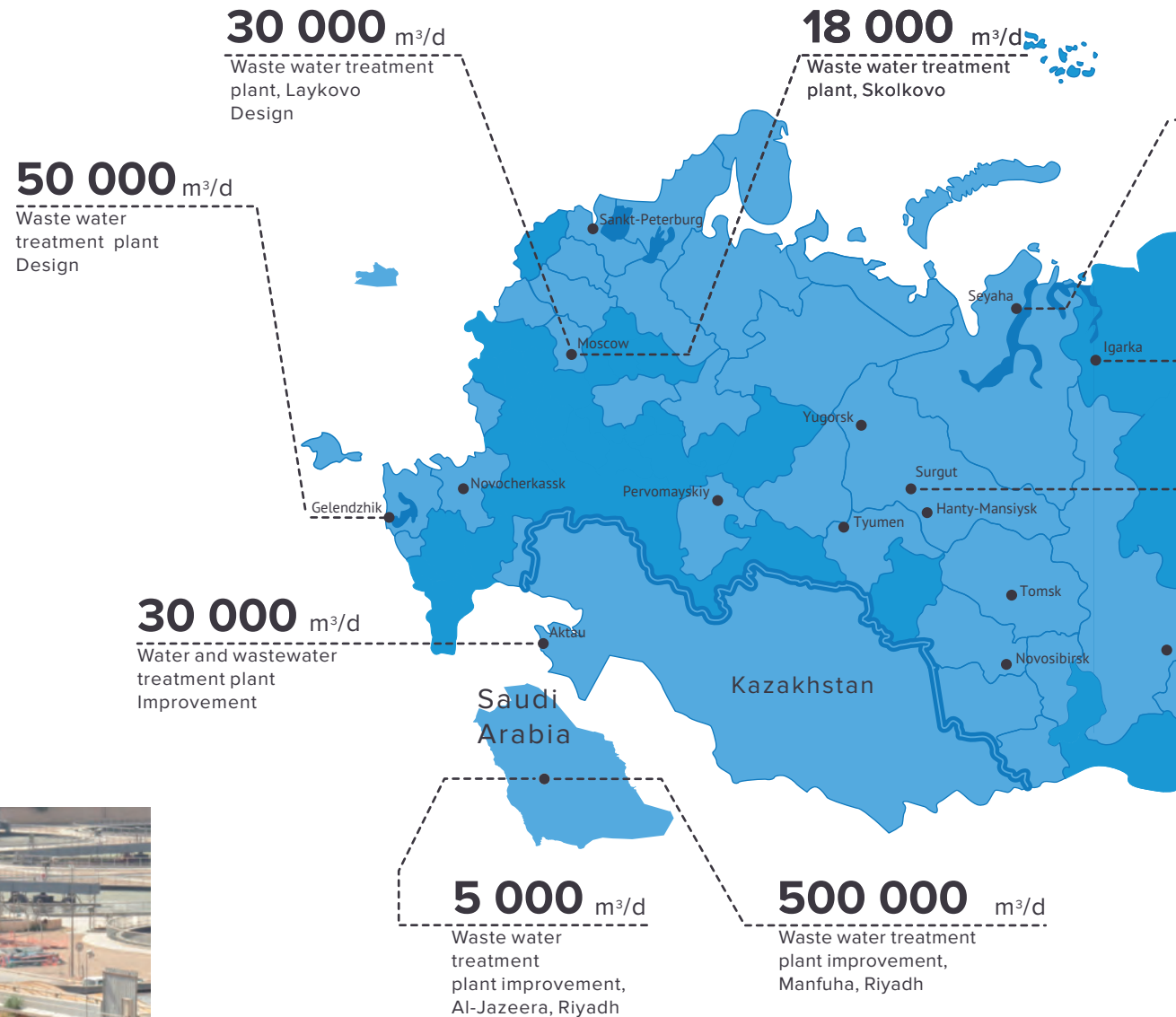
Al-Jazeera, KSA



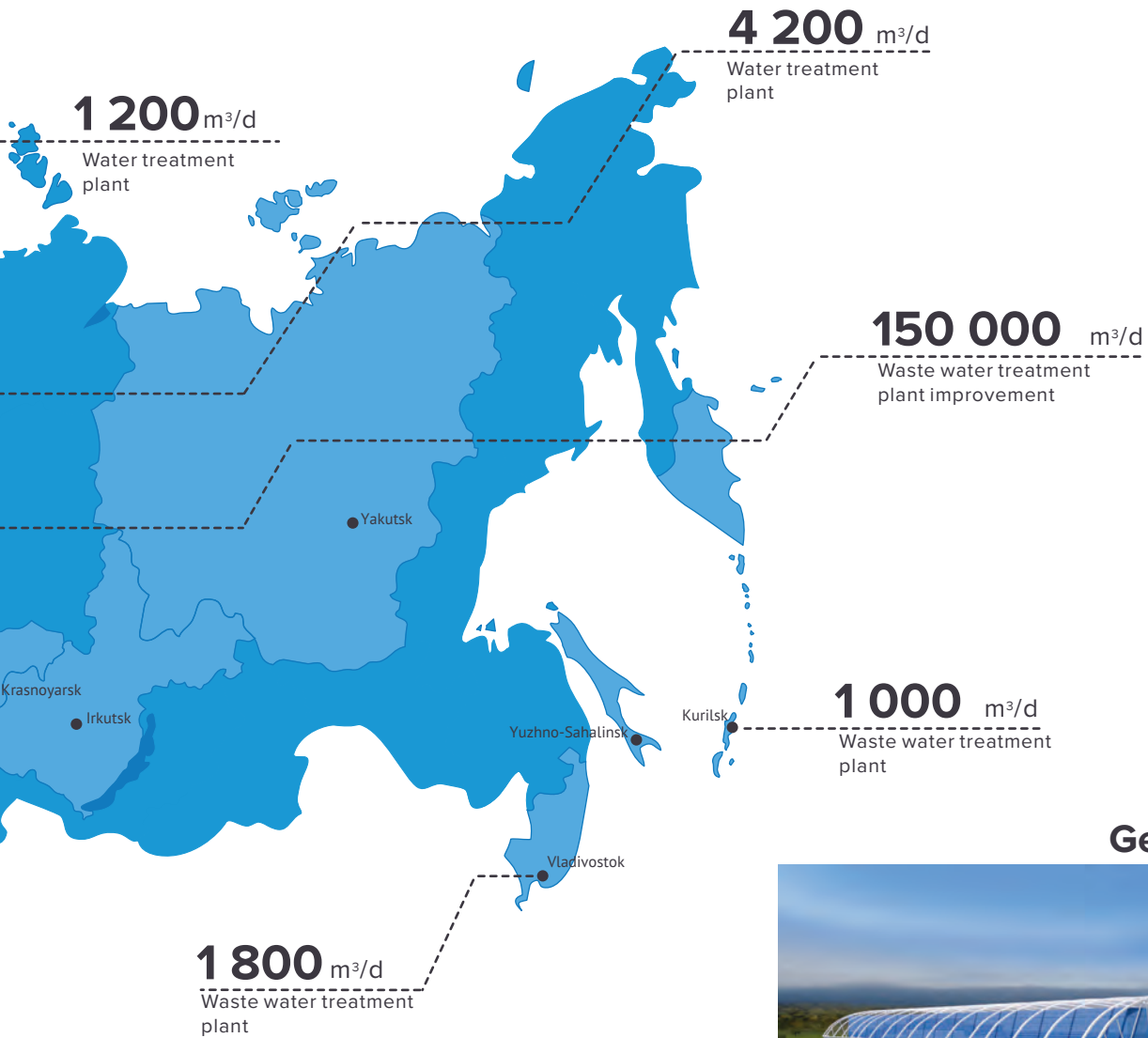
Laykovo, Russia



Manfouha, KSA



IMPLEMENTED MORE THAN **400** PROJECTS.



Skolkovo, Russia



Surgut, Russia



Gelendzhik, Russia



WWTP – 5 000 AL-JAZEERA

Improvement of Al-Jazeerah WWTP Riyadh, Saudi Arabia

Customer: Ministry of Water and Electricity.

Project goals:

- Decrease SS and Biological Oxygen Demand (BOD) from 30 mg/l to 10 mg/l.
- Improve WWTP capacity from 3000m³/day to 5000 m³/day.

ECOS suggested the Customer to:

- make significant improvement in the process chart.
- Apply for the final treatment process ERSH-Anthracite Filters, specially designed by its engineers.

All targets were achieved even with better performance. During 265 days of warranty operation average influent SS and BOD concentrations were 41 mg/l and 42 mg/l respectfully. Effluent concentrations did not exceed 9 mg/l for SS and 8.8 mg/l for BOD.

As a result of implementation innovative process solution WWTP ECOS managed to:

- upgrade the treatment efficiency by more than 78%.
- Upgrade the the capacity by 2000 m³/day (170%).
- OPEX increased by 0.03 USD/m³ (10%) only.



WWTP - 500 000 MANFOUHA



Upgrading of North and East Plants in Riyadh, Saudi Arabia

- In 2013 ECOS has won an international tender for upgrading two central wastewater treatment plants in the capital of Saudi Arabia, Riyadh. In order to increase the capacity and improve the treatment quality to a level allowing reuse of the purified water for industrial and irrigation purposes. Improve WWTP capacity from 3000m³/day to 5000 m³/day.
- The Customer of the Project is the National Water Company (NWC).
- The Manfouha treatment facilities consist of three wastewater treatment plants, called the North, East and South, with a total throughput capacity of 600 000 m³/day. (200 000 m³/day per plant).
- The Project task was to upgrade the North and East Plants, bringing them in line with modern requirements, and to increase the total capacity by at least 100 000 m³/day. The total throughput capacity of the two plants after upgrading should be 500 000 m³/day.
- Under the terms of the contract, these tasks was fulfilled only through optimization process, without any additional facilities being constructed. At the same time, both plants were to operate without interruption or any deterioration in the existing indicators during upgrading.



WWTP - 150 000 SURGUT

Upgrading of wastewater treatment facilities in Surgut, Russia

In 2005 ECOS completed upgrading of WWTP in Surgut, one of the oldest cities in Siberia.

WWTP had two stages with the same process flow of biological treatment and a total capacity of 100,000 m³/day.

ECOS has made comprehensive survey of the treatment facilities, as a result we set the following goals:

- 50% performance improvement (up to 150,000 m³/day).
- Improvement of the wastewater treatment quality.
- Construction of an advanced treatment unit.
- Upgrading of the sludge dewatering plant.
- Integrated process automation of processes.

Solution:

All upgrading works were carried out in accordance with the design, without no shutting down of the treatment facilities by step-by-step putting out of taking stages out of operation of stages one by one and diverting the and diversion of flow. At the final stage of the project, works were carried out on integrated automation of plant.



WWTP - 18 000 SKOLKOVO



Construction of a Megapolis® WWTP, 18 000 for the Skolkovo Innovation Center, Moscow, Russia

In 2014 the ECOS completed construction of the first Megapolis Plant for the Skolkovo Innovation Center. The treatment facilities were constructed from scratch and designed for reception and treatment of wastewater in a volume of 18 000 m³/day.

- The Megapolis® Plant applied in the project, which is an innovation by ECOS with zero emissions, unconditionally has won the Client's tender owing to a number of advantages over conventional treatment facilities.
- The plant is extremely compact, with the appearance of a single, circular building with a diameter of 48 m, a subterranean part 9 m deep and a 13 m high superstructure.
- The plant is maximally enclosed, allowing noise and atmospheric pollution to be minimized and the sanitary protection zone around the treatment facilities significantly reduced, releasing 8 hectares for housing construction.

Solutions:

- Energy efficiency indicators are unique for treatment plants with similar environmental characteristics. Power consumption is only 0.85 kWh/m³.
- People staff of all plant - 11 employers only.
- Reliable process solutions are applied at each treatment stage, this making it possible to achieve consistently high quality of treated effluent that can be used in recycling the water supply.

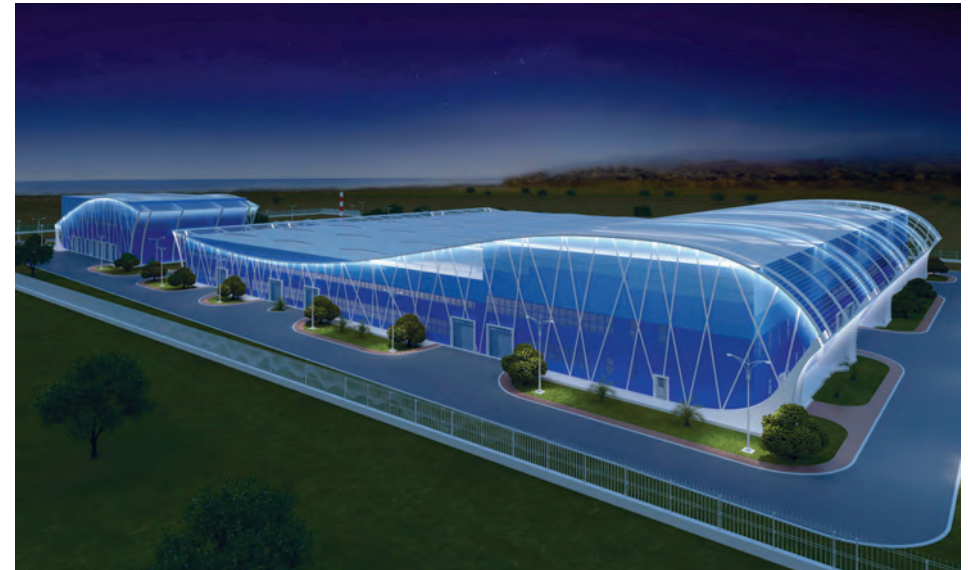


WWTP - 50 000 GELENDZHNIK

Design of a Megapolis® WWTP, 50 000 for the city Gelendzhik, Russia

In 2016 the ECOS had got the positive opinion of the Main State Expertise of Russia Federation of projecting and geological engineering survey WWTP for the Gelendzhik city.

- Plant opportunity was designed for reception and treatment of wastewater in a volume of 50 000 m³/day.
- The applied technologies allow to change the capacity of the plant's facilities in accordance with season changes.
- The Megapolis® Gelendzhik has minimum impact on the environmental. The optimal shape allows to locate all equipment and technological tanks in one building.
- Plant footprint and sanitary protection zone are reduced 6 times compared with conventional design WWTP.
- The quality of treated wastewater is very high, therefore, it can be reused for irrigation and technical needs.
- The degydrated sludge will be used like fertilizer or bio-fuel.
- Operation crew is only fifty persons.



WWTP - 30 000 LAYKOVO



Design of a Megapolis® WWTP, 30 000 for the Laykovo, Russia

- WWTP for premium dormitory and exist social infrastructure in 18 km from Moscow by Rublevo-Uspenskoe highway. Project takes care of progress in housing development on this area.
- High requirements to WWTP are motivated by keeping ecological situation and high investment attraction of the area near Rublevo-Uspenskoe highway.
- Megapolice WWTP with non-emission and optional part of membrane purification (MBR), applied in this project, has guaranteed high efficiency of wastewater treatment and attractive architecture solution.
- Influence Megapolice station to the environment minimized in contrast to traditional WWTP with open systems of aeration, collectors and dehydration areas for sludge.
- By reason of zero pollution emissions, sanitary zone around plant decrease for minimum area. High quality of treatment guarantees by implementation of optional part of membrane purification (MBR).



MEGAPOLIS® PROJECT

Our innovative solution
Megapolis is a new
generation plant with
zero emissions.

- Unique wastewater bio treatment process using Anammox bacteria.
- Megapolis is extremely compact and totally enclosed.
- All treatment processes are located in one building.
- All harmful emissions are recycled.
- Environmental pollution is reduced to zero.
- The sanitary protection zone is minimized.



ZERO EMISSIONS

The Plant is extremely compact and enclosed to the maximum: all treatment processes, sludge treatment, auxiliary operating areas and services are located in the same building. It allows the construction area to be reduced to a fifth or a sixth times. Air purification is carried out by electric charge action on gas molecules, which are subsequently captured and neutralised by special filters. Environmental pollution is reduced to zero and thus the sanitary protection zone to a minimum.

ECONOMIC EFFICIENCY

The compactness of the Megapolis® Plant and reduced sanitary protection zone allow the building construction area to be minimised and the plant to be located almost anywhere within a residential area. The area released can be used more efficiently. Reduced length of onsite utilities and number of pumping stations cut costs for construction and power consumption for pumping. The resulting treated water may be used for economic purposes and for industrial water supply, this providing additional economic benefits.

Sludge dehydrated at the plant after special treatment may be used as:

- fertiliser for agricultural purposes;
- biofuel.

MEGAPOLIS® PLANT



TRADITIONAL WWTP

MEGAPOLIS® PROJECT

Megapolis® Plants are truly innovative solutions in the field of wastewater treatment, in terms of both applied technologies and business model. The innovativeness of Megapolis® Plants is achieved by the following characteristics:

COMPACTNESS

All the processes of wastewater treatment, sludge treatment, auxiliary operation and service areas are located in the same building, and the area of construction and the sanitary protection zone are reduced to a fifth or a sixth times (compared to the standard arrangement).

GREEN OPERATION

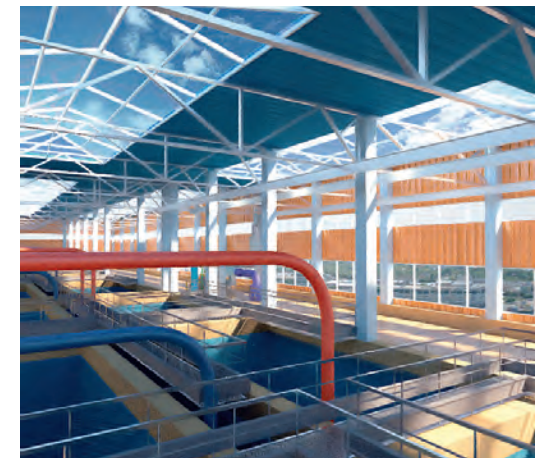
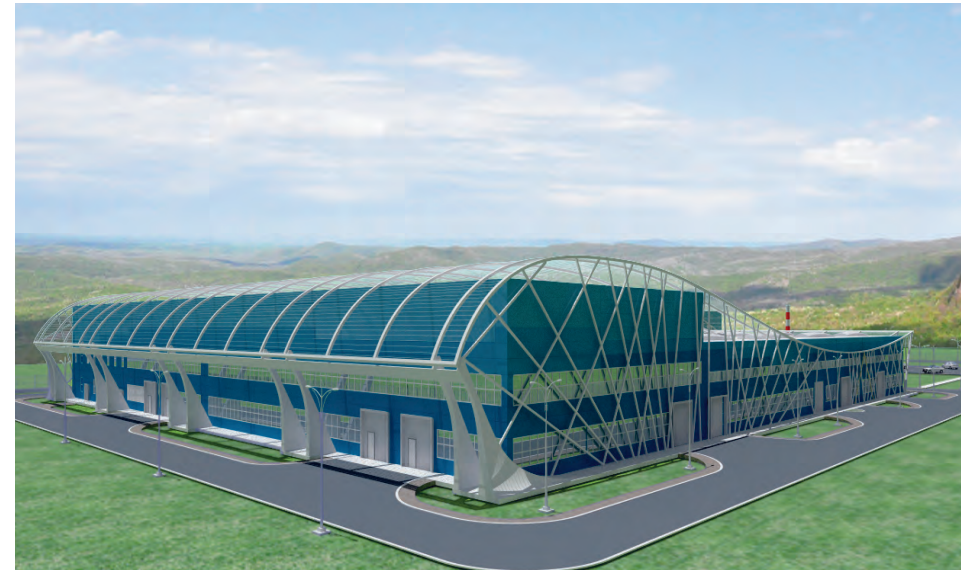
The Plant treats all resulting pollution, thereby precluding its discharge into the atmosphere.

COMPLETE AUTOMATION

Operation of the plant may be controlled even via the Internet (however, if necessary, control can be switched to manual mode at any time).

CUSTOMISATION

A wide variety of architectural and building solutions can be used in the design and construction of the plant. For example, a Megapolis Plant may be rectangular, this being dictated by economic efficiency of the solution to enclose (localise) only highly contaminated areas of wastewater treatment lines.



ENVIRONMENTAL COMPATIBILITY

Megapolis® Plants with zero emissions have minimal environmental impact, in contrast with standard treatment plants that have open systems of aeration, sedimentation tanks and sludge pits. All stages of the wastewater treatment processes are localized inside the plant and harmful emissions are treated and not released into the atmosphere, making the Megapolis® Plant the most environmentally friendly.

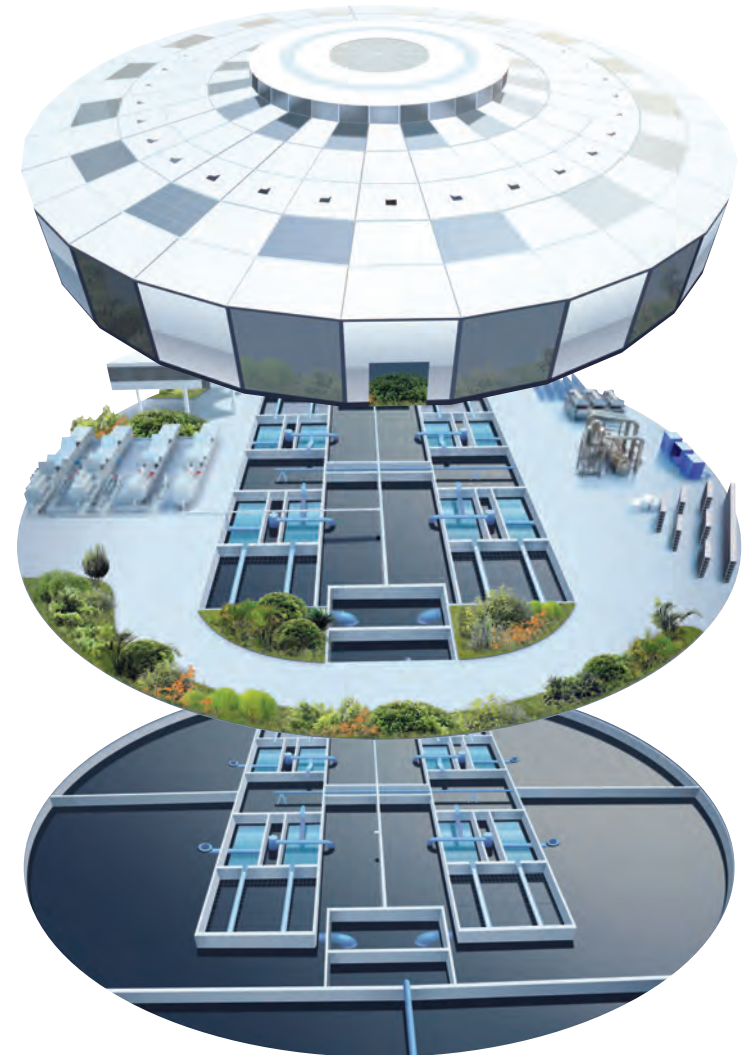
The level of treatment is very high and the resulting water can be used for many purposes, including washing streets and watering green spaces.

TECHNOLOGIES

Basically the classical cycle of wastewater treatment is used in Megapolis® Plants:

- mechanical treatment;
- full-scale biological treatment;
- tertiary treatment;
- disinfection;
- treatment of resulting sludge.

Operating and auxiliary areas, as well as service facilities, are optimally located inside the plant. A guaranteed stable degree of wastewater treatment is already provided for in the basic design. Use of optional solutions such as MBR Technology allows the list of options for reuse of treated water, from irrigation to industrial and other engineering purposes, to be extended.



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