



reVODA

MULTIPURPOSE WASTEWATER NEUTRALIZATION & PURIFICATION PLANTS



GUARANTEED SOLUTION:

- extraction of suspended and dissolved pollutants from wastewater;
- neutralization and removal of heavy metals, phosphates, phenols, chlorine compounds, acids, salts, oil products and fats from wastewater;
- reduction of COD and BOD level;
- destruction of pathogenic microflora and odors in wastewater.



COST REDUCTION:

- no need for concrete and earthworks;
- does not require capital construction;
- low material consumption during constructive execution ensures the lowest CAPEX;
- low energy consumption and minimal expenses guarantees the lowest OPEX.



TECHNOLOGICAL EXCELLENCE:

- sanitary area – 25 meters;
- lack of wetlands;
- no need for chlorination;
- no need for wastewater disinfection.

WASTEWATER NEUTRALIZATION AND PURIFICATION PLANT

is a cutting-edge and high-tech approach to the neutralization and purification of industrial and domestic wastewater, based on the physical and chemical technology of purification, disinfection and neutralization of wastewater based on the reVODA reactor.






reVODA



100% GUARANTEED RESULT OF WASTEWATER TREATMENT:




- ✓ Intensification of all separation processes (effluent / pollutants).
- ✓ Significant reduction of COD and BOD level.
- ✓ Neutralization and removal of heavy metals from wastewater by converting them into insoluble hydroxyl groups.
- ✓ Neutralization and removal of phosphates, phenols, chlorine compounds, acids, salts, oil products and fats from wastewater.
- ✓ Extraction of suspended and dissolved substances, as well as organic pollutants, from wastewater.
- ✓ Disinfection of wastewater due to the presence of a large amount of ozone in the core of the reVODA reactor.
- ✓ Destruction of pathogenic microflora due to mechanical destruction of organic compounds in wastewater.
- ✓ Neutralization and removal of organic compounds from wastewater, including antibiotics, pesticides and herbicides.
- ✓ Neutralization and complete destruction of odors.
- ✓ Neutralization and decomposition of toxic organic waste up to a neutral and safe level.

TECHNOLOGICAL UNIQUENESS OF *re*VODA

-  Purification plants are not demanding in terms of effluent composition and temperature fluctuation;
-  Purification plants are not sensitive to salvo discharges and downtime;
-  Purification plants have a high output in a small size;
-  Purification plants has low capital and operating costs, proven in various industries.
-  Strength and reliability of the reVODA plant' equipment, confirmed by 13 years of practice.

PURIFICATION LEVEL ACCORDING TO TLV

ReVODA is guaranteed to provide neutralization and purification of wastewater to any level required by the Customer:

-  Reuse of purified water for the industrial water supply applications.
-  Discharge of purified water into the drainage system (sewer).
-  Discharge of purified water into a streams, rivers or bodies of water.

ECONOMIC BENEFITS OF USING *re*VODA

COMPARED TO BIOLOGICAL WASTEWATER TREATMENT PLANTS



BY 100%

Full reduction of wetlands, return of liberated lands to economic circulation



BY 80%

Reduced capital costs when constructing new treatment facilities



BY 40%

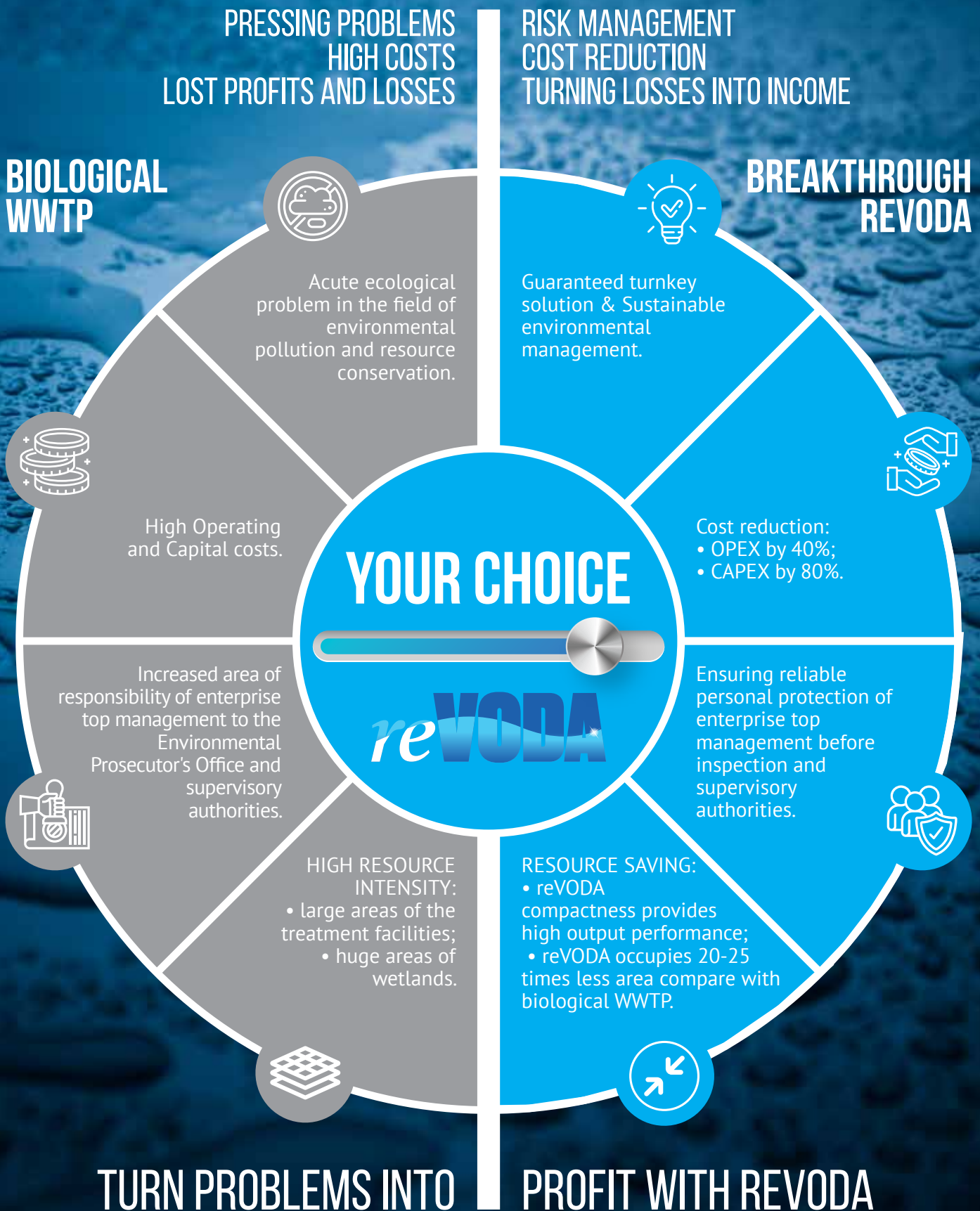
Reduced operating costs (small number of reagents, small number of personnel)



UP TO 3 YEARS

Quick payback creates conditions for the growth and development of enterprises

ReVODA perfectly solves technological, environmental and market problems that traditional biological wastewater treatment plants (WWTP) cannot cope with today and transforms them into undeniable advantages of the enterprise.



COMPARATIVE CHARACTERISTICS OF TECHNOLOGIES

CONVENTIONAL BIOLOGICAL TREATMENT

- The need to maintain a constant bacterial biomass in order to ensure complete cleaning.
- If there are toxic compounds in the wastewater, the biomass dies.
- The need for strict adherence to the technological regime to ensure the proper level of wastewater treatment.
- An inability to react flexibly:
 - to changes in effluent discharge patterns;
 - to changes in the chemical composition of effluents;
 - to natural temperature fluctuations;
 - for short/long stoppages of operation.
- Significant financial costs of construction of treatment plants.
- Higher energy consumption – $1.5 \div 2.0 \text{ kW/M}^3$.
- Sanitary area – 150 metres.
- Wetlands and biofilters need to be built.

INNOVATIVE BREAKTHROUGH *reVODA*

- + Bacterial biomass is not used.
- + Absolutely independent of wastewater toxicity.
- + Easy to operate equipment (1-2 personnel). Flexible plant operation mode (round-the-clock / cyclical with stops).
- + Not sensitive and easily responds:
 - to burst effluent and lack of effluents during plant downtime/s;
 - to the chemical composition of effluents;
 - to the temperature differences of effluents;
 - to different volumes of effluents due to parallel and series connection of reactors.
- + Lower construction and installation costs and considerably less space equipment footprint.
- + Lower energy consumption – $0.8 \div 1.0 \text{ kW/M}^3$.
- + Sanitary area – 25 metres.
- + Wetlands and biofilters are not used at all.



reVODA REACTOR

ReVODA a closed electromagnetic field reactor, which affects the purified wastewater and ensures a multiple increase in the rate of the following chemical reactions and physical processes:



In the working area of the reactor with ferromagnetic particles create a powerful electromagnetic field, which affects the effluent to be purified.



There is a mechanical breakdown of organics and the destruction of pathogenic microflora in the purified effluent.

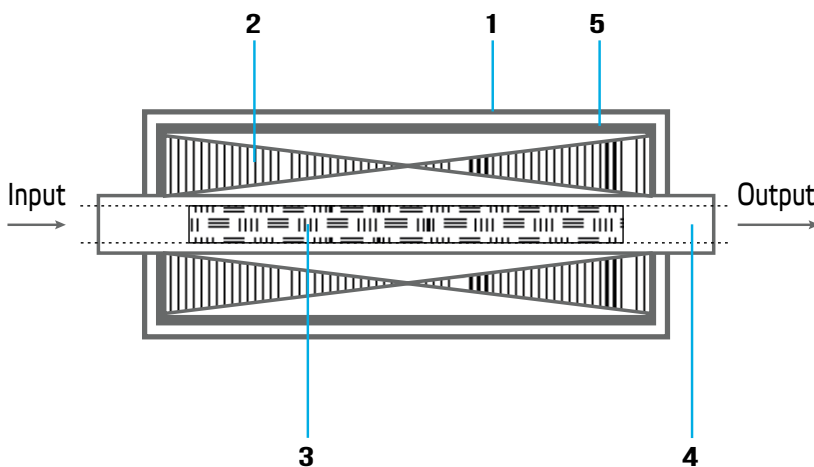


Due to the collapse of air bubbles at the gas-liquid interface of the effluent to be purified, a shock wave is generated (cavitation effect), which affects the molecular structure of the treated substances.



Almost all groups of metals are converted into insoluble compounds (hydroxides) and are subsequently removed along with sludge.

The design of the reVODA reactor allows to combine from 1 to 4 reactors in parallel into one line on an area of 2.0 x 2.0 m, providing a wastewater neutralization and purification capacity of 10 to 60 m³ per hour.



- 1 Hull
- 2 Inducer
- 3 Needles
- 4 Replacement insert
- 5 Reactor operating area



PROCESSES IN THE OPERATING AREA OF reVODA



shredding



ion exchange



magnetostriction



oxidation

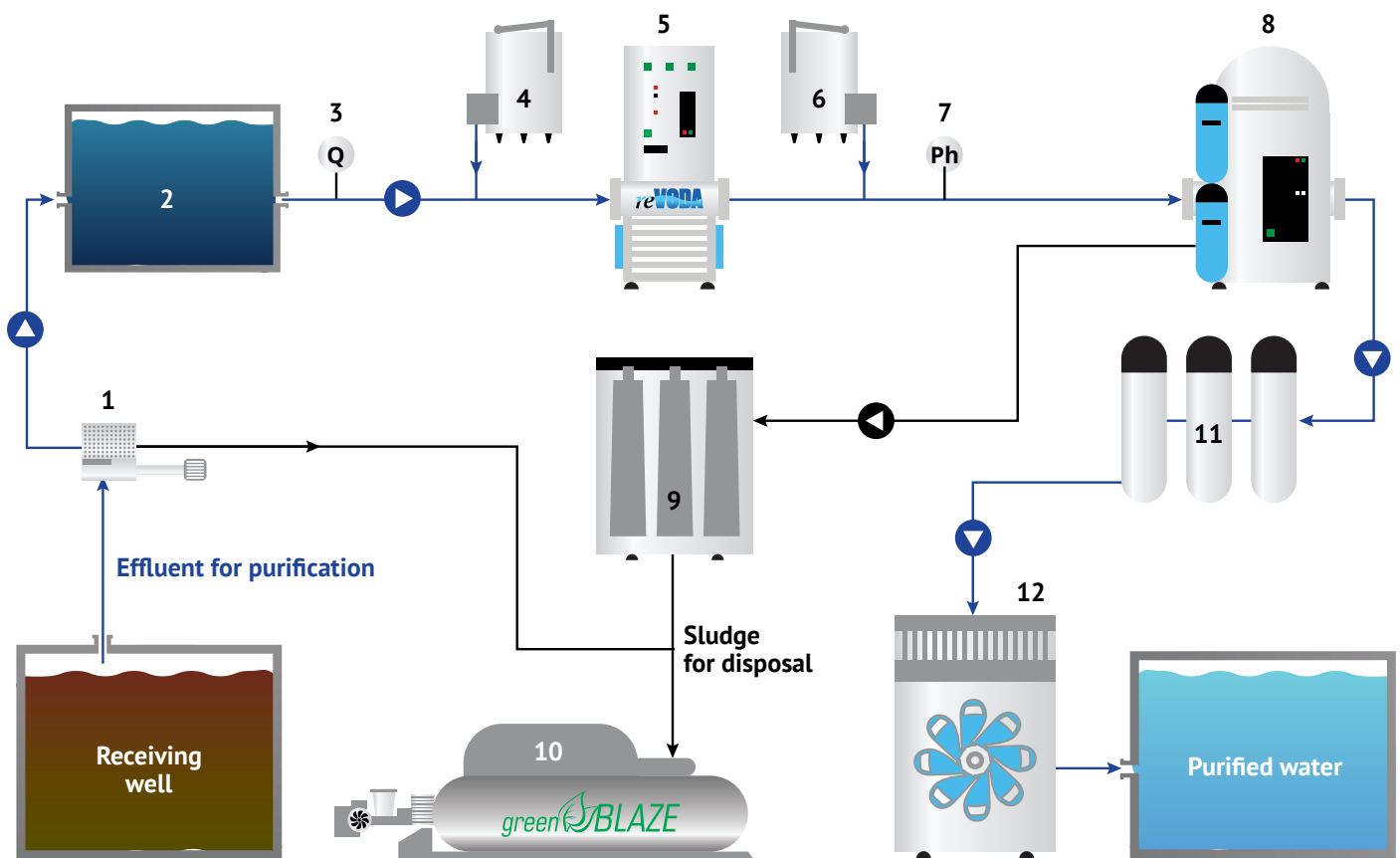


cavitation



mechanostriction

INTEGRATED PURIFICATION PLANT SCHEME



The wastewater from the receiving well is fed to the **Self-cleaning Trommel Screen (1)**, where coarse impurities are separated and sent directly to the GreenBLAZE Unit (10) for disposal.

The wastewater flows to the **Averaging Tank (2)**, from where it is pumped to the **reVODA Reactor (5)**.

A reagent is dosed into the flow, which is prepared at **Reagent Dosing Station (4)**.

In reVODA reactor under the influence of electromagnetic fields the oxidation of medium and decomposition of oil products, neutralization of fats, paraffins, phenols, reduction of metal content, COD and BOD.

After treatment in the reVODA reactor, a solution of **coagulant/flocculant (6)** is pumped into the treated medium, if necessary, using a dosing pump.

The effluent then enters the **Sedimentation Unit (8)** where the treated effluent is separated into solid and liquid fractions.

The solid fraction goes to the **Sludge Dewatering Unit (9)** and then to the **GreenBLAZE Unit (10)**.

The supernatant water is fed to the **Sorption Treatment Unit (11)** and then, if necessary, to the **Finishing Treatment Unit (12)**.

VERSATILITY OF PERFORMANCE AND APPLICATION OF *reVODA*

- ReVODA plants easily integrate with existing wastewater treatment facilities when refurbishing and upgrading existing treatment plants to achieve higher (required) higher purification rates.
- ReVODA plants are installed as newly constructed treatment facilities during the construction of new infrastructure facilities. At the same time, there is no need for capital buildings, time-consuming underground and concrete works.
- The modularity of ReVODA plants allows increasing or decreasing the productivity of existing treatment facilities without significant capital costs and without stopping their operation.



OPTIONS FOR CONSTRUCTIVE EXECUTION OF *reVODA*

- **STATIONARY** – installation of equipment in existing buildings and structures, rapidly erecting structures, capital construction.
- **MOBILE** – installation of equipment in a container/is intended for transportation to the required on-site purification by road or rail.



Since 2011, based on reVODA reactors, our team has successfully completed and implemented more than 50 projects in various industries and household sewage systems in different countries.

Our customers include: livestock units, poultry farms, biological waste treatment facilities, feed mills, drinking water preparation and bottling plants, chemical plants, industrial enterprises, as well as in water treatment plants in cities and municipalities.

EXCERPT FROM THE REFERENCE SHEET OF PROJECTS

DESIGNATION	CAPACITY
Poultry slaughterhouse wastewater purification plant	360 m ³ /day
Livestock unit wastewater purification plant	864 m ³ /day
Soybean oil facility wastewater purification plant	288 m ³ /day
Water preparation and treatment system for livestock facility	240 m ³ /day
Livestock facility wastewater purification plant	720 m ³ /day
Water preparation and treatment system for drinking water bottling line	120 m ³ /day
Sewage sludge neutralization plant for wastewater purification plant for cities with population exceeding 500,000	1080 m ³ /day
Highly hazardous toxic wastewater neutralization and purification plant	280 m ³ /day
MSW landfill leachate neutralization and purification plant to the level of discharge of purified water into bodies of stream water.	240 m ³ /day
Waste paper recycling wastewater purification plant with reuse of purified water into the water circulation of the enterprise	360 m ³ /day

WHY USE *reVODA* AND NOT BIOLOGICAL TREATMENTS?

1 COMPLEX AND FREQUENTLY CHANGING COMPOSITION OF WASTEWATER

Biological WWTP have restrictions on input parameters in terms of pollution levels, COD, BOD and chlorides. The development of technological progress has radically changed the composition of modern wastewater, which has become complex in configuration. Today, wastewater from both individual enterprises and cities requires an individual approach to their purification, which tightens the requirements for local treatment facilities, which biological treatment plants cannot physically cope with.

ReVODA plants do not depend on the quality and quantity of incoming wastewater. ReVODA plants are reaching a new unprecedented level in wastewater neutralization and purification with a wide range from effluents contaminated with pathogens to toxic and electroplating industries, as well as to iron removal and drinking water treatment stations to any level.



2 TOXICITY AND INFECTION OF WASTEWATER

Modern wastewater has become toxic and also contains viruses, pathogens, antibiotics and other organic matter. For this reason, wastewater today must first be neutralized and then purified.

Conventional Biological WWTP for wastewater neutralization are not technologically suitable at all and are not able to cope with the given task.

ReVODA plants are specially designed to neutralize wastewater of any complexity and toxicity and have no analogues in the world.



3 POSSIBILITY OF CYCLIC OPERATION

Seasonal and industrial fluctuations in wastewater volumes lead to difficulty, and sometimes even impossibility, of treating wastewater at Conventional Biological WWTP (for example, a 3- or 4-fold fluctuation in household wastewater in resort cities).

ReVODA plants can easily operate with any capacity, including forced shutdowns (when there is no wastewater), and vice versa, increase productivity by connecting additional reVODA reactors during peak wastewater discharge.



AREAS OF APPLICATION OF *re*VODA

AGRICULTURE

1. Neutralization of pigsty, cattle waste and poultry manure with humidity up to 98%.
2. Purification and neutralization of wastewater from the poultry and livestock slaughterhouse.
3. Purification and neutralization of wastewater from dairies and cheese factories.
4. Production of organic fertilizer from manure and droppings.
5. Neutralization of organophosphorus compounds - pesticides and herbicides.



INDUSTRIAL WASTEWATER WITH COD MORE THAN 2000 MG/L

1. Restoration of coolant.
2. Neutralization of wastewater from galvanic production:
 - Galvanizing;
 - Chrome plating.
3. Purification and neutralization of wastewater from waste paper recycling and pulp and paper mill.
4. Purification and neutralization of wastewater from textile production.
5. Neutralization and purification of wastewater from car wash.



HOSPITALS AND PHARMACEUTICAL PRODUCTIONS

1. Neutralization of wastewater from pharmaceutical production.
2. Neutralization of wastewater from hospital.



MSW LANDFILL

1. Neutralization and purification of MSW landfill leachate.

SEWAGE TREATMENT PLANT

1. Neutralization and purification of wastewater from households, businesses and industrial.
2. Neutralization and removal of excess sludge and biodegradable organic matter.
3. Remediation of wetlands and biofilters with return of land to economic use.



SUSTAINABLE WASTEWATER TREATMENT

Our goal is to achieve maximum quality of reVODA plants performance in the field of ecology and environmental conservation.

Our Team in practice implements a personalized approach to each Client, from receiving the Technical Specifications to the delivery of the Project and its further support.



FEASIBILITY STUDY

- Collection of material and on-site examination.
- The selection and configuration of the equipment is done individually for each point of the Customer's technical task.
- Choosing the best solution.
- Proof of selected solution in own working laboratory.



TECHNICAL IMPLEMENTATION

- Equipment manufacture.
- Functionality check.
- Quality control.
- Supervised installation of equipment.



TURNKEY LET

- Commissioning work.
- Service maintenance.
- A personalised approach.
- Operational support.



GUARANTEED RESULT

- The technical solutions are based on 2 in-house technologies, reVODA and greenBLAZE, which are unparalleled in the world.
- The chosen wastewater purification method is guaranteed to be verified by means of a laboratory simulation.
- Optimization of capital costs with maximum quality and a significant reduction in operating costs.
- Minimum number of employees to operate the reVODA plant when it is in operation.

**WE SAVE YOUR RESOURCES
AND PROVIDE 100% RESULTS!**



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