PURECO
THE PURE ECO

BDL
Environmental Consulting Ltd.

INTRODUCTION

The Pure Eco

Introduction

- International Company
  - Headquarter: Budapest
  - Subsidiaries: Slovakia, Czech Republic, Romania, (Bulgaria)

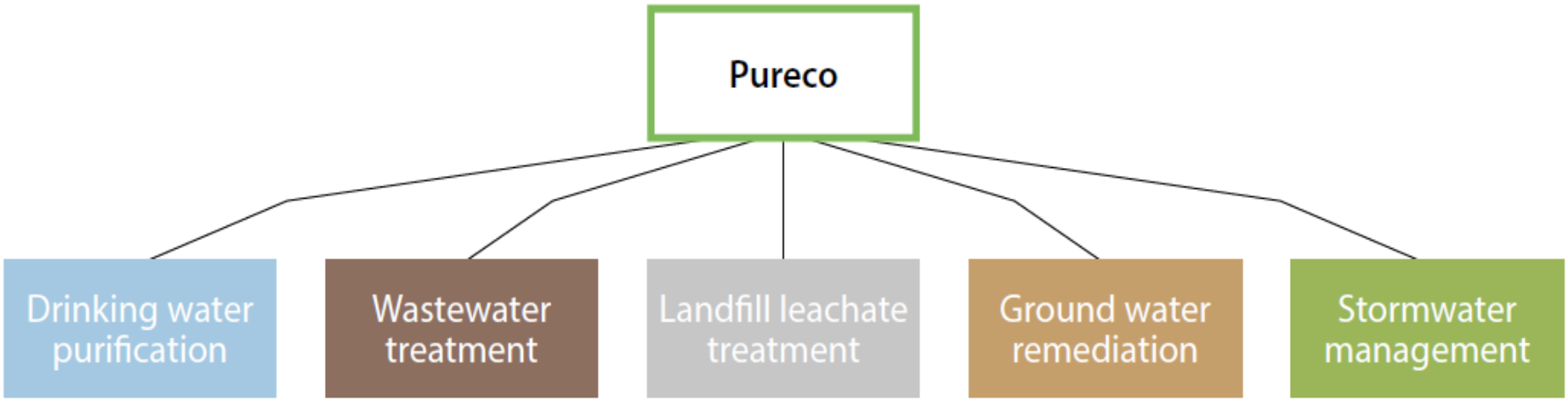
- Consolidated Revenue for 2015 is around 25 million USD

- Founder and member of the Hungarian Water Cluster (2000 colleagues and 250 M USD Rev.)

- Internationally recognized CEOs (President of European Water Association – EWA)

- Financing option with EXIM Bank

Water Related Solutions



Pureco

- Drinking water purification
- Wastewater treatment
- Landfill leachate treatment
- Ground water remediation
- Stormwater management

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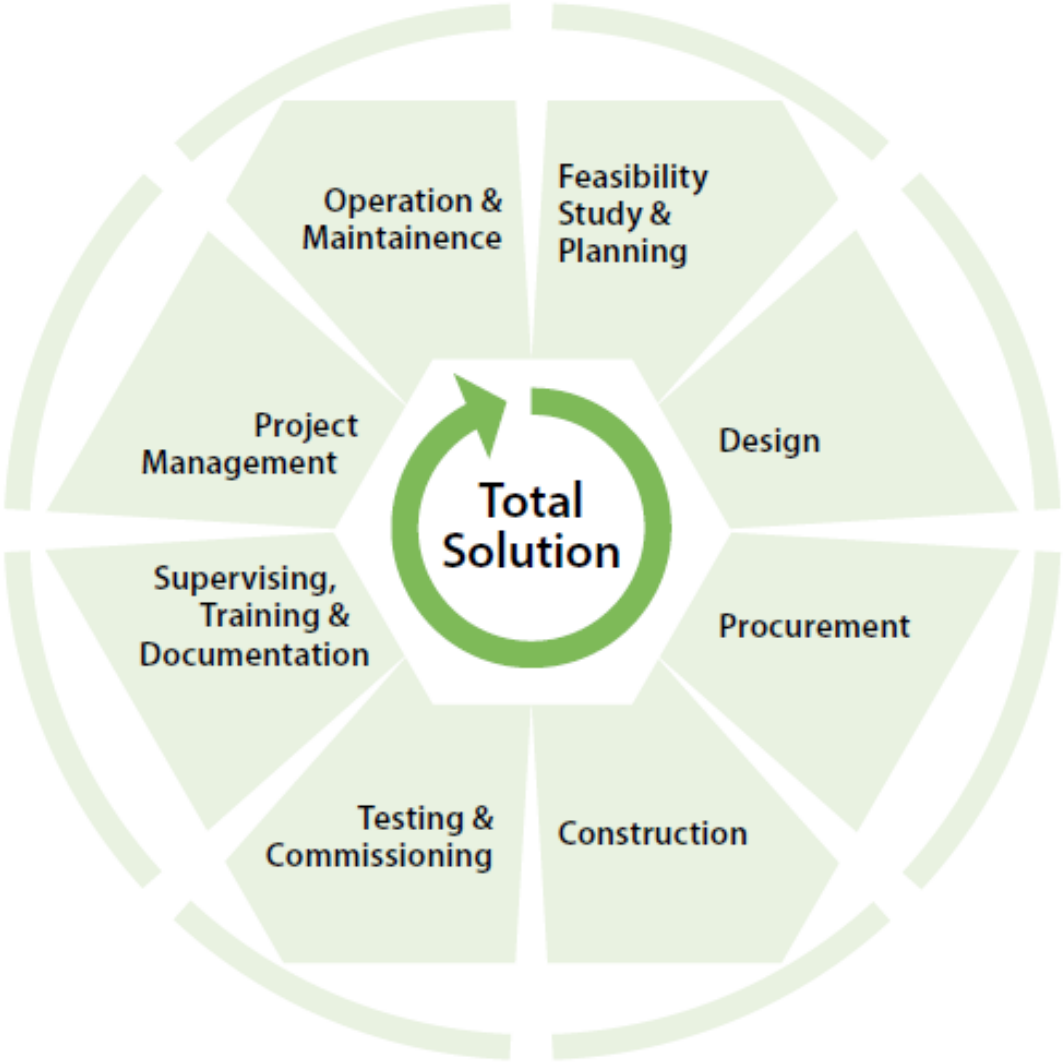
Total Solution



The Pureco Film

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We respect **water**

www.pureco.hu

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We respect water

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Mr. Bálint Horváth
CEO
Business Development Manager
in Hungarian Water Cluster

Mr. Károly Kovács
CEO
President of European
Water Association (EWA)
Vice president
of ASEM Water

Solution oriented approach

We design-build, operate and maintain and operate water and waste-water treatment facilities that combine technical and economic performance, while respecting site environments, whether it is natural or urban.

Special devotion and professionalism in the fields of **drinking water purification, communal and industrial wastewater and landfill leachate treatment, ground water remediation, storm water collection and treatment**.

Pureco and its partners **believe** that the best solution can be born with a strong **cooperation** and collaboration. This philosophy and our excellence, reliability, professionalism let Pureco to be unique in the market and provide a fully customized and innovative solutions in all aspects of water management.

We know and highly respect water. We develop optimal and cost-effective, long-life solutions in order to keep our waters safe, focusing on added value and sustainability.

We are an **international** company with several offices in Central & Eastern Europe and we are also present in Asia, Africa and Middle-East throughout our projects.

Our growth and success are represented with our **increasing** revenues which is around **20%** annually in the past five years. Besides, Pureco is one of the founding members of the Hungarian Water Cluster, with about 25 other corporate members, we rely on the expertise and resources of around 2000 colleagues with more than 250 million USD turnover per year.

Our experts in the different segments of the water industry possess an outstanding professional and innovative knowledge, which have been known and recognized in many parts of the world. Our CEOs play important roles in national and international organizations (President of **European Water Association**, Vice president of Eurasian **ASEM Water** Academic Development Committee, etc.) and have been working for several years for the worldwide recognition of the Hungarian professional knowledge in the field of complex water management.

international projects
serving more than 400 000 people worldwide
cooperation, added-value, innovation
fully customized solution

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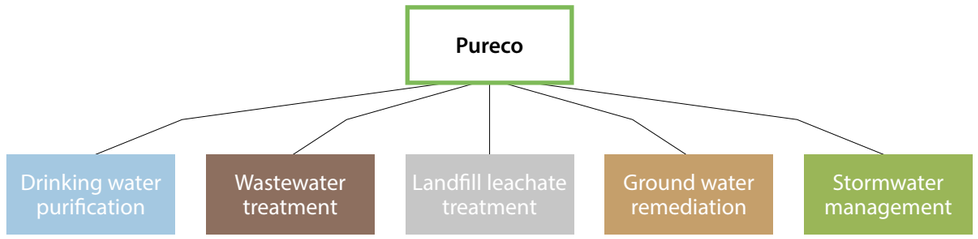
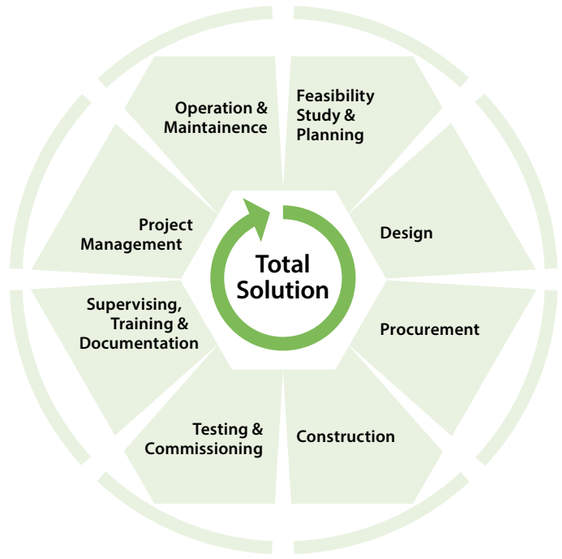
Water related solutions

We believe in people; with our highly qualified and experienced colleagues we are able to provide customized solutions in order to bring you the **added value** in the following core fields of water management:



PURECO is offering a variety of **tailored service levels** in the view of the importance of the **integration.**

We work with you, focusing to keep your system running at **maximum performance** and at the **lowest cost of ownership** from the raise of your idea, through design, implementation, operation and maintenance.



Drinking water purification

Natural drinking water for everyone! There are several ways to protect and conserve existing water resources and to provide potable water. From engineering perspective, this task is primarily about developing sustainable, efficient and environmentally friendly water management designs, technologies and solutions.

Our water purification works (extraction of iron, manganese, heavy metals, arsenic, etc) are conducted in accordance with international standards. We pay special attention to the expansion, the conversion and reconstruction of existing facilities, we carry out our activities in a sustainable and cost-effective manner.

Among our previous successful projects, in addition to water purification assignments, we also designed and managed the construction of river surface water intake facilities, water treatment structures, and the mechanical engineering of the above.

Here is a list of the applied technological elements of water purification, frequently used by Pureco:

- Sedimentation
- Flocculation
- Membrane technologies
  - Ultrafiltration
  - Nanofiltration
  - Reverse osmosis
- Coagulation
- Sand filtration
- Ion exchange / water softening
- Desinfection
  - Chlorination
  - UV, O_3

Using the latest technological process we are capable to **desalinate** sea water in order to provide drinking water either for human consumption or for agriculture/industrial purposes.

contenarized systems

latest technological developments

Water-purification and service system construction in Vietnam

The aim of the Central Vietnam, Quang Binh province water treatment project was the construction of water intake and water management structures to provide the region with healthy drinking water. There are over a 100 000 people living in the service area, north and south of the Gianh River. The project contributed to the increase of the quality of life of the low-income households and families, and to the development of basic infrastructure.

Pureco as a member of the project owner, Hungarian Water Cluster, contributed to the development of the water treatment plant with its professional knowledge, design and construction experience. The project was about a 22 000 m^3/day capacity surface water intake structure had been built on the Rao Nan River, which serves as the main water base.

The 22 000 m^3/day capacity water intake structure serves a 10 000 m^3/day capacity water treatment plant, constructed in the first phase and a 12 000 m^3/day capacity water treatment plant, developed in the second phase of the project.
The water purification technology used here:

- Coagulation
- Flocculation
- Clarification
- Sand filtration
- Water storage

Quality of the treated water was tested by laboratory measurements and it is our pleasure to report that the system is operating perfectly and according to the desired limits.

Clarification and sand filtration

surface water intake from river

22 000 m^3/day capacity

drinking water network

Wastewater treatment

Responsible water management means the treatment and disposal of the generated waste water, for which suitable and effective wastewater treatment plants and systems are needed. Based on our expert knowledge and our products, we offer not only the reconstruction of old, outdated sewage treatment plants, or the construction of new systems, but our engineering, consulting and construction works are accompanied by a professional-consciousness throughout the various fields of waste management as well.

Municipal wastewater treatment technologies:

- Mechanical cleaning (mechanical grid, sand trap, grease trap, primary clarifier, equalization)
- Biological treatment (activated sludge technology, SBR, fixed -film systems, membrane bioreactors)
- Tertiary treatment
- Surplus aerobic sludge treatment (sludge stabilization, sludge thickening and dewatering)

For a higher efficiency:

- The BIOCOS (Combined Biological System) technology is the improved version of the aerobic activated sludge process, combining the benefits of traditional flow systems and the SBR basin (compared to conventional sludge separation processes it is significantly better, with a minimal mechanical demand, reduced energy consumption and maintenance requirements).

Industrial wastewater treatment (alchoholic and non-alcoholic bewarage; dairy, slaughterhouse – meat processing, rendering, eddible oil, sugar industry, paper, textile, chemical, petrochemical industry) **technologies**:

- Mechanical cleaning (mechanical grid, sand trap, grease trap, primary clarifier)
- Physical- chemical purification (coagulation, flocculation and flotation) anaerobic high rate reactors (UASB, EGSB)
- Aerobic reactors (SBR, Continious, Active sludge flotation, MBR, MBBR)
- Membrane technologies (UF, NF, RO)
- Activated sludge treatment (sludge thickening and dewatering, aerobic sludge stabilization)
- Anaerobic sludge digestion

industrial and municipal waste water treatment

40 000 m^3 treated wastewater/day

Municipal and industrial WWTP

In Bulgaria, experts of Pureco developed and modernized the **municipal wastewater** treatment plant of Vratsa. The engineers used an individual biological technology, and as a result of the development works the capacity of the plant has increased to 18 000 m^3/day and the quality of the treated water complied in every aspect with the European standards.

- Blowers
- Screen building
- Sampling equipment
- UV desinfection
- Sludge dewatering building
- Tank in vat
- Dosing system

PARAMETER		LIMITS	CLEANING EFFECT
BOD_5	mg/l	25	70-90 %
Nitrogen	mg/l	15	70-80 %
Phosphorus	mg/l	2	80 %

Pureco successfully delivered and commissioned a physical-chemical pre-treatment based **industrial wastewater treatment plant** (WWTP) to a duck slaughterhouse in Kiskunmajsa, Hungary.
The slaughterhouse generated wastewater, where the flow rate is 120 - 200 m^3 on daily base, the high concentration of non-dissolved materials like suspended solids, oil and grease are successfully removed due to the dissolved air flotation unit. The technological steps are as follows:

- Fine grid as drum filter
- Flocculation
- Flotation

PARAMETER	DESIGN PARAMETERS (mg/l)	REMOVAL EFFICIENCIES (%)
TKN	427	40
COD	7111	78
BOD_5	3556	78
TSS	2560	92
TP	71	85
Oil and grease	1564	95

municipal and industrial waste water treatment plants

biological treatment chemical flotation

excellent effluent quality

Wastewater treatment

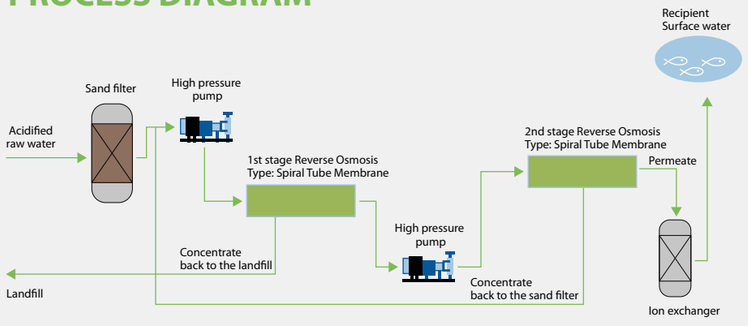
Landfill leachate treatment

Domestic waste, has been / being placed on communal landfills, contains highly concentrated biodegradable organic materials. Treatment of leachate - arising from its moisture and rainfall – is difficult due to its unstable characteristics, high organic and ammonia content, but is essential to avoid huge environmental risks.

Pureco provides turn-key, containerized leachate treatment units, equipped with the latest technological development with the so-called Spacer Tube Module® (STM) operating with Reverse Osmosis technology, installed after suitable pre-treatment steps.

Making the technology available in container means transportable, complex, easy to install solution for purifying the dirtiest water of human consumption.

PROCESS DIAGRAM



Membrane advantages:

- No sludge generation from pre-treatment process
- High rejection of contaminants such as COD; BOD; TDS & heavy Metals etc.
- Large surface area of membrane
- Greater resistance to scalling and fouling
- Low space requirement
- Low flux

technological development
compact solution
contenarized system
membrane technology

Partner in production

HIDR FILT

Leachate treatment in Oradea, Romania

Pureco delivered a great solution for landfill leachate treatment that meets with the requirements of the strict Romanian regulations. With a two-stage reverse osmosis system that is placed int a 40 feet ISO container (PURE-RO/LTC) 120 m^3 contaminated water of landfill of Oradea can be treated on daily basis and with the recovery rate of 60-70%.

Main Technological Steps of PURE-RO/LTC

- Sand filtration to remove core TSS particles
- Cartridge filtration to remove the fine TSS particles
- DT® designed in one, two or in three-staged configuration depending on the required discharge parameters and influent concentrations

PARAMETER	DIMENSION	RAW LEACHATE ANALYSIS	DESIGN PARAMETERS	EFFLUENT REQUIREMENTS
Flow of raw leachate	m^3/d	120		
pH	-	8,48	6,5-8,5	6,5-8,5
Temperature	°C	26,4	20	
COD	mg/l	9910	9910	<125
BOD_5		1390	1390	<25
Conductivity	microS/cm	36 900	36 900	<600
NH_4^+-N		1634	1634	<2

reverse osmosis technology
two-stage system
max. capacity of of 150 m^3/day
PURE-RO/LTC membranes

Landfill leachate treatment

Groundwater remediation

The detection of residual contamination accumulated in groundwaters, the exploration of the extent of contamination, the mitigation and elimination of residual environmental damages are all part of the tasks of environmental remediation activities.

Not only the professional design and construction of the water delivery systems can protect our irreplaceable resources, the **drinking water sources and groundwaters**, but we also have to take care of the **protection and purification** of said **water resources.**

We have exceptional references in the field of ground water remediation, in which projects highly concentrated toxic compounds were removed from the excavated ground water flow. Via these remediation projects, Pureco has contributed to the sustainability of water resources with the design and implementation of these unique water management systems.

Pureco provides a comprehensive set of services for the elimination of soil and groundwater contamination, encompassing engineering, consultancy and construction works. Our aim is to return a "clean" environment to our clients after the contamination assessment, demarcation and reclamation.

Remediation procedures

- Exploration of soil and groundwater contamination
- Exploratory drilling
- Development of sampling and monitoring wells
- Exsitu and insitu soil and groundwater treatment
- Extraction and disposal of waste
- Contaminated soil treatment
- Reclamation works
- Operation & maintanence

protection and purification of water resources

toxic removal

remediation

The remediation of the leather factory at Simontornya

As a result of the factory's 150 years of operation, a large amount of pollutants drained into the ground waters: brine protein, lime and sulfur solutions, solutions containing calcium salt, chromium (VI) and chromium based tanning material, aliphatic hydrocarbons and toxic metals from paints, solvents and treatment agents.

Our company, based on the preparatory studies, licensee plans, field measurements and laboratory experiments, developed a complex water treatment process, created its construction plans, built it and is currently operating the water management system.

Main technical parameters:

- The amount of contaminated groundwater in total: 232 500 m^3
- The amount of groundwater that is crucial to be purified: 168 200 m^3
- Establishment of 10 extraction wells Q = 500-600 m^3/d total capacity
- 500 m^3/day capacity continuously operating water pre-treatment system
- 4 pieces, in total of 1 934 meters in length, drainleakage system
- 1 157 m^2 infiltration area,
- 6,94 l/s continuous flow of purified water to infiltrate.

As a result of the project, the threat to the nearby water source is neutralized, the people living in and around Simontornya can live in a cleaner environment, and on the remediated area can welcome new businesses thus creating new jobs in the region.

toxic metal removal from ground water

1 934 meters in length

drainleakage system

1 157 m^2 infiltration area

Ground water remediation

Stormwater management

Rain water is a great treasure and at the same time it is a great controversy. The rainfall retention and re-use contributes significantly to the improvement of water management of the land, the flora and fauna, and the protection of our water resources, as well as the protection of our lands and cities from floods that follow great seasonal rainfalls. What do we do with precipitation and stormwater runoff? It is best to manage and to retain it for ourselves, and reuse it for our benefits!

The only renewable water source is rain water, and the threat of pollution to our global surface and ground waters, and the threat of aquifer depletion is ever increasing.

The rainfall once on the surfaces often gets contaminated - just think of the pollutants on the paved surfaces - so the challenge is not only the collection and the possible recycling/reuse of the storm water, but the cleaning and infiltration of the not utilized water is also crucial. Our goal to preserve the environment and to properly manage storm waters successfully can only be realized through complex solutions.

We offer:

- Patented product (oil separator) for stormwater treatment
  - Developed by Pureco for filtering and retaining the contaminants washed away by storm water, flowing down from linear engineering structures (**roads, motorways, parking lots**)
- Special systems for dewatering municipal, industrial surface
- Unique storm water drainage systems
- Infiltration and storage equipment capable for fire water as well

85 000 l/s treating capacity oil separators sold by every year

complex stromwater management at LEGO factory in Hungary

Patented solution for rainwater treatment

Arad bypass highway construction work for water management - ENVIA TRP

Due to the erosion caused by high intensity rainfalls and pollutants washed off of paved surfaces, today the runoff water can only be introduced into the recipient after a proper pre-treatment, when the water quality reaches the required levels.

The Arad bypass was completed in 2012 in Arad County. Pureco proposed a special solution for the treatment of the rainwater, collected from approximate 12 km of highway: the ENVIA TRP® drift and light liquid separator installable in open-surface stormwater drainage channels. In this project we have used 50 pieces of different sizes of equipment, between 60 and 225 l/s nominal flow capacity.

Debrecen M35 motorway bypass - water management construction work - ENVIA TRP

The newly built junction was realized at a small area of the existing M35 road, at the intersection of the railway, the road and rail overpass, and of natural waters. According to the original plans, the stormwater would have been infiltrated into a basin and vaporized, but due to the risk of the road and rail embankment soakage leading to deterioration of stability, this solution was not feasible. The new concept sees the pre-treated water being deposited into the Tócó-stream.

800 l/s purification

1 400 l/s flow

Believing in

the strong cooperation we provide fully customized solutions in all aspects of water management.

Contact us,

if you are looking for an innovative, solution-oriented company, with excellent references on national and international levels.

HEADQUARTER

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