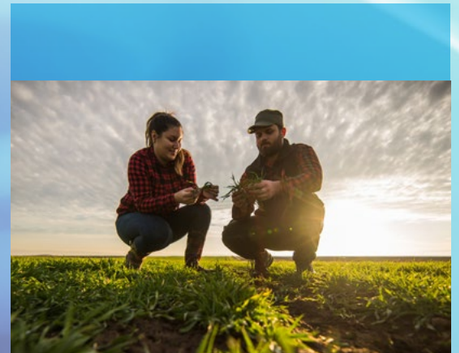

CLEAREADY©
Natural and cost-effective solutions
DRUG RESIDUE-FREE
CLEAN WATER

# Who we are and what we do

The number of new pharmaceutically active compounds and the total quantity of pharmaceuticals is continuously increasing. Some of these agents (e.g. antiepileptics, analgesics, anaesthetics, rarely hormones) can be found in the surface water, groundwater and freshwater. Their metabolites are also present in the water.

However, the concentration of an individual drug is very low (generally, a few tens of nanograms per each litre), the total amount of the drugs reaches a significant proportion and represents an immediate risk.

Most of the scientific papers emphasize that the pharmaceuticals have low concentrations in the drinking water and therefore do not cause any health and environmental hazard. Nonetheless, some compounds may be present also in high concentrations in purified wastewater and in freshwater bodies and have an impact on aquatic and other organisms.



# Cleaready solution: new adsorbents

by Nature for Nature

Although a lot of intentions and researches aim at reducing the concentrations of drug residues in water, these procedures can be characterized by high maintenance cost including the production and disposal of the adsorbents. That is why our development focuses on new cost-effective and green alternatives.

Our novel approach focuses on cost-effective natural adsorbents. Most of these materials are based on:

- soil mixtures
- water filters
- biochar

We accomplished successful experiments on the adsorption of different kinds of soils, water filters. Now, we are testing green wastes (e. g. twigs, grass, leaf) which are widely available in the urban and rural environment.

These adsorbents can remove a high proportion of hydrophobic compounds (e.g. carbamazepine, tramadol, lamotrigine, lidocaine, hormones, like estradiol) from different kinds of waters. The developed method seems to be suitable for cost-effective pharmaceutical active compounds removal. Moreover, the saturated adsorbents treated and disposed by easy and cost-effective ways.

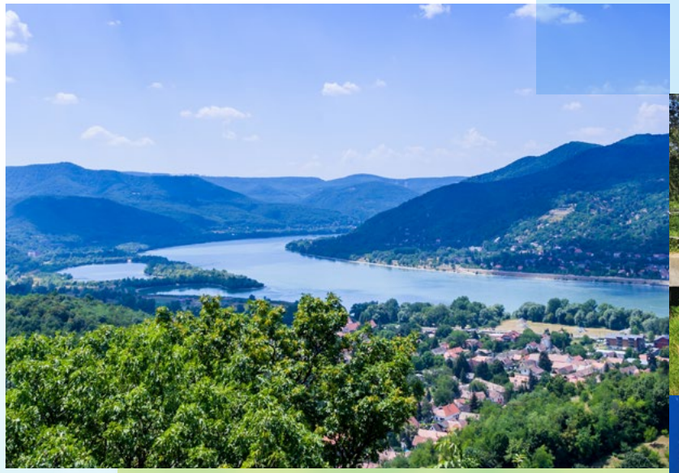
# Clear water for drinking

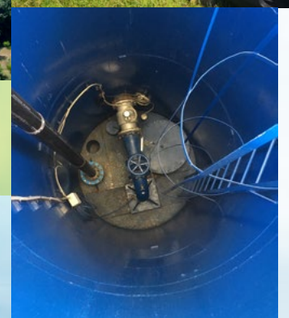
by water filtration technologies

According to the quality of drinking water resources, our survey focuses on the identification of drug residues and hormones. Regarding the experiments and results, we are working on the improvement of effective filtration technologies.

We believe that one of the great challenges of the future is the filtration and removal of drug residues and hormones from our water sources.

Besides the investigation processes, risk reduction solutions are worked out about the preventing actions and warning signs to be concerned in order to avoid even the lowest concentration of drug residues and hormones in the drinking water sources.





## Complex sampling actions

Complex sampling actions and tailor-made water quality analyses were implemented at great agglomeration area.

At numerous tests, more than 100 different drug residues and hormones (including endocrine disruptors) were analysed, so the most frequent drug residues and hormones could be identified in the water sources.

## Effective filtration technologies

The main focus of our work is to investigate the efficiency of water purification technologies and filter materials used in the industry for the elimination of the identified drug residues and hormones. For the research of the most effective filtration technologies, a unique equipment was developed.

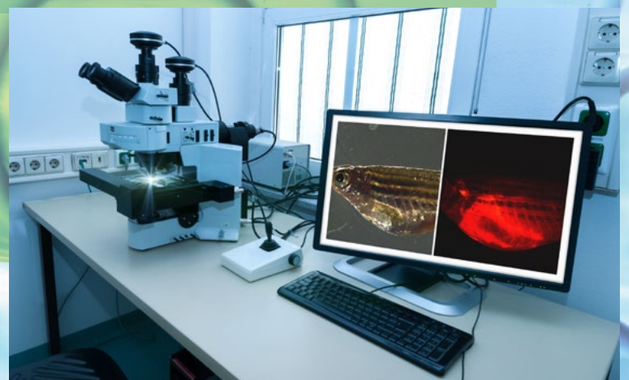
## Risk reduction solutions

# Water quality measurement

with Tg (vtg1: mCherry) biomonitor-bioindicator transgenic zebrafish

In addition to drug compounds, there are a large number of endocrine disrupting chemicals (EDC) in our environment, which pose a serious threat to living organisms. Among vertebrates, the role of fish in environmental risk assessment is outstanding, and it has long been used for toxicological testing as well. Tg(vtg1:mCherry) zebrafish, in addition to the classic toxicological endpoints and symptoms, indicates the EDC involvement of the tested samples with a clear “red light”. There are many benefits to using a transgenic line:

- Fast and cheap analysis in different samples from water to sediment
- An easy to evaluate and unequivocal indication of the EDC effect on individual molecules or complex samples
- Applicability to classic acute-, chronic-, multi-generation tests, and ISO or OECD protocols
- Insertable in GLP (Good Laboratory Practice)
- In vivo embryo applicability, which complies with animal protection laws
- Contribution to clean drinking water and safe food as well as sustainable agriculture



# A liquid soil- and plant conditioner

from organic waste

The reNEW process is a patented, two-step biothermal process for recovering volatile fatty acids (VFA) and essential nutrients (NPK) from organic waste. Patented in the EU and US. (EP2917324, US09944893: A method for organic waste hydrolysis and acidification and an apparatus thereof. EP2996987, US10017398: Process to recover soluble carbon and nutrients from organic waste.)

- More than 95% recovered macro- and micronutrients for plant growth
- Reach in humic- and fulvic acid for soil health
- Sustainable product for circular economy



## Cleaready Project & Partners

Laboratory tests and new adsorbents - Geographical Institute, Research Centre for Astronomy and Earth Sciences (CSFK)
**www.mtafki.hu**

Water quality measurement with zebrafish - Department of Aquaculture, Szent István University
**www.halt.mkk.szie.hu**

Clear water for drinking by filtration technologies – Aquaprofit Co.
**www.aquaprofit.com**

Plant and soil conditioner from organic waste - UTB Envirotec Co.
**www.utb.hu**

**www.cleareadywater.com**

AQUAPROFIT

UTB Envirotec

SZENT ISTVÁN EGYETEM

CSFK

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