




Environmental Issues Addressed by the Project

The bioaccumulation of **APIs (Active Pharmaceutical Ingredients)** can lead to:

- The potential induction of antimicrobial resistance in microorganisms.
- The exhibition of endocrine-disrupting properties.
- Long-term negative impacts on aquatic life due to chronic toxicity.

The Environmental Problems the project addressed are the following:

-  Increased concentration of APIs in water bodies: This is caused by the global rise in pharmaceutical use, resulting in higher levels of APIs being discharged into water systems.
-  Ineffectiveness of conventional wastewater treatment plants (WWTPs): These treatment facilities are unable to completely remove all APIs from wastewater, leading to their persistence in the environment.
-  Accumulation of APIs in soil and crops during wastewater reclamation for irrigation: When treated water is reused for irrigation purposes, APIs may accumulate in the soil and subsequently in crops, posing potential risks to human health and the environment.



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European- Environmental concerns include:

-  Untreated discharge of over 80% of wastewater generated by pharmaceutical industry operations worldwide.*
-  High levels of active residues in water, soil, and sediments have been noticed in manufacturing sites resulting in hotspots of Antimicrobial Resistance (AMR).
-  AMR is listed by the World Health Organization as one of humanity's top ten global public health threats.
-  The removal percentage of APIs was lower than 10% in five broadly used compounds. (Data from 264 Wastewater Treatments Plants - WWTPs).



* Report of 2020, World Bank





Project Summary Info



Aims to:

-  Detoxify wastewater from pharmaceutical industry and avoid APIs release in the wastewater sewage system.
-  Promote the circular economy concept for pharmaceutical industry by the recovery of water that would otherwise have been discharged in the wastewater sewage system.

Achieved through:

-  Development and implementation of an innovative and cost-efficient system for the transformation of pharmaceutical compounds in wastewater, into non-toxic substances.
-  Use of recovered water in noncritical applications (heat exchanging systems, cleaning, irrigation).



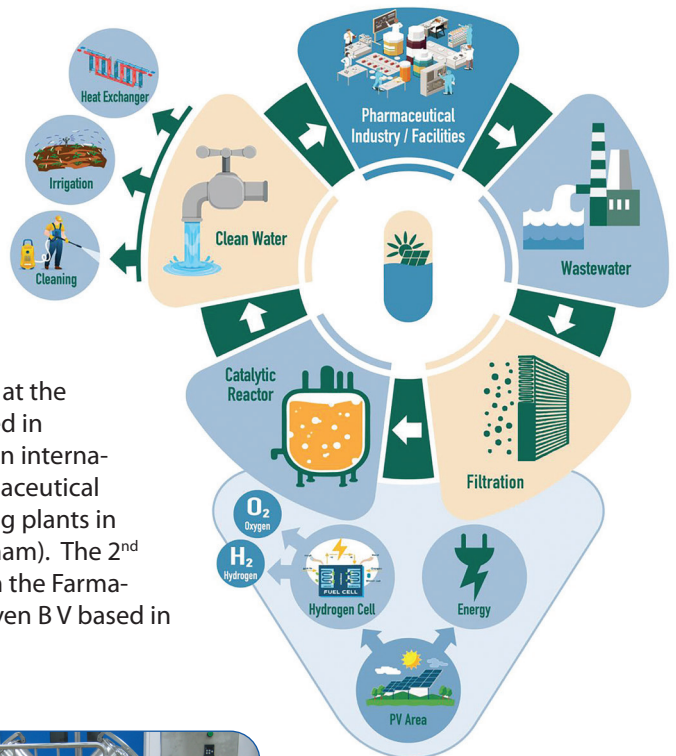
LIFE PHARMADETOX project is expected to contribute to European environmental policies and objectives such as:

- The Roadmap to a Resource Efficient Europe
- Water Framework Directive
- European Green Deal Roadmap
- Renewable Energy Directive
- The Energy Efficiency Directive



PHARMADETOX prototype system

The prototype system that will be designed and constructed by the project partners, will recover reusable and clean water from pharmaceutical wastewater using a combination of filtration, water electrolysis (by solar power), and reduction/detoxification technologies.



Pilot installation:

The prototype system will be installed at the Medo B site of Medochemie Ltd located in Limassol, Cyprus. Medochemie Ltd is an international company and the largest pharmaceutical company in Cyprus with manufacturing plants in 3 countries (the Netherlands and Vietnam). The 2nd demonstration phase will take place in the Farmaceutisch Analytisch Laboratorium Duiven BV based in the Netherlands.



Expected Results

- ✓ Save 3,650 m³ of potable water annually.
- ✓ Convert 1,606 kg of APIs to nontoxic compounds before being discharged in the wastewater sewage system annually.
- ✓ Eliminate environmental impacts occurring due to the discharge of APIs in the wastewater sewage system.
- ✓ Minimize the environmental footprint of the system using 100% renewable energy sources.
- ✓ Transfer the project's results to other pharmaceutical companies across Europe.
- ✓ Communicate and promote public awareness at the local and regional level, including authorities, universities, and pharmaceutical manufacturing industries.
- ✓ Suggest policy measures to the EU.
- ✓ Create an effective value chain through the socio-economic impact of the proposed actions.



Project Events

Kick-off meeting

October 29th, 2021: The kick-off meeting took place online with the participation of all beneficiaries' representatives involved in the project implementation.



Life20Welcome Meeting

November 23rd, 2021: The event was organized by CINEA, the European Climate Infrastructure & Environment Executive Agency which supports the implementation of EU LIFE Programme. Its aim was to present the newly funded LIFE projects on Environment and GIE Sessions Groups. LIFE PHARMA-DETOX was presented by Maria Kyriazi in the Working Group "Wastewater and Water Reuse/Recycling".



European Researchers' Night

September 30th, 2022: At the Researchers Night in Athens, the NTUA-Unit of Environmental Science and Technology project team members presented the PHARMA-DETOX project.

