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Life PHARMA DETOX

Demonstration of an innovative method for the detoxification of pharmaceutical wastewater from pharmaceutical facilities

Deliverable D.1.1: Three Videos
Date: 6/2026

Coordinating Beneficiary

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Disclaimer

The information included herein is legal and true to the best possible knowledge of the authors, as it is the product of the utilization and synthesis of the referenced sources, for which the authors cannot be held accountable.

Abstract

The LIFE PHARMA-DETOX project aims to address the environmental challenges posed by pharmaceutical wastewater by developing an innovative treatment system that detoxifies Active Pharmaceutical Ingredients (APIs) and promotes water recovery and reuse. The video package consists of three complementary videos: an Environmental Video addressing the general public and policy makers, a Technical Video illustrating the operation of the demonstration system under real industrial conditions for a technical audience, and a Business Video presenting the technology's replication potential and market value to industrial stakeholders.

Keywords

▪ APIs ▪ Wastewater ▪ Pharmaceutical Industry ▪ Environmental Video ▪ Technical Video ▪ Business Video

Abbreviations and Acronyms

APIs	Active Pharmaceuticals Ingredients
ATEX	Atmosphères Explosibles (EU framework for equipment and workplaces in explosive atmospheres)
EU	European Union

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RO	Reverse Osmosis

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Executive Summary

The present report was prepared in the framework of the co-financed European LIFE PHARMA-DETOX (LIFE20 ENV/CY/000615) during the implementation of Activity D.1.1.: "Three Videos".

The Environmental Video introduces the environmental challenges posed by pharmaceutical wastewater and presents the innovative LIFE PHARMA-DETOX solution together with its environmental and sustainability benefits. The Technical Video provides a step-by-step overview of the demonstration system and illustrates the complete treatment process under real industrial operating conditions at the two pharmaceutical industries that hosted the pilot system, Medochemie (Limassol, Cyprus) and FAL B.V. (Duiven, the Netherlands). Finally, the Business Video presents the project's value proposition for the pharmaceutical industry, highlighting regulatory compliance, resource efficiency, circular water management and the system's market uptake potential.

Together, the three videos communicate the project's key messages through accessible and engaging audiovisual material, supporting the dissemination, exploitation and long-term uptake of the LIFE PHARMA-DETOX results.

1. Introduction

The LIFE PHARMA-DETOX project addresses the environmental challenge of pharmaceutical wastewater by developing, demonstrating and validating an innovative, economically viable and cost-effective treatment system for the detoxification of APIs. The LIFE PHARMA-DETOX system successfully transforms pharmaceutical compounds present in industrial wastewater into non-toxic substances before their discharge into the wastewater network, while enabling water recovery and reuse for applications such as equipment cleaning, irrigation and other non-potable purposes.

Effective communication of the project's objectives, technological achievements and expected impact is an essential component of the LIFE Programme. To support these activities, three complementary dissemination videos were produced, each addressing a different dimension of the project and targeting different stakeholder groups. Together, the videos communicate the environmental challenge addressed by LIFE PHARMA-DETOX, demonstrate the operation of the innovative treatment system under real industrial conditions and present its environmental, technological and business benefits, contributing to the wider dissemination and future exploitation of the project results.

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2. The LIFE PHARMA-DETOX Video Package

As part of the project's dissemination strategy, three professional videos were produced to communicate the objectives, results and long-term impact of LIFE PHARMA-DETOX in an accessible and engaging way. Although complementary, each video addresses a distinct aspect of the project and is tailored to different audiences, ranging from the general public and policy makers to technical experts and industrial stakeholders.

The video package consists of:

- The **LIFE PHARMA-DETOX Environmental Video**, presenting the environmental problem of pharmaceutical wastewater, the project's innovative solution and its contribution to environmental protection and sustainable water management.
  Publication details: Duration: 11:21 min. | Narration: English | Subtitles: Greek | Published on: Project Website, YouTube, LinkedIn
- The **LIFE PHARMA-DETOX Technical Video**, illustrating the operation of the demonstration system and the complete pharmaceutical wastewater treatment process under real industrial conditions at two pharmaceutical industries: Medochemie (Limassol, Cyprus) and FAL B.V. (Duiven, the Netherlands).
  Publication details: Duration: 2:06 min. | Narration: English | Subtitles: English | Published on: Project Website, YouTube, LinkedIn
- The **LIFE PHARMA-DETOX Business Video**, highlighting the business value of the technology, its contribution to regulatory compliance, resource efficiency and its potential for market uptake across the European pharmaceutical sector.
  Publication details: Duration: 2:49 min. | Narration: English | Subtitles: English | Published on: Project Website, YouTube, LinkedIn

Together, the three videos provide a comprehensive presentation of the LIFE PHARMA-DETOX project from environmental, technical and business perspectives, supporting the project's communication, dissemination and exploitation objectives.

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2.1. The LIFE PHARMA-DETOX Environmental Video

The LIFE PHARMA-DETOX Environmental Video presents the environmental challenge posed by pharmaceutical wastewater and highlights the innovative solution developed by the LIFE PHARMA-DETOX project. It explains how Active Pharmaceutical Ingredients (APIs) released from pharmaceutical manufacturing can persist in the environment, affecting aquatic ecosystems, biodiversity, and contributing to antimicrobial resistance. The video introduces the project's consortium and demonstrates how the developed treatment system detoxifies pharmaceutical wastewater using catalytic hydrogenation powered by renewable energy, as demonstrated at the project's two pilot sites, Medochemie in Limassol, Cyprus and FAL B.V. in Duiven, the Netherlands. It also showcases the recovery of high-quality water suitable for industrial reuse, reducing freshwater consumption and supporting circular water management. The video features contributions from Prof. Maria Loizidou (NTUA), Dr. Christakis Sergides and Mr. Vyronas Kouzourides (MEDOCHEMIE), Prof. Giuseppe Mancini (UNICT), and Prof. George Xydis (Aarhus University). Through their presentations, the video highlights the project's environmental, technological, and socio-economic benefits, including the innovative catalytic hydrogenation process, life cycle sustainability assessment, renewable energy integration, and the system's potential for replication across Europe.

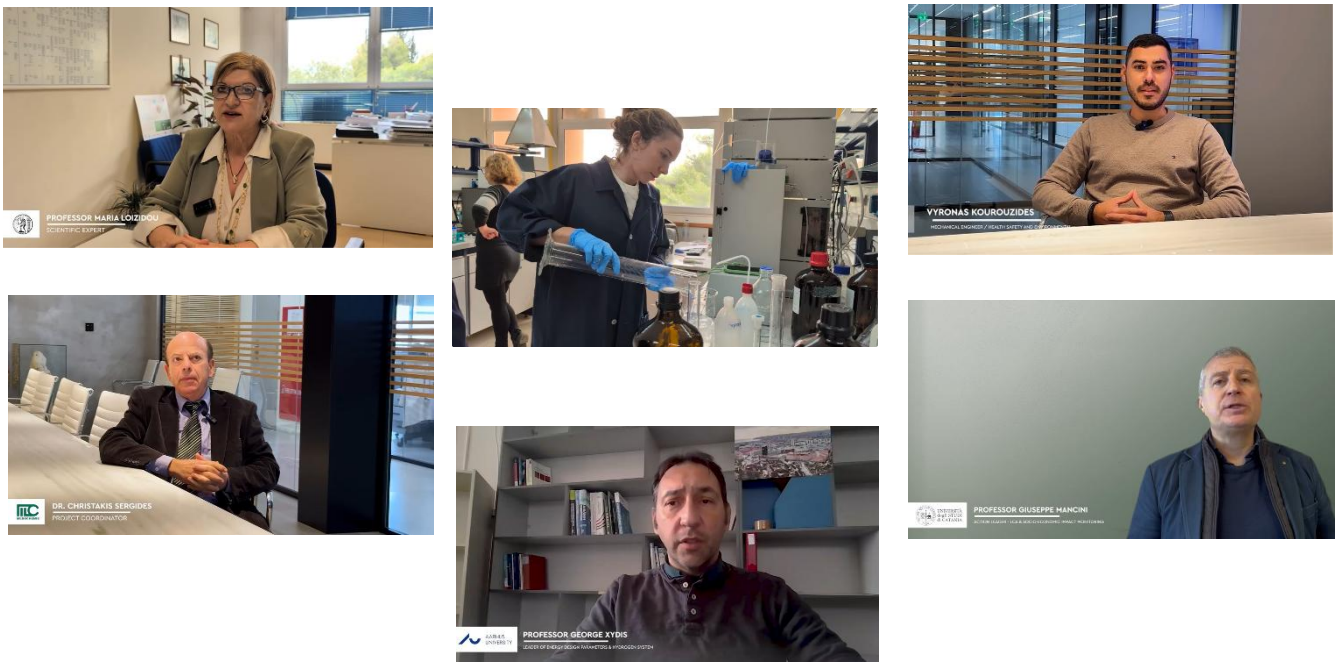


Figure 1: *Selected footage from the LIFE PHARMA-DETOX Environmental Video*

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2.2. The LIFE PHARMA-DETOX Technical Video

The LIFE PHARMA-DETOX Technical Video presents the operation of the demonstration system which operated at two pharmaceutical industries, Medochemie in Limassol, Cyprus and, during its second pilot phase, FAL B.V. in Duiven, the Netherlands. The video provides a step-by-step overview of the pharmaceutical wastewater treatment process, beginning with wastewater pre-treatment, which includes a coagulation step, and continuing through reverse osmosis and catalytic treatment. After reverse osmosis, the flow is separated into two streams, the permeate and the concentrate, with the concentrate directed to the catalytic reactor for furthertreatment. It explains how the system concentrates APIs before their detoxification in the catalytic reactor and illustrates the main operational stages of the process. The system produces two output streams: the permeate, a high-quality water stream that complies with Regulation (EU) 2020/741 on water reuse for irrigation purposes, meeting the most stringent Class A criteria, and the treated stream from the catalytic reactor, which is reused for secondary industrial purposes. Both streams are verified through toxicity tests on Daphnia magna and on plants., The video also shows the separation of the container into two operating areas, ATEX and non-ATEX zones, follows all the safety parameters required due to the use of hydrogen gas.Overall, it presents the complete operational workflow of the LIFE PHARMA-DETOX technology under real industrial conditions, highlighting its efficiency, reliability, and safe operation.

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Figure 2: *Selected footage from the LIFE PHARMA-DETOX Technical Video*

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2.3. The LIFE PHARMA-DETOX Business Video

The LIFE PHARMA-DETOX Business Video demonstrates how the LIFE PHARMA-DETOX project transforms pharmaceutical wastewater treatment into a sustainable and business-oriented solution for the pharmaceutical industry. It presents the environmental challenges associated with APIs and explains how emerging European legislation is driving the need for advanced on-site wastewater treatment technologies. The video showcases the LIFE PHARMA-DETOX system as an innovative solution that combines catalytic hydrogenation and reverse osmosis, powered by renewable energy, to efficiently remove pharmaceutical residues while enabling safe water reuse. It highlights that the system produces two output streams: the permeate, a high-quality water stream that complies with Regulation (EU) 2020/741 on water reuse for irrigation purposes, meeting the most stringent Class A criteria, and the treated stream from the catalytic reactor, which is reused for secondary industrial purposes. Both streams are verified through toxicity tests on Daphnia magna and on plants. Emphasis is placed on the business benefits of the technology, including regulatory compliance, reduced environmental footprint, lower operational costs, freshwater conservation, and support for circular water management. Finally, the video highlights the system's modular and scalable design, demonstrating its readiness for market uptake and its strong replication potential across the European pharmaceutical sector.

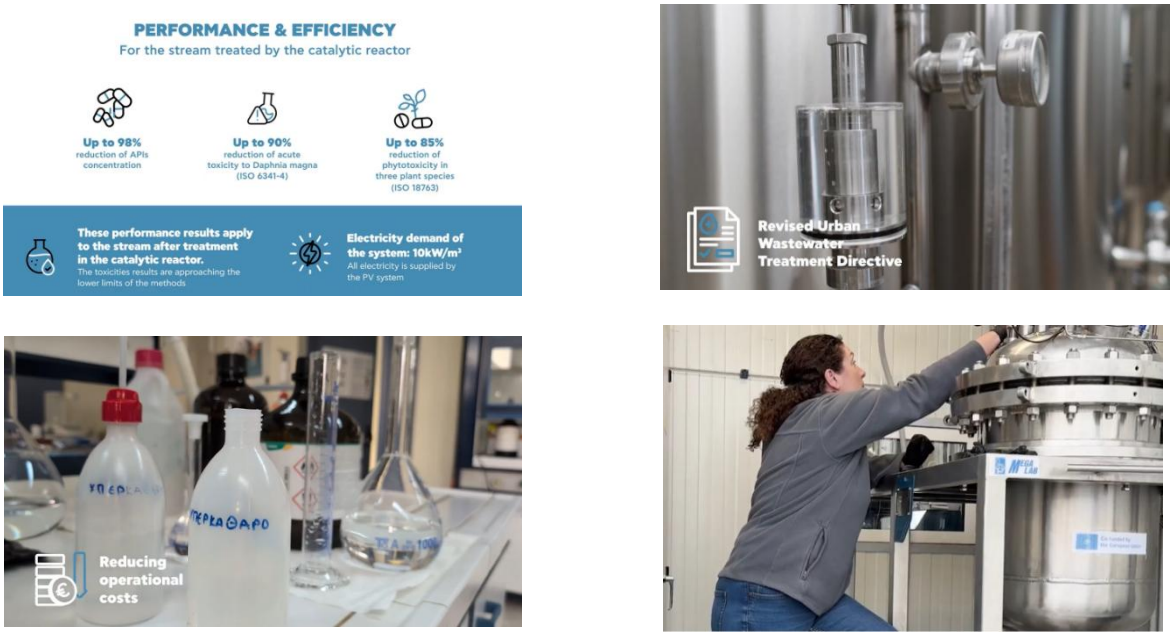


Figure 3: *Selected footage from the LIFE PHARMA-DETOX Business Video*

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3. Conclusions

The three dissemination videos developed within the LIFE PHARMA-DETOX project provide a comprehensive audiovisual presentation of the project's objectives, technological innovation and expected impact. By addressing environmental, technical and business aspects through three complementary perspectives, the videos communicate the project's key messages to a wide range of stakeholders, including the general public, researchers, industry representatives, policy makers and potential end users.

Together, they strengthen the visibility of the project, facilitate knowledge transfer and promote the wider uptake and replication of the LIFE PHARMA-DETOX technology. As long-term dissemination assets, the videos will continue to support awareness raising, stakeholder engagement and the exploitation of the project's results beyond the project's lifetime.

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