

 Case study factsheet

Nafplio, Greece

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ULTIMATE Project ULTIMATE

Peloponnese , Greece



Description

The eastern Peloponnese is one of the most important citrus fruit producing areas in Greece, while other fruits are commonly cultivated, such as stone fruits, berries, grapes and so on. This has given rise to the flourishing industry of juice manufacturing in the area, with a significant number industrial units of various sizes in the wider area. Intensive farming and increasing industrial activity exert great pressure in the aquifer with farmers and industrial units alike, are competing for ground water. Hence Water recycling has become imperative tackle the competition for water and the diminishing quality of the aquifer. Greener than Green Technologies has developed a methodology for the remediation of wastewater rendering it suitable for reuse, but also provides the ability to extract compounds of interest, or value-added compounds (VAC), from wastewater for further purification and commercial commercialisation. A prototype has been developed and installed in the facilities of Alberta, a juice manufacturer, near Nafplion, in the eastern Peloponnese. The prototype incorporates number of established and novel technologies. At first VACs are extracted by adsorption on suitable material, scubas polymeric resins. Suspended solids are then precipitated before further treatment by Advanced Oxidation process (AOP), where organic matter is decomposed by photocatalytic oxidation. This can lead to either complete mineralisation i.e. decomposition to CO₂ or simply to either smaller molecular entities that are easier be decomposed by the next step. The resulting is then subjected to biological treatment using a Small Bioreactor Platform (SBP) where bacteria encapsulated in a capsule made of a porous membrane decompose the remaining organic matter rendering the wastewater suitable for reuse; irrigation of nearby orchards, reuse within the facility for secondary uses such as cleaning or simply dispose of it in the local or municipal biological wastewater treatment plant as less organic burden as possible. In parallel to ULTIMATE, Greener than Green Technologies is developing an AI and machine learning enchanted Decision Support Software (DSS). This will not only control the unit, but will also process signals from built-in and external sensors, as well as gather historic and other external data such as weather forecast, in order to determine the most suitable way to reused the reclaimed water. The DSS prompting the user with simplified information, and decision choice, reduced the need of highly skilled personnel for supervising or running the unit. The business model upon which this technology will be made available to the market also offers and innovative aspects, aligned with the principles of circular economy. The unit has been designed to be mobile and quickly deployable. Units will be offered as a “Product-as-a-Service” (PaaS), rather than sold, only for the desired time slot, to cover the seasonal needs of customers.

Outcome of assessments

Total cost of ownership (TCO)

The technology in CS 4 (VesperX™) is offered as a Product-as-a-Service (PaaS) by Greener Than Green Technologies. As such a TCO assessment was not applicable. Instead of selling the physical product, the company provides a service where industries subscribe to a flat fee for installing and using the VesperX™ system, which processes water and extracts value-added compounds (VACs). The ownership and responsibility for the equipment remain with the service provider, and customers only pay for the services they use, eliminating the need for them to bear the technology’s TCO. Their model aligns with Circular Economy principles and aims to reduce operational complexity for the customer, making it easier to adopt new technologies. Revenue projections suggest that with an average annual investment of 900,000 EUR, the company expects to expand from 25 units in the first year to 160 units by year five, generating over 17 million EUR in revenue.

Legislation and policy recommendations

Clarifying responsibilities and developing consistent guidelines for water reuse licensing and service provision across the EU are essential to ensure effective practices. The strategic agenda proposes comprehensive coverage of all water reuse types, emphasizing safety, environmental impact assessment, and the integration of reclaimed water into local water balances based on regional circumstances. Future regulations should establish minimum standards for non-agricultural uses, enhance risk assessment, and promote research on innovative water reuse technologies and practices. (see also D1.10)

Applied technology

- [Small Bioreactor Platform \(SBP\)](#)

Publications and references

- Kleyböcker, A., Bruni, C., Gonzalez Camejo, J., Naves Arnaldos, A., D1.10 Lessons learned from synergy workshops, Project report, 2024
- Naves Arnaldos, A., van den Broeke, J., Guleria, T., Bruni, C., Fantone, F., Touloupi, M., Iossifidis, D., Giménez Lorang, A., Sabbah, I., Farah, K., Baransi-Karkaby, K., Pidou, M., Reguer, A., Kleyböcker, A., Jährig, J., Vredenbregt, L., Thisgaard, P., D1.9 Start-up and intermediate results of plant operation from all case studies, Project report, *ULTIMATE*, 2023
- Yeara Bar Oza,b , Hadas Mamaneb , Ofir Menashec , Vered Cohen-Yanivb , Rupak Kumard , Lilach Iasur Kruhe , Eyal Kurzbaum, Treatment of olive mill wastewater using ozonation followed by an encapsulated acclimated biomass, Scientific paper / Journal, 2018

Scale

Operational scale of this case study related to the application of tools and technologies

- Local scale

Challenges

Challenges that are addressed through the application of tools and/or technologies to the case study

- Water Scarcity
- Other

Related tags

adsorption

Advanced Oxidation Processes

Nutrient recovery

water remediation

Contact data

Contact person

Dimitri Iossifidis (GtG), d.iossifidis@greenerthangreen.co

Involved organisation

1. Alberta S.A. Fruit Processing Industry

URL

<https://ultimatewater.eu/demo-site/mobile-wastewater-treatment-unit/>