

Project coordinator's note

Dear reader,

On behalf of the whole INCOVER consortium, I am pleased to introduce the fifth and last INCOVER Newsletter. After 38 months of INCOVER project, the initial objectives have been reached successfully and all proposed technologies have been validated at real scale for extracting valuable resources from domestic, agricultural and industrial wastewater.

The INCOVER project has generated 23 products, including the technologies validated most of them at TRL 7 in the 3 Cases Studies of the project.

The main technical results achieved are the following:



- 2.6 kgPHA/d from phototrophic bacteria systems treating domestic wastewater and high organic substrates.
- 85% of PHA extraction efficiency providing a revenue of 1.06 €/m³ of wastewater.
- 30 kg organic acids/d from the yeast bioreactor treating oil waste.
- 8 m³ biomethane/d through an innovative biogas cleaning technology removing CO₂, H₂S, NH₃ and VOCs from biogas.
- 10 m³/d of pathogen free water by solar-driven power anodic oxidation and ultra-filtration systems (0.2- 0.4 kWh/m³ covered by solar PV).
- Set up of optical sensing monitoring device for measuring PHA and the chemical/organic compounds.

To learn more on INCOVER project, visit our [website](#) and follow us on [Twitter](#), [LinkedIn](#) and [Youtube](#).

Once finished INCOVER project, partners are looking for new ideas to collaborate and continue working for a better world implementing new circular economy solutions in the water sector.

Best regards,

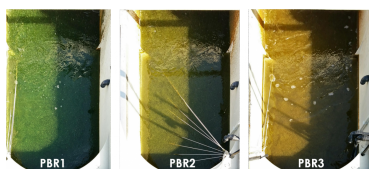
Juan Antonio Álvarez Rodríguez.
INCOVER Project coordinator



All INCOVER public results are available in [scientific publications](#), in [deliverables](#), on [INCOVER website](#) and [INCOVER community on ZENODO](#).

Results from the field

Case study 1 - Converting agricultural wastewater into biopolymers, fertilizers and reclaimed water



Case-study 1 technologies implemented in Barcelona were tested with agricultural and domestic wastewater. The results showed that an excellent removal of nutrients was achieved in the photobioreactors while cyanobacteria were able to accumulate PHA (bio-plastics) through photosynthetic process. Solar-driven filtration-disinfection system permitted to produce between 5m³/day and 10m³/day of treated water for irrigation. The nutrient recovery columns permitted to test a P-recovery material for 15 months, which showed no sign of disintegration or

biofouling, which permits to consider future commercial deployment. The sludge treatment wetland produced good quality soil conditioner, fulfilling the Spanish regulations for heavy metals in sludge and soil.

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Case study 2 - Resources recovery from municipal wastewater, using High Rate Algae Ponds, evaporative systems and planted filters



High productivities of PHA with PHA content up to 35% were achieved with Phototrophic Purple Bacteria Ponds (PPBPond). A photosynthetic biogas upgrading technology produced high quality biomethane ($\text{CH}_4 > 95\%$) while recovering nutrients from centrate through microalgae cultivation in ponds. Evaporative system was validated as a nature-based system to treat digestate coming from anaerobic codigestion, while producing biomass and a good structure soil conditioner. In Almeria, planted filters were a high effective tertiary treatment after high rate algae ponds. Solar-driven electro-chlorination and smart irrigation system were also successfully optimized.

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Case study 3 - Optimization of implemented technologies finalised!



On case-study 3 in Leipzig, all technologies for the treatment and valorization of waste water and waste from the food sector were successfully implemented. For the first time, it is possible to produce citric acid almost completely by recycling from waste water and waste products. The yeast-based bioprocess achieves product concentrations of 100-120 kg CA/m³ and formation rates of 0.5 – 1.2 kg/m³/h. The hydrothermal carbonization technology (HTC) permitted to produce several samples of HTC biochar, e.g. for energetic purposes reaching a heating value of up to 22 Mjoule per kg. After the end of the project, the HTC technology will be marketed to companies working in the wastewater treatment sector.

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Decision Support System tool



Eventually, the Decision Support System (DSS) of INCOVER has been released and is now functional. You can download it [here](#) and also [the guidelines on use and operation](#). This tool aims at supporting decisions mainly in wastewater treatment sector by providing economic, social and environmental evaluations for a series of reference systems.

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Communication and dissemination results!

All partners have been actively involved in disseminating INCOVER project and engaging with technology end-users and key stakeholders.

**101
events**

Scientific conferences, EU-related events, business-oriented events, face-to-face meetings and other type of events where INCOVER project was disseminated.

**73
press-
releases**

Published both in specialized magazines and local newspapers, and 7 video reports.

**14
articles**

Partners published 14 [scientific articles](#) in peer-reviewed journals.

**3
awards**

Industry Water Award in the Sludge&Resource recovery category, shortlisted for the IWater Awards for Best Innovation, finalist of the POWER Idea contest for sustainable communities.

Check out our leaflets on water reuse !

Pressures on Europe's water resources are increasing and there is a growing need to reduce water demand especially in the agricultural sector which accounts for 36% of annual total water use in Europe (EEA, 2017). It is with this backdrop that reclaimed water emerges as an untapped resource in the fight against water scarcity with only about 2,41% of the 40,000 million m³ of the annual volume of wastewater treated in the EU being reused (EC, 2012).

To address this issue, INCOVER has produced two leaflets:



One [leaflet](#) targets farmers and the general public and reflects on the benefits and need for agricultural water reuse.



The other [leaflet](#) targets local authorities and gives practical examples of successful existing municipal water reuse practices within Europe.

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Latest events

3rd Innovation Workshop

The third and final Innovation Workshop for the H2020 INCOVER Project was held in Almeria, Spain. The agenda included a site visit to El Toyo WWTP (one of the project demonstration sites) and a Masterclass on financial support opportunities to accelerate commercialisation.

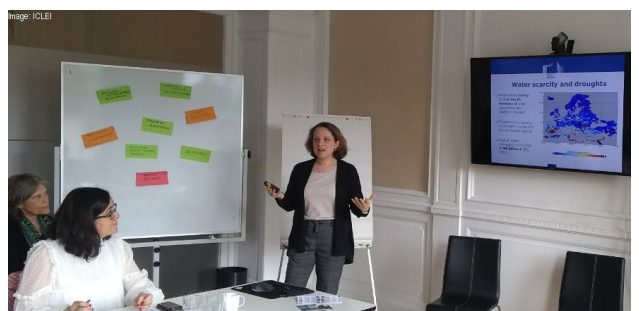
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3rd Stakeholder Dialogue

The third INCOVER stakeholder dialogue focused on the proposal for a new EU Regulation on water reuse in agriculture. It took place in the ICLEI Brussels Office on 21 May 2019 as an EU Green Week Partner Event. The workshop attracted 15 dedicated experts in the field of water reuse representing water utilities, regional government, the agricultural and the private sector who engaged in a lively debate.

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Other past event: [INCOVER last technical meeting](#).

A few words from technology end-users and INCOVER partners



Peter Vale, Severn Trent (UK)

"I've been hugely impressed with how the INCOVER project has made significant progress in successfully developing and validating a number of innovative and sustainable technologies that demonstrate the exciting potential of moving from traditional, linear wastewater treatment plants to bio-refineries that recover energy, nutrients and added-value products."



Jean-Jacques Bellayer, Bourges Plus (France)

"INCOVER workshops were an opportunity to meet not only passionate and friendly people but also promising technologies to build a better future."



Raul Munoz, Universidad de Valladolid (Spain)

"INCOVER was a unique platform to upscale photosynthetic biogas upgrading and validate our technology in collaboration with industrial partners such as AQUALIA."

[A few words from end-users](#)

[A few words from INCOVER partners](#)

Learn more about INCOVER



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INCOVER partners



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