

## Project coordinator's note

Dear reader,

On behalf of the whole INCOVER consortium, I am pleased to introduce the fourth INCOVER Newsletter. All INCOVER technologies have been implemented and started-up at real scale for extracting valuable resources from wastewater in three case-studies (municipalities, farms and F&B companies). The validation of each innovative technology will be obtained during the second part of the project. The main results obtained until now are the following:



- A production of **0.67 kgPHA/d** has been reached from phototrophic bacteria/microalgae systems.
- A set up of **optical sensing monitoring** device for measuring PHA and the chemical/organic compounds has been calibrated in-situ at the INCOVER bioprocesses.
- A production of **8 m<sup>3</sup> biomethane/d** has been produced through an innovative biogas cleaning technology capable of simultaneously removing CO<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub> and VOCs from biogas.
- A production of **22 kg organic acids/d** has been achieved from the yeast bioreactor treating oil waste.
- **10 m<sup>3</sup>/d** of pathogen free water is provided by solar-driven power anodic oxidation and ultra-filtration systems.

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

Best regards,

*Juan Antonio Álvarez Rodríguez.*  
INCOVER Project coordinator

## Final straight for the case studies!

### Case study 1 - Optimization of operating strategies

The operation of the 3 tubular horizontal semi-closed PBRs has been modified and during this period the PBRs have been connected in series, instead of in parallel. This way, the process undergoes different phases or stages in order to, not only **treat the wastewater and produce biomass**, but also **to promote the growth of cyanobacteria and the accumulation of PHA**. The growth of cyanobacteria over green microalgae is promoted in the first PBR.

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### Case study 2 - Recovery of bioplastics, biomethane and nutrients

At El Torno (Chiclana) wastewater treatment plant, bioplastics (PHA - Polyhydroxyalkanoates) production has been made through a two-stage anaerobic-phototrophic system, using anaerobic pretreatment and Phototrophic Purple Bacteria Ponds (PPBPond) systems. These ponds are currently being operated by Aqualia with laboratory support from iBET. They are fed with a mixture of pretreated wastewater and molasses previously fermented. During the summer 2018, the ponds became enriched in Phototrophic Purple Bacteria (PPB) and a **30% PHA content was achieved**.

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### Case study 3 - Continuous optimization and validation at demo scale

To improve the control of the operating temperature in the **yeast-based Citric acid process**, the demo reactor was equipped with a cooling unit and a heat exchanger area. The cooler is designed for a maximum power of 5 kW and for the heat transfer (~2.7 m<sup>2</sup>), flexible cooling mats are installed. The air supply of the reactor has also been improved, allowing for maximum of gassing rates up to 400 L/min.

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### Decision Support System tool

The purpose of the Decision Support System (DSS) to be developed in INCOVER is to integrate the **life-cycle sustainability assessment results of the developed technologies** into a **ready-to-use planning tool**. The tool will be structured in a modular way so that the various technology modules can be built together modeling a full technology chain in wastewater treatment equipped with waste recovery techniques.

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## Coming soon

### Second Innovation Workshop

The 2nd INCOVER Innovation Workshop, hosted by Aqualia, will be held on **Wednesday 27 February in Jerez, Spain**. A site visit to the El Torno WWTP in Chiclana (Case study 2) will form part of the day's agenda.

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### IWAAlgae 2019

IWAAlgae2019 will be held in **Valladolid, Spain, in July 1st-2nd 2019**. This event represents a joint conference, bringing together the 2nd IWA Conference on Algal Technologies for Wastewater Treatment and Resource Recovery and the 12th IWA Specialist Group Conference in Wastewater Pond Technology.

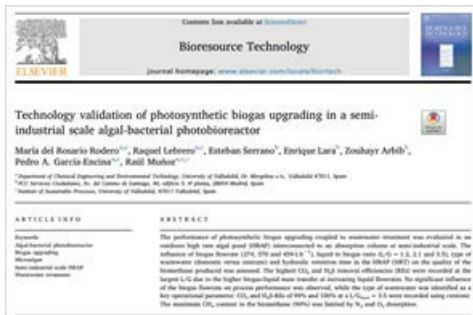
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## Latest news

### Read our last scientific publications!

More than 10 scientific papers have been published since the beginning of the project, by our partners UFZ, UVA, UPC and AQUALIA. The papers have been published in several journals, such as Ecological Engineering, Water Science and Technology, Bioresource Technology, etc. These articles present the key findings and outcomes of INCOVER research, mainly about citric acid production, microalgae based treatment systems such as semi-closed horizontal photobioreactors (case study 1) and High Rate Algae Pond (case-study 2) and photosynthetic biogas upgrading. All the articles are available on [INCOVER website](#) and INCOVER community on [ZENODO](#).





## Watch the video about optical sensing!

During our last meeting in Leipzig in November 2018, a colleague from AIMEN took the opportunity to be there to do some tests with **FTIR spectroscopy to measure the organic acid concentration in the yeast bioreactor of Case-Study 3**. A video was made and presents the experiments which were conducted.

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## Learn more about INCOVER



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[Download the new description of INCOVER project!](#)

## INCOVER partners



The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 689242. The dissemination of results herein reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

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