PRODIAS
Developing resource and energy-efficient methods and technologies to boost competitiveness of European Industry
PRODIAS (PROcessing Diluted Aqueous Systems) fosters competitiveness of the European process industry.

PRODIAS aims to decrease production costs for renewable-based products via increasing the efficiency of raw material use and production processes.

PRODIAS: Consortium of nine partners, funded by European Union with €10 million – total project budget is about €14 million.

PRODIAS Start Date 1st of January 2015, Duration 48 Month.
The challenge

- Integration of renewable raw material into industrial value chains
- Cost-competitiveness of processes using renewable resources
- Challenging product properties
- Complex, energy intensive downstream processes

The target

- Substantially improvement of downstream processes
- Decreasing CAPEX via shorter process chains and / or smaller unit sizes
- Decreasing OPEX via increased efficiencies, less energy and utility usage
- Increase of competitiveness of bio-processes and renewable processing
PRODIAS
Concept & Schedule

[ The concept ]

- Development of **optimized and novel**, cost-effective and “renewable-tailored” **concentration and separation technologies**
- Tuning of **up-stream** process
- Development of **hybrid combinations**
- **Demonstration** of technologies in industrially appropriate environments
- Process characterization to identify the key **physical property data** required for the design and operation
- **Integrated design approach** for the fast-track selection

[ The schedule ]

- **WP 1**: “Getting started”
- **WP 2**: “INEMOS” - Integrated Experiments, Modeling, Simulation
- **WP 3**: “LEG6Y” - Low Energy Separation Systems to handle diluted aqueous systems
- **WP 4**: “SelSepS” - Adaptation and optimization of selective separation steps
- **WP 5**: “Tunaction” - Tuning reaction to facilitate smart down-streaming
- **WP 6**: “HySys” - Hybrid systems by combining performance optima
- **WP 7**: “DemoSys” - Demonstration plants for optimized systems
- **WP 8**: “Integral Design Approach” - Fast track process design, based on specification and decision criteria
- **WP 9**: “Management of Project”
- **WP 10**: “Dissemination & Exploitation”
The technologies

- Novel & optimized concentration + separation technologies with improved performance
  - Significant increase in productivity and efficiency
  - Decrease of complexity of processes
  - Significantly lower energy consumptions
  - Decrease of investment costs

Expected realizations

- **Demonstration of 2-3 technologies** in pilot plants in industrially appropriate environments **TRL 5-7**
- 6 – 7 implementations of reaction & separation technologies as standards in R&D
- 3 implementations of the design approach
PRODIAS 18 Month Status

Tech-Matrix
Development
Demonstration (next step)
Evaluation

WP3 LESSY
WP4 SELSEPS
WP5 TUNACTION

11 Single Techn.
12 Hybrid Combi.

PRODIAS obj. fit

Take decision
Go
Stop
Stop in PRODIAS

Overall Score

(Source: PRODIAS Consortium partners)

(Source: BASF picture database)
## Single Technologies

**Project Month 18**

- Low energy high-speed centrifuges
- In process microflotation
- Small hydro-cyclones for yeast separation
- Screening apparatus for flocculation
- Co-Crystallization to decrease solubility
- Salt-form Crystallization
- High titer product fermentation
- Biomass recycling as active booster for fermentation
- Purifying sugars hydrolysate via adsorption
- Purifying sugars hydrolysate via chromatography
- Crystallization greens recycling

## Hybrid Technologies

**Project Month 18**

- Flocculation inside high-speed centrifuges
- Flocculation as preconditioning for high-speed centrifuges
- EBA in SMB-Mode
- In situ batch extraction & recovery
- Reactive extraction & recovery
- Extraction & bipolar ED
- IEX & bipolar ED
- Anti solvent crystallization & SMB
- Combined Cryst. & Dec
- Combined Cryst. & Reflux
- Purifying sugars hydrolysate via flocculation / flotation & membrane
- Freeze concentration & membranes

(Source: PRODIA Consortium partners)
PRODIAS Technology Evaluations towards Demonstration

Technology Score Card

Fit to PRODIAS Objectives

- Decreased investment costs
- Increased raw material efficiency
- Decreased energy consumption leading to e.g. less CO₂ emission

Today three Technologies nominated for DEMONSTRATION in pilot plants in industrially appropriate environments TRL5-7

CENTRIFUGES WP3
- Energy efficient (50% reduction)
- Improved functionality
- Pilot plant separator 2017

HIGH TITER FERMENTATION WP5
- Increase of final titer
- Increased productivity
- Improved raw material efficiency
- Implementation ongoing

FREEZE CONCENTRATION WP4
- Technical feasibility proven
- Quick return on investment
- Savings in OPEX
- Starting construction of commercialized size module 2017
[ Technological

- Novel & cost effective separation technologies
  - Toolbox of validated separation technologies
  - Integrated design approach

- Improved Performance
  - Significant increase in productivity and efficiency
  - Decrease of complexity of processes
  - Significantly lower energy consumptions
  - Decrease of investment costs

[ Environmental

- Reduction of energy consumption
- Reduction in GHG emissions
- Reduction of water usage
- Increase of raw material efficiency

[ Economic/Social

- Stronger Competitiveness of the European Industry
- Establishes R&D results in near to industrial environment
- Develops methods and technologies used in different industrial sectors
- Increase of competitiveness of renewable-based chemical products
- Offers employment opportunities

- Improved Innovation Capacity and Knowledge Integration
  - Cross sectorial partners share knowledge and costs
  - Deepened understanding of downstream processes via cooperation
  - Acceleration of adaption, transfer and take up of new technologies
[ Next steps

 продолговатый куб с символами

  Advanced development phase for technologies for implementation with planned TRL 4 and above

  Specification of starting conditions and boundary conditions towards DEMOSYS (WP7) for technologies TRL5-7

  WP8 (Integral Design Approach) Initiation of information exchange (publication event) and starting workshop on the topic of "Decision support for design of downstream processes“ in Nov 2016

  Next technology review planned for beginning of 2017

PRODIAS webpage:
https://www.spire2030.eu/prodias/
PRODIAS
Posters on ProcessNet 2016
PRODIAS webpage:
http://spire2030.eu/prodias/

Framework Horizon2020:
http://ec.europa.eu/programmes/horizon2020

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