



The European Pilot and Demonstration Infrastructure Fair 04/04/2025

Agenda



- Welcome
- Pilots4U Introduction
- Pilot and Demonstration Infrastructure Pitches
- COPILOT activity Introduction
- Matchmaking
- Lunch
- Shaping Bio Workshop









Welcome to the European Pilot and Demonstration Infrastructure Fair

Nicoló Giacomuzzi-Moore Executive Director of CBE-JU



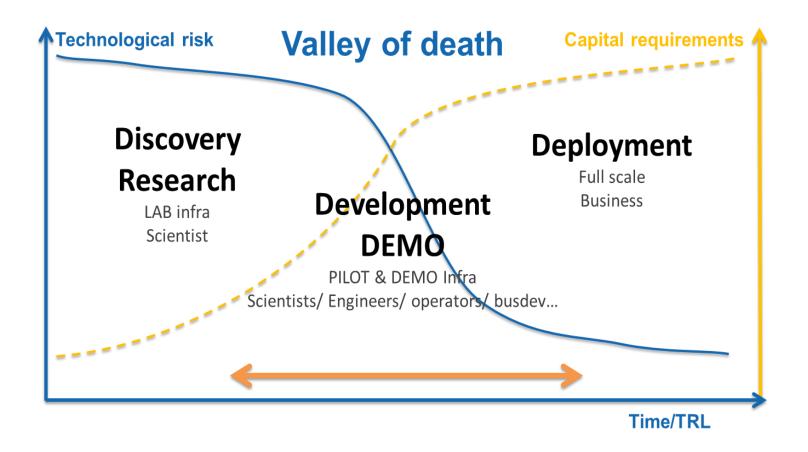


Pilots4U supporting the scale-up of the European Bioeconomy

Stef Denayer Pilots4U Stakeholder Relations Manager

Scaling up is a tricky phase to get through





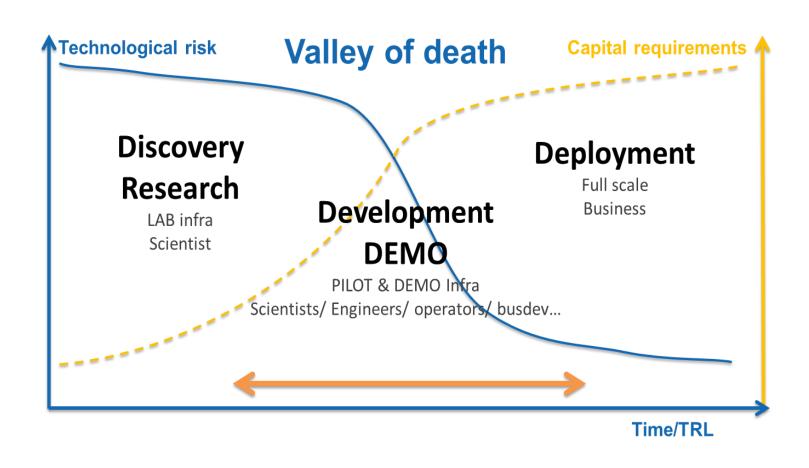






Scaling up is a tricky phase to get through





Shared Pilot Facilities

risk sharing & reduction







The TRL levels covered by Pilots4U



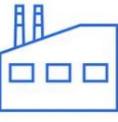
Technology Readiness Levels

PILOTS4U = pilot & demo infra









Research

Develop

Deploy







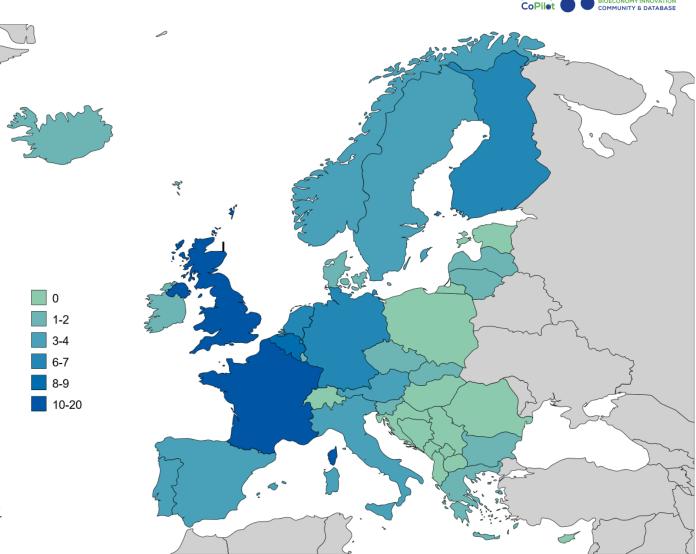
Availability of 120+ shared pilot & demo infrastructures for the bioeconomy in Europe



Support the Pilots4U ecosystem structurally as a strong network

Put these infrastructures clearly on the map within the EU Biotech Hub

Support to keep the infrastructure state-of-the-art









Pilots4U covering a broad scope of technology areas





Size reduction and Homogenisation

Chipping Extrusion Grinding Milling Densification



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hvdrothermal



Pulping

Chemical: sulphate/sulphite, organosoly, soda

Hybrid: Chemi-thermo-mechanical pulping. neutral sulphite semi-chemical pulping



Thermochemical conversions

Gasification Pyrolysis



Algae technologies

Algae cultivation in open ponds, photobioreactors and fermenters



Seperation technologies

Mechanical separation Centrifugation

Membrane filtration

Particle filtering

Particle classification and sieving

Physicochemical separation

Chromatography

Crystallization

Distillation

Drying

Evaporation

Crystallization and precipitation Field-Flow Fractionation

Flocculation

Extraction

Liquid-Liquid extraction Solid-Liquid extraction



| Fermentation and Digestion

Anaerobic digestion Biomass fermentation and precision fermentation Solid-state fermentation Gas fermentation Composting



Enzymatic catalysis

Enzymatic hydrolysis and enzyme immobilization Remediation



| Chemical conversions

Reduction

Acid and alkaline hydrolysis Carbon capture utilisation Polymerisation Heterogeneous catalysis



Material technologies

Coating or lamination Textile fibre spinning Fibre web production Nano/micro fibre production Biocomposite processin



Sterilisation technologies

UHT Pasteurisation UV





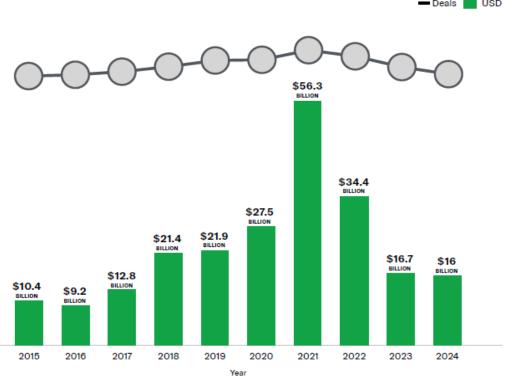


The Investment trend in Biotech

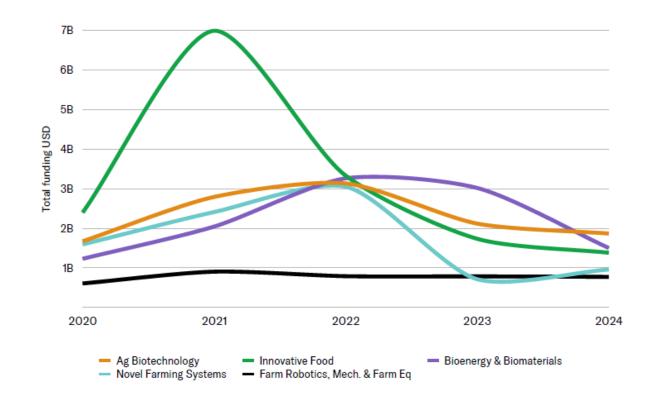








Funding for five chosen categories 2020-2024









Short term need = de-risking



More public support is needed to encourage private investments

Focus on supporting the innovators

Co-fund the scale-up work of SMEs

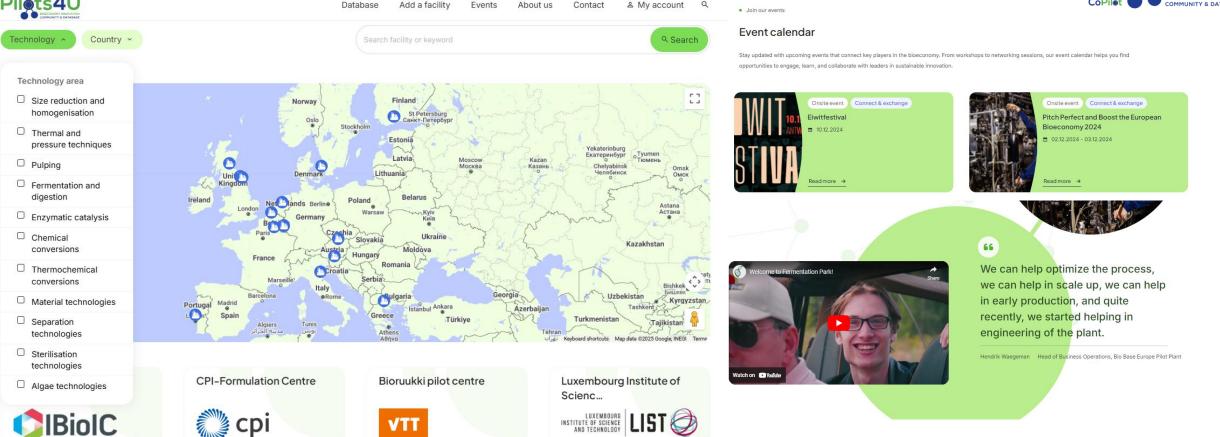






Launch in June of the next generation platform Pilots4U powered by COPILOT















Pitch your Pilot and Demonstration Infrastructure



Acies Bio Pilot Facility, Slovenia



Bor Klančnik, Business Development bor.klancnik@aciesbio.com (+386) 59 0 7995





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Densification



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BIOPROCESS DEVELOPMENT

SCALE UP SERVICE

BIOMANUFACTURING & CDMO

Our approach:

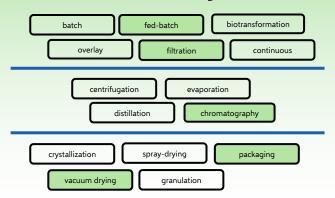
- Bioprocess set-up & development
- Scale up/down the process
- Eco-efficiency
- Broad and Lean Operations
- Working with different organisms



Integrated facility:

- Different vessels interconnected
- Scaling up to 10,000L
- Early DSP conceptualization
- Testing the robustness

Modular design



Track record:

- 80+ partnerships with leading biotech and chemical companies
- 25+ technologies scaled successfully









Markets we serve







Agbio

Food & Feed

Sustainable Chemicals















STRAIN DEVELOPMENT & ENGINEERING

Pathway engineering Non-GMO strain evolution Technological platforms

BIOMANUFACTURING

DOWNSTREAM PROCESSING

ANALYTICS

HPLC MS GC-MS Spectrophotometry Fluorescence









Caitii P AITIIP Technology Centre, Zaragoza, Spain



Carolina Peñalva Lapuente, Head of Sustainable Products and Solutions carolina.penalva@aitiip.com



I Size reduction and Homogenisation

Chipping Extrusion Grinding Millina Densification



and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



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Heterogeneous catalysis Reduction



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Sterilisation technologies

UHT Pasteurisation











Innovative Solutions for Advanced Industries

AITIIP is a leading technology center and private foundation that has been fabricating ideas since 1995. We provide cutting-edge R&D services across various sectors including aeronautics \Re , healthcare \mathbb{H} , automotive \Re , and energy ϕ

- La Capabilities
- √ Pilot scale facilities
- ✓ Industrial services include injection molding, mechanical manufacturing, and 3D printing for daily industrial applications.
- √ Supported by dedicated laboratories
- Sustainable Manufacturing & Smart Innovation
- 1 Material Innovation: Development of customized additives and new material compounds to enhance product performance: Extrusion compounding lines.
- 2 Material Transformation: Pilot lines, film blowing, cast extrusion, injection moulding and rotomolding.
- 3 Prototyping 3D Pilot Plant: FDM, LSPc. MJF, FFF, SLM and PolyJet.
- 4 Robotic Pilot Plant: Experts in robotic transformation of industrial processes, including imitation-based programming for accelerated robot learning: ROBOMIMIC
- **5 Recycling Technologies:** Specialized in **mild solvolysis and robotic solutions** for dismantling large infrastructures.

Let's Collaborate to Shape the Future of Sustainable Industries! 🌞 🦞 👶



























































Bio Base Europe Pilot Plant, Ghent, Belgium

Esthèle Goure, Business Development Manager esthele.goure@bbeu.org







Chipping
Extrusion
Grinding
Milling
Densification



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Sterilisation technologies

Pasteurisation
UV











Bio Base Europe Pilot Plant, Ghent, Belgium

















Biocon, KU Leuven @TRANSfarm, Lovenjoel, Belgium





Elien Lemmens, Innovation Manager (Product Development) elien.lemmens1@kuleuven.be



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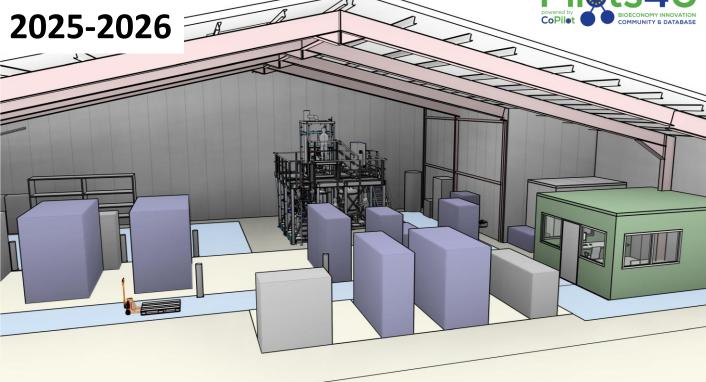


Biocon Open Pilot Facility for Chemical Process Development









- 200 L Reactor, Batch120 bar, 235 °C, H₂
- ✓ All equipment is designed to produce kg-scale (intermediate) samples



€1.5 Million Investment

- 200 L Reactor, semi-continuous
- Separation & Purification (Fed-batch Rotavap, Short path evaporator, Batch & Continuous L-L extraction)
- (Advanced) analytics (GCxGC, GC-FID/MS, GPC, etc.)
- Product synthesis (20 L Hastelloy reactor, Vacuum oven)



€8.2 Million Investment











Biocon

































Your biotech partner

Marco Pistocchi, General Manager marco.pistocchi@biospheresrl.it





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Pasteurisation UV









Biosphere - Forlì, Italy



SCALE-UP SOLUTIONS & CONTRACT MANUFACTURING

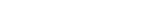
UPSTREAM

- **6X LAB-SCALE FERMENTATION UNITS 2 X 1 LITER & 4 X 6.5 LITERS**
- > 2X PILOT-SCALE FERMENTATION **UNIT** 150-LITERS
- > 1X DEMO and INDUSTRIAL **SCALE FERMENTATION UNIT 1.500-LITERS**

DOWNSTRFAM

- > 1X DISC-STACK **CENTRIFUGATION** 50 - 150 L/h
- > FLOCCULATION
- > 2X TANGENTIAL FLOW MICRO & **ULTRA-FILTRATION** 500 L/h
- > BATCH CHROMATOGRAPHY PILOT, DEMO and MANUFACTURING

- ISO 9001:2015
- Codex Alimentarius
- Production of food enzymes according to HACCP (EU Reg. 852/2004)
- Kosher Certification



- > 1X HIGH-PRESSURE
- **HOMOGENIZATION** 120 L/h 1000 bar
- > DEPTH FILTRATION
- PILOT, DEMO and MANUFACTURING

SERVICES

- Process design:
- Scaling-up of biomass and precision fermentation. downstream and biocatalysis solutions;
- Run validation from TRL 3 to TRL 7:
- Full scale industrial manufacturing;
- Cultivation of a wide spectrum of microorganisms (bacteria, yeast, microalgae, fungi);
- Experience with different classes of (oxidoreductases, enzymes lyases. hydrolases, transferases. cofactor recycling enzymes).













OUALITY SYSTEM BASED ON INTERNATIONAL STANDARS



Biosphere – Forlì, Italy

Your biotech partner























Bodec B.V., Helmond, The Netherlands

Sjoerd Matthijssen, Sales Engineer Matthijssen@Bodec.nl





Size reduction and Homogenisation

Extrusion
Grinding
Milling
Densification

Chipping



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



Pulping

Chemical: sulphate/sulphite, organosolv, soda Mechanical Hybrid: Chemi-thermo-mechanical pulping,

neutral sulphite semi-chemical pulping



Thermochemical conversions

Gasification Pyrolysis



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Chromatograp Crystallization Distillation

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Remediation



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Acid and alkaline hydrolysis Carbon capture utilisation Polymerisation Heterogeneous catalysis



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Textile fibre spinning
Fibre web production
Nano/micro fibre production
Biocomposite processin



Sterilisation technologies

UHT Pasteurisation UV









Reduction





- Reactor tanks:
- 6 Reactor tanks with a total capacity of 43m3. Double jacketed with high-shear mixing.
- Separation & concentration:
- Centrifuge 500kg/hr. Decanter 500 kg/hr & 2500kg/hr.
- Membrane filtration 50kg/hr.
- Falling-film evaporator 200kg/hr water evaporation
- Drying technologies:
- Spraydrying: 10kg/hr pilot units, 100kg/hr multi-stage production unit.
- (Vacuum) drum drying: 2 pilot units at 15-20kg/hr.
- Agitated thin-film drying: 2 pilot units at 10-20kg/hr.
- Additional equipment: Meat grinder, Colloidal mill, Powder dissolver,





























Biomass Valorization Platform, Herve, Belgium

Dr. Job Tchoumtchoua, Coordinator of EU-Funded Projects itc@celabor.be





Size reduction Homogenisation

Chipping Extrusion Grinding Milling Densification 🛑



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EXTRACTION PILOT PLATFORM



The "Extraction" department is equipped with a **technological platform** (350 m²) unique in Wallonia boasting an **ATEX zone**, a test hall constituted of laboratory and pilot extraction machinery.









- Conventional solvent extraction | 60-350L
- Supercritical Fluid Extractors SFE-CO₂ | 2 x 6L/batch
- Subcritical Water Extraction | 6L/batch
- Ultrasounds Assisted Extraction | 25-70L
- Microwave Assisted Extraction | 2-5L
- Pulsed Electric Field | Liquid 350 L/h & Solid 0,5L/batch
- o Membrane separation Ultra- & Nano-filtration | 1 − 10L/h
- Molecular distillation
- o Bioreactor for **fermentation & enzymatic hydrolysis** | 2 − 10L
- Pilot-scale post-treatment equipment's [Centrifuge, Evaporator, Freeze-dryer, Spray-dryer, Microwave vacuum dryer]

More than 30 years of experience !











EXTRACTION PILOT PLATFORM







Subcritical Water Extraction

350L solvent extraction





Supercritical Fluid Extractors SFE-CO₂

Pulsed Electric Field









Centre for Process Innovation, UK

Dr. Jude Huggan, Business Development Manager judith.huggan@uk-cpi.com





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Centre for Process Innovation, UK



- CPI operate open-access pilot (100L, 400L, 2000L) and demonstration (10,000L) scale fermentation facilities and pilot/demo scale DSP (Plug & Play)
- Food-Grade pilot facilities available (FSSC 22000/ISO 9001 certified)
- **Pilot** Scale **mammalian and animal cell culture** (200L) for cultivated products
- Pilot Scale plant cell culture bioreactors (400L)
- Molecular Farming can process pilot and demo scale quantities of plant biomass
- Feb-batch & continuous culture at pilot and demo scale
- Experience in a range of microbial systems at plant and demo scale bacterial (+ve & -ve), yeast, filamentous fungi, algae and protists, plant and mammalian cells











Pilot Scale Fermenters 10-150L



Plug & Play DSP Units



Pilot Scale Fermenters 2x1000L



Demo Facility – tanks for continuous culture



Circular Bio-based Europe

Demo Facility- 10,000L



Pilot Scale DSP Facility









CRITT Bio-Industries, INSA Toulouse, France



Benjamin Percheron, Pilot Platform Project Manager benjamin.percheron@insa-toulouse.fr



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Sterilisation technologies

Pasteurisation













Your Partner for Bioprocess Scale-Up & Innovation Expert in industrial biotechnologies and separative techniques since 1989







- Separation & Purification Technologies Membrane filtration, extraction, and chromatography
- ▼ Techno-economic & Industrial Feasibility Studies OPEX/CAPEX analysis, industrial transition

Process Modeling & Digital Twins – Enhancing process understanding and scalability







Toulouse Biotech Alley
a unique integrated ecosystem
to discover, innovate, develop and scale-up
From genes to industrial processes



15,000 m² dedicated to biotechnology



~ 500

































Biosolutions Technology Center, Taastrup, Denmark



Anne Christine Hastrup, Director, PhD acha@dti.dk



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Biosolutions Technology Center, Taastrup, Denmark





KEY COMPONENTS

Fermentation Processes

- Discovery and development of fermentation processes for food, feed, pharmaceuticals, and biomaterials.
- Modular fermentation systems ranging from lab-scale to pilot-scale, enabling flexible process development and optimization.
- GMO-1 & food-grade certified facilities



Biorefining & DSP processes

- Conversion of renewable biomass into high-value products (e.g., food, feed, biofuels, bioplastics, and biochemicals).
- Processes include enzymatic hydrolysis, aqueous extraction, bioconversion, and downstream processing through separation, membrane filtration, chromatography, etc. for efficient resource utilization.
- Modular, flexible, and food-grade certified facilities



Analytical & Technical assessment

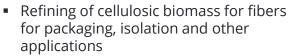
- Access to specialist and networks from different disciplines
- Tailormade and interdisciplinary advice
- Regulatory guidance and market compliance
- Risk assessments related to food-grade, GMO1, scalability

APPLICATIONS

Food and Feed

- Alternative proteins and sustainable production methods for plant-based products and meat alternatives.
- Enhancing safety, sustainability, and quality of food products.
- Functional ingredients

Biomaterials





Ingredients & chemicals

- Innovative ingredients for healthboosting and functional products.
- Chemical building blocks



SCALE-UP SERVICES

Microbial productions

- 1-200 L stainless steel fermenter
- 1-250L photobioreactors
- Sensors and data management
- Full downstream processing

Biorefining

- Biomass hydrolysis (800L x 2)
- Cellulosic fiber refining
- Centrifuges, membrane filtration
- Drying etc.



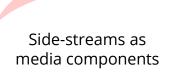


Biosolutions Technology Center, Taastrup, Denmark



Biorefining







Downstream processing



Fermentation



Extraction and separation









EXTRACTIS, Dury, France

Julienne Allemon, Business Developer allemon@extractis.com





Size reduction and Homogenisation

Chipping Extrusion Grindina Milling Densification



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



Chemical: sulphate/sulphite, organosoly, soda Mechanical

Hybrid: Chemi-thermo-mechanical pulping, neutral sulphite semi-chemical pulping



l Thermochemical conversions

Gasification Pyrolysis



technologies

Algae cultivation in open ponds, photobioreactors and fermenters



Seperation technologies

Mechanical separation Centrifugation Membrane filtration Particle filtering

Particle classification and sieving

Physicochemical separation

Crystallization Distillation

Field-Flow Fractionation

Extraction

Liquid-Liquid extraction Solid-Liquid extraction



Fermentation and Digestion

Anaerobic digestion Biomass fermentation and precision fermentation Solid-state fermentation Gas fermentation Composting



Enzymatic catalysis

Enzymatic hydrolysis and enzyme immobilization Remediation



Chemical conversions

Acid and alkaline hydrolysis Carbon capture utilisation Polymerisation Heterogeneous catalysis Reduction



Material technologies

Coating or lamination Textile fibre spinning Fibre web production Nano/micro fibre production Biocomposite processin



Sterilisation technologies

Pasteurisation UV





















Cosmetics



Nutrition



Technical additives



Toll

manufacturing

Certifications



Extraction



Reactors -> up to 15 m3

All IP

for

- Aqueous & solvent
- Ultrasonication
- High pressure homogenizer
- Enzymes
- Permanent 2 x 8 operation
- 2 tons per batch of raw materials processed

Liquid/solid separation

- Aqueous & solvent
- Centrifuge decanter
- Basket centrifuge
- Clarifier
- Plate filters

Up to 7000 kg/h



DSP

- Purification
 - Membrane filtration

MF, UF, NF, RO -> **up to 100 m**²

- Precipitation -> up to 10 m³
- Electrodialysis
- Ionic resins
- Evaporation -> up to 1000 kg/h
- Spray drying -> up to 100 kg/h











Aqueous extraction workshop



Solvent extraction workshop



Liquid/ solid separation workshop















Food Pilot, Melle, Belgium

Karen Verstraete, Communication Manager karen.verstraete@ilvo.vlaanderen.be





Size reduction and Homogenisation

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Grinding
Milling
Densification



Thermal and Pressure techniques

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Pulping

Chemical: sulphate/sulphite, organosolv, soda Mechanical

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Extraction Liquid-Liquid extraction

Solid-Liquid extraction





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Chemical conversions

Reduction

Acid and alkaline hydrolysis
Carbon capture utilisation
Polymerisation
Heterogeneous catalysis



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Sterilisation technologies

UHT Pasteurisation UV



















Towards any Application in Food and Feed

Develop new Ingredients, Recipes & Processes
Test & Analyze & Scale (1-250 kg) the impact of processing

Capabilities

- 100 Pilot Processing Machines
 >500 trials a year
- 100 Experts in Food and Feed Applications 750 Employees strong Dairy (analogues), Meat (analogues), Feed, Snacks, Bakery, Chocolate,...
- 10 Food labs (accredited): >20.000 Food Analyses
 Functionality, Microbiology, Taste & Odor, Allergens & GMO, Toxins, Nutrition,...

Themes: Novel Food, Side stream valorization, ingredient functionality,...



























Get in touch! Find all Pilot Equipment here:











Fraunhofer Fraunhofer CBP, Leuna, Germany

Dr. Christine Rasche Head of Business Area Sustainable Chemistry christine.Rasche@cbp.fraunhofer.de





Size reduction and Homogenisation

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Option "There is still a lot to do"
Joint R&D projects
Publicly funded projects



"We need to move fast or know our stuff"
Direct contracting



Use our existing pilot equipment in e.g. EU-funded projects



Build your dedicated demo plant integrated into our site in e.g. EU-funded projects



Use our existing pilot equipment on short notice



Build your dedicated demo plant integrated into our site incl. R&D and operation package













Pre-treatment and pulping of biomass incl. continuous lignin precipitation



Various reactors for chemical synthesis, batch and continuous



Fermentation up to 10 m³, ATEX, S1, MeOH-Feed







Very large selection of various downstream equipment

Installation and testing of additional rental equipment possible









IBERS, Aberystwyth Pilot-scale Biorefinery, UK

Dr. David Bryant, Senior Research Fellow dgb@aber.ac.uk





Size reduction and Homogenisation

Chipping
Extrusion
Grinding
Milling
Densification



Thermal and Pressure techniques

Microwave
Cold plasma
Ultrasonication
Torrefaction
Hydrothermal

Steam explosion



Pulping

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Reduction





Aberystwyth Pilot-scale Biorefinery

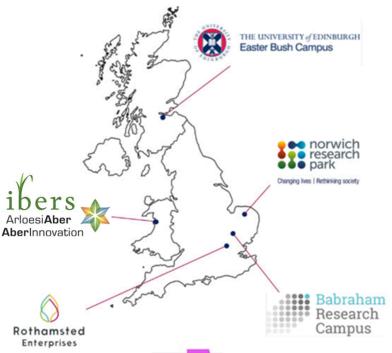




AberInnovation Industrial Research Centre (3500 m²)

- 1. Pilot Scale Biorefining Centre
- 2. Future Foods Centre
- 3. Advanced Analytical Centre

BBSRC Research and Innovation Campuses



- State-of-the-art Pilot-scale
 Production Areas (TRL 4-6)
- Product Testing Facilities.
- Cutting Edge Laboratories
- Office Space for SMEs
- Collaborative Environment
- Innovation and Growth
- Experts in Biotechnology,
 Agritech, and Food Science.













Aberystwyth Pilot-scale Biorefinery

























Biomass processing

- ✓ Screw press 0.1tonne to 1 t/h
- ✓ Biomass drier 25 kg to 150 kg/h
- ✓ Stirred, jacketed hydrolysis tanks 50 250 L
- ✓ Pyrolysis 0.5 tonne/batch
- ✓ Steam explosion <35 BarG
 </p>

Precision fermentation and DSP

- ✓ 25 L, 2 x 50 L, 300 L working vol SIP bioreactors
- ✓ Centrifugation: Continuous decanter & disc stack
- ✓ Cross-flow filtration UF/MF (<2 m³/h), NF/RO
- ✓ Spray dryer 7 L/h Food grade capability





INSTITUTE, LJUBLJANA ICP - Pulp and Paper Institute, Ljubljana, Slovenia



David Ravnjak, Managing Director david.ravnjak@icp-lj.si



Size reduction and Homogenisation

Chipping Extrusion Grinding Milling Densification



| Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



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neutral sulphite semi-chemical pulping



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Sterilisation technologies

UHT Pasteurisation UV







Reduction



ICP - Pulp and Paper Institute, Ljubljana, Slovenia



Pulping equipment for conversion of biomass to cellulose pulp

• operating conditions: normal pressure, T_{max} = 90 °C, modified Kraft or Soda process

Pilot paper machine with stock preparation

- stock preparation: pulper (70 kg dry/batch, 8-10 % solids), conical refiner, hollander beater
- paper machine Fourdrinier type: net width = 62 cm, basis weight = 50-300 gsm, speed = 15-50 m/min, production capacity 100 kg/h,
- online QCS: basis weight, moisture, filler content and caliper
- inline surface treatment (size press) max. 6 g/m²/side

Offline calender (paper + chrome plated rolls)

1-2 nips, width = 54 cm, load: 1-4 tons, roll T = max.130 °C, roll hardness = 88 Sh

Pilot coater for paper

- single sheet or roll-to-roll, operation modes = blade, rod, size press, film press
- net width = 24 cm, coat weight = 0,5-30 gsm, speed = max. 25m/min, IR and hot air drying

Converting machines for packaging prototyping

UV-LED inkjet printer (100 x 160 cm), ESKO cutting table (120 x 160 cm) for packaging prototyping









ICP - Pulp and Paper Institute, Ljubljana, Slovenia

























LSIWC Pilot-Scale Hangar, Riga, Latvia

Dr.sc.ing. Ugis Cabulis, Scientific Director ugis.cabulis@kki.lv





Size reduction and Homogenisation

Chipping
Extrusion
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Densification



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UHT Pasteurisation





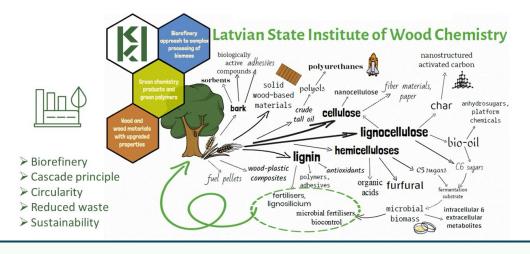






Vision:

Latvian State Institute of Wood Chemistry as a Baltic bioeconomy excellence centre will promote biorefinery as the backbone of future industry, and wood as a modern, sustainable building material, thus reducing the use of fossil resources and achieving Europe 2050 Zero Emission goals.







In 2020, the <u>Pilot-Scale Hangar</u> of the LSIWC was opened, which promotes the commercialization of the technologies developed in our laboratories. Raw material preparation and material production sections, biorefining process workshop, which includes biomass hydrolysis, pyrolysis, extraction, are available in the hangar; carbonization; steam explosion equipment for biomass decomposition. Pilot facilities provide an opportunity to up-scale laboratory processes developed at LSIWC or at the Institute's cooperation partners, reaching technological readiness level (TRL) 4-6.

Material preparation:

- Coarse mill
- Vibrating mill
- High-capacity coarse sieve
- High-grade fine sieve
- Dryer
- Spray dryer
- Vacuum evaporator
- Filter press
- Climatic chamber

Circular Bio-based Europe





Biomass processing:

- Wood impregnation equipment
- Non-destructive testing machine
- Mini reactor for synthesis in liquid medium with mechanical mixing
- Polyurethane production and test equipment
- Impact-tolerance measuring equipment with accessories
- Extraction plant (with 10 L extraction cells)
- Homogenizer for micro- / nano- cellulosis
- Electrospinning equipment
- Steam explosion equipment
- Hydrolic press
- Extraction station
- Continuous operation tunnel oven
- Fermentation plant











Biomass processing



















Platform chemicals production at Leibniz Institute for Agricultural Engineering Agrartechnik und Bioökonomie and Bioeconomy (ATB), Potsdam, Germany



Agata Olszewska-Widdrat, PhD, Group Leader aolszewska-widdrat@atb-Potsdam.de



Size reduction and Homogenisation

Chipping Extrusion Grindina Milling Densification 🛑



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



Chemical: sulphate/sulphite, organosoly, soda Mechanical

Hybrid: Chemi-thermo-mechanical pulping, neutral sulphite semi-chemical pulping



Thermochemical conversions

Gasification



technologies

Algae cultivation in open ponds, photobioreactors and fermenters



Seperation technologies

Mechanical separation Centrifugation Membrane filtration Particle filtering

Particle classification and sieving

Physicochemical separation

Chromatography Crystallization Distillation

Drying Evaporation

Crystallization and precipitation Field-Flow Fractionation

Flocculation

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Fermentation and Digestion

Anaerobic digestion Biomass fermentation and precision fermentation Solid-state fermentation Gas fermentation Composting



I Enzymatic catalysis

Enzymatic hydrolysis and enzyme immobilization Remediation



Chemical conversions

Acid and alkaline hydrolysis Carbon capture utilisation Polymerisation Heterogeneous catalysis



Material technologies

Coating or lamination Textile fibre spinning Fibre web production Nano/micro fibre production Biocomposite processin



Sterilisation technologies

Pasteurisation UV







Reduction





The processes for producing organic acids from biomass/residues include the following 4 main steps:

- **Pretreatment** breaking down the structure of the feedstock matrix
- **Enzymatic hydrolysis** depolymerizing biopolymers like starch, cellulose etc. to fermentative sugars, such as glucose (C6) and xylose (C5), by means of hydrolytic enzymes
- Fermentation metabolizing sugars to organic acids, such as, lactic acid generally by LAB
- **Separation and purification** purification of organic acids acid to meet the standards of commercial applications



Pilot plant facility for organic acids fermentation at Leibniz-Institute for Agricultural Engineering and Bioeconomy / ATB











ATB's Conference Venue - Circle







Pilot plant facility for oganic acids fermentation at Leibniz-Institute for Agricultural Engineering and Bioeconomy / ATB









LIST GreenTech Innovation Center, Luxembourg



Lucie Pfaltzgraff, Business developer lucie.pfaltzgraff@list.lu



Size reduction and Homogenisation

Extrusion
Grinding
Milling
Densification

Chipping



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



Pulping

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Thermochemical conversions

Gasification Pyrolysis



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Sterilisation technologies

UHT Pasteurisation UV









Plant cultivation in reactor:

- Stirred tanks (16 x 2L or 4L, 2x30L and 1x300L)
- 3 wave reactors (up to 11L single use plastic bags & light control available)

Completed by

- In vitro culture room
- Phytotrons
- Cryopreservation

Microbe bioprocessing:

- Pilot-scale anaerobic digestion reactors, including 200x 2L continuously stirred-tank reactors (CSTRs)
- AMPTS II automated system (15 x 500 ml bottles)
- 2L, 5L & 100L range of lab and pilot scale anaerobic bioreactors including ABRs
- 1x 1000L pilot scale dense membrane gas capture reactor (DMGC) mobile methanation prototype
- Field equipment for rapid diagnosis of AD process on biogas plants (mobile digester)



Downstream & analytical:

- Continuous centrifugation
- Rota-evaporation 20L
- Nutsche filters 140L
- Chromatography Akta PCC & Avant
- Continuous grinding & milling
- Filter press
- High pressure homogenizer
- Freeze drier 60 kg

Omics facility

- LC-MS-MS & GC-MS-MS
- Fractionation systems







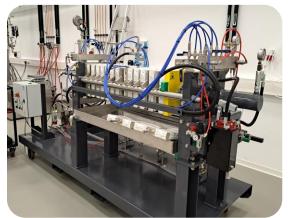
























Metrosert Applied Research Center, Tallinn, Estonia





Kaupo Reede, Head of Biorefining Unit kaupo.reede@metrosert.ee



Size reduction and Homogenisation

Chipping Extrusion Grinding Milling Densification 🛑



Thermal Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrotherma



Pulping

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| Thermochemical conversions

Gasification Pyrolysis



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Sterilisation technologies

UHT **Pasteurisation** UV









Reduction



Pre-treatment and media preparation

15 containers of various sizes and functions (0.5-4 m³)

Auxiliary Equipment

Various Pumps, Heat Exchangers, and Process and Work Environment Supporting Equipment



Applied research services including prototype development



Consulting on a research-intensive business model and its financing

including product development planning

Project management and project monitoring

Various initiatives with industry, academic institutions, and government agencies

Consultation and advisory services

Pre-certification consulting (including training)

Downstream Processing Equipment

Separators and filtration systems;

Homogenization, Evaporators and drying systems;

Sterilization and pasteurization

Packaging and Storage

Packaging and Filling Systems, Storage -80°C - RT

Technological Focus Areas

Starter Cultures

Fermentation system

500L, 5000L

Fermenters for scaling: 10L, 50L,

- Batch and fed-batch development
- Experimental production using aerobic and anaerobic cultivation
- **Enzymes and Proteins**
 - Development and experimental production
- **Functional Cell Biomass Fractions**
 - o Development and production of lipids, yeast extracts, and other biomass fractions
- **Bioplastics**
 - o Development of sustainable bioplastic materials





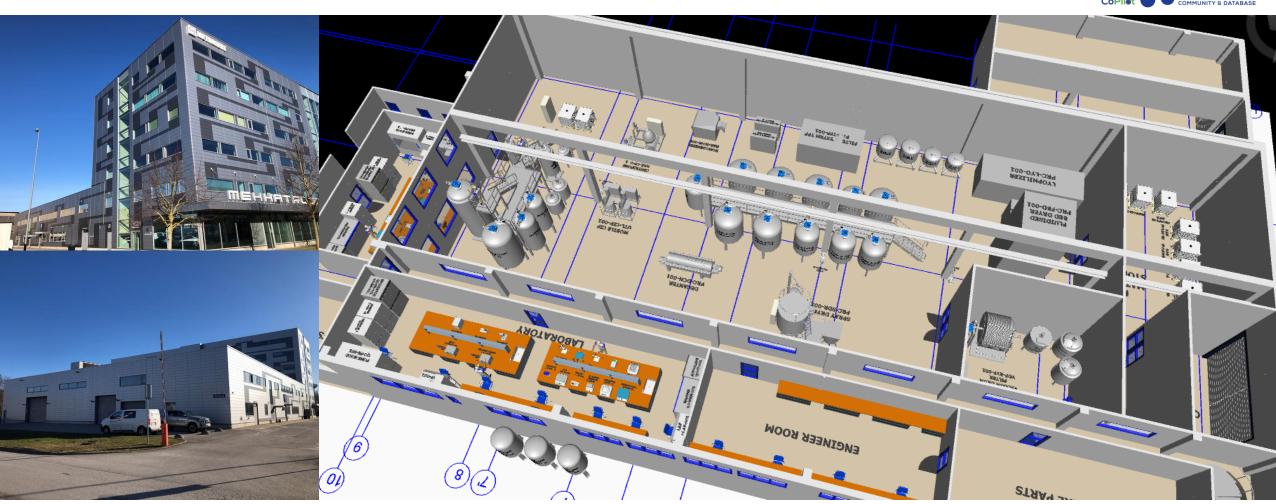






















NIZO down stream processing facility, Ede, Netherlands BFF biotechnology fermentation factory, Ede



Marcel Oogink, Managing Director BFF marcel.oogink@bff-ede.com



Size reduction and Homogenisation

Extrusion
Grinding
Milling
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Chipping



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Sterilisation technologies

UHT Pasteurisation UV













- Size reduction and homogenisation: Extrusion & Milling
- Separation technologies: Centrifugation, Membrane filtration, Particle filtering, Chromatografy,
 Crystalisation, Drying, Evaporation, Crystalisation and precipitation, Flocculation, Extraction
- Sterilisation technologies: UHT, Sterilisation
- Enzymatic Catalysis: Enzymatic hydrolysis and enzym immobilisation



- Fermentation and digestion: 600 and 4000 Ltr biomass fermentation
- 2026 expansion: 1000, 10000 Ltr (precision) fermentation













NBioC National Bioprocessing & Fermentation Centre, Stavanger, Norway





Catherine Boccadoro, Chief Scientist cabo@norceresearch.no



Size reduction Homogenisation

Chipping Extrusion Grindina Milling Densification



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hvdrothermal



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Sterilisation technologies

UHT Pasteurisation













New open access infrastructure supporting fermentation optimisation, scale-up, demo and piloting



Equipment at our facility

Range of fermenters from 2L to 1500 L

Fully certified ATEX halls and mobile units for gas fermentation 2L to 1000L

Downstream processing

Sensors and analytics

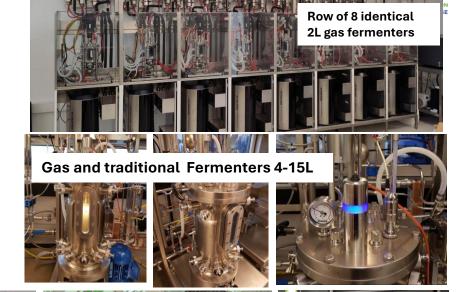
What can we do?

Process design, set up, optimisation, scale up and piloting

LCA, TEA and process modelling

Partnership on projects

Contract manufacturing



The building and facilities

Access to our fermentation equipment and pilots

Space to establish your own pilot or equipment

Available ATEX spaces, labs and offices

What type of fermentations?

Wide range of processes: flexible fermenter configurations, sensors, and high pressure

Wide range of substrates: gasses (H₂, CO₂, methane...), industry byproducts...

Products: enzymes, proteins, feed/food ingredients, polymers, other chemicals

















Process Technology Center – PTC School of Life Sciences, Muttenz, Switzerland



Prof. Dr.-Ing. Wolfgang Riedl, Head of Pilot Center wolfgang.riedl@fhnw.ch



Size reduction and Homogenisation

Extrusion
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Acid and alkaline hydrolysis Carbon capture utilisation Polymerisation Heterogeneous catalysis Reduction



Material technologies

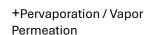
Coating or lamination
Textile fibre spinning
Fibre web production
Nano/micro fibre production
Biocomposite processin



Sterilisation technologies

UHT Pasteurisation

 Image: Control of the control of the













Innovation and practical relevance are at the heart of applied R&D at the FHNW School of Life Sciences. Our Process Technology Center (PTC) offers research and industry partners the ideal platform to scale up laboratory-developed processes before large scale implementation — <u>from milligram to kilogram.</u>

From (bio)pharmaceuticals and (bio)chemicals to environmental and nutrient technology – whatever the field, the PTC offers the same facilities as pilot systems used in industry.

Thanks to comprehensive **state-of-the-art measurement and control** technology, all relevant process parameters are recorded, visualized and analysed, allowing process evaluation in terms of the results expected.

PTC process technology and data science are used to evaluate the feasibility of innovative ideas and processes; for this piloting is essential.

Projects in the PTC achieve <u>TRL 5–7</u> requirements. Hence the PTC offers unique research and development opportunities which correspond to industrial requirements.



See more on: https://www.fhnw.ch/en/about-fhnw/schools/lifesciences/process-technology-center-ptc























VEG'EXTRA, Montreuil-Bellay, France

Laurent Fleutry, President laurent.fleutry@vegextra.com





Size reduction and Homogenisation

Chipping
Extrusion
Grinding
Milling
Densification



Thermal and Pressure techniques

Steam explosion Microwave Cold plasma Ultrasonication Torrefaction Hydrothermal



Pulping

Chemical: sulphate/sulphite, organosoly, soda Mechanical

Hybrid: Chemi-thermo-mechanical pulping, neutral sulphite semi-chemical pulping



Thermochemical conversions

Gasification Pyrolysis



Algae technologies

Algae cultivation in open ponds, photobioreactors and fermenters



Seperation technologies

Extraction

Mechanical separation

Centrifugation
Membrane filtration
Particle filtering
Particle classification and sieving
Physicochemical separation
Chromatography
Crystallization
Distillation
Drying
Evaporation
Crystallization and precipitation
Field-Flow Fractionation
Flocculation

Liquid-Liquid extraction Solid-Liquid extraction





Fermentation and Digestion

Anaerobic digestion Biomass fermentation and precision fermentation Solid-state fermentation Gas fermentation Composting



Enzymatic catalysis

Enzymatic hydrolysis and enzyme immobilization Remediation



Chemical conversions

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Sterilisation technologies

Pasteurisation
UV











TECHNOLOGIQUE

MANUFACTURER **NDEPENDANT**

PHYSICOCHEMICAL SEPARATION

- CHROMATOGRAPHY: resin columns 800L/1600L
- CRYSTALLIZATION and PRECIPITATION: solvent anti solvent
- EVAPORATION: 3 falling films evaporators (500 L/h to 2500 L/h), 3 stirred concentrators (150L, 700L, 4000L)
- DRYING: 3 ATEX vacuum ovens, 1 filter dryer 2 m² / 800L cake



SOLVENTS

ENZYMATIC AND ACID/ALKALINE HYDROLISIS

- 1 glazed tank, 250L
- 1 coated tank, 1000L

GRINDING AND CRYOGRINDING, up to 50 KG/h

MULTI-SECTOR

Cosmos, ISO22000, ISO9001

Ve

PROCESSING CAPACITIES

- Atex: 78 m³, ranging from 12 m³ to $0.5 \, \mathrm{m}^3$.
- Water: 35 m³, ranging from 8 m³ to $0.5 \, \mathrm{m}^3$.

SINCE 1997

MECHANICAL SEPARATION

- **CENTRIFUGATION:** automatic basket centrifuge, horizontal decanter
- MEMBRANE FILTRATION: Hollow frame, plate, bag and press filters. Crossflow filtration: ceramic and organic (4/10/15 m²)

SIZE REDUCTION & HOMOGENISATION







THANK YOU FOR YOUR ATTENTION!

LAURENT.FLEUTRY@VEGEXTRA.COM +33 687 694 225

VEGEXTRA.COM











VTT Bioruukki pilot centre, Espoo, Finland







Size reduction and Homogenisation

Chipping Extrusion Grindina Milling Densification 🛑



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UV

Sterilisation technologies

Pasteurisation













VTT Bioruukki Pilot Centre



An integrated enabler to accelerate development in bio and circular economy Piloting and scale-up at TRL 3-6

Biomass Waste Side streams Biomass processing and biomaterials

Thermochemical conversions

Process chemistry and hydrometallurgy

Industrial biotechnology







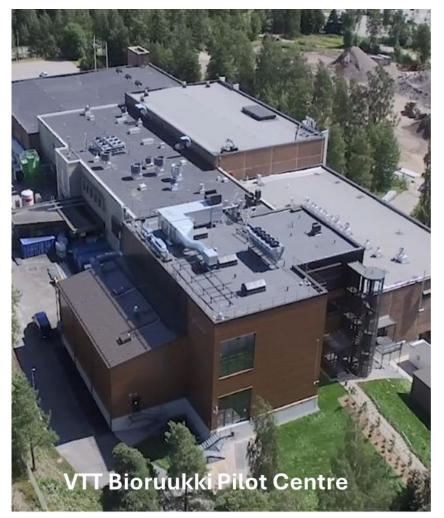


Sustainable biobased materials
Fuels from waste and CO₂
Chemical recycling of plastics
Metal recovery from ashes
Bio-based chemicals



VTT Bioruukki Pilot Centre





















YDLabs, Israel

Roee Vidavski, Chief Business Officer roee@yd-labs.com





Size reduction and Homogenisation

Chipping Extrusion
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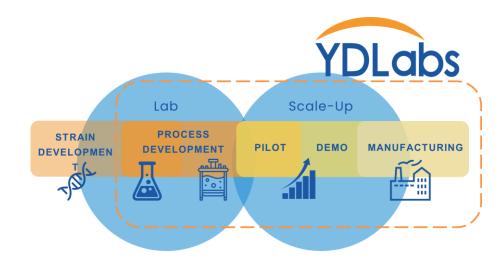




From Lab to Demo



- USP Services using state-of-the-art upstream equipment
 - Pilot facility: 80L, 300L & 1,000L
 - Demo facility: 7,500L & 15,000L (operational in 4Q.25)
- Fully equipped DSP to support scale-up processes
 - Separation: Disc-Stack (Westfalia) 200L/h & 3,000L/h; Tubular Centrifuge (CEPA) 40L/h
 - Homogenization: HPH 100-120L/h & 1,000L/h (1Q.26); Sonicator 20-30L/h
 - o Filtration: Ceramic & Polymeric micro, ultra & nano filters
 - Dryers: Spray Dry 5L/h & 100L/h (4Q.25); Freeze Dry 40Kg & 500Kg (3Q.25)
- Regulatory Accreditation (3Q.25)
 - HACCP
 - o ISO9001
 - Food Manufacturer Permit
 - Food-GMP

























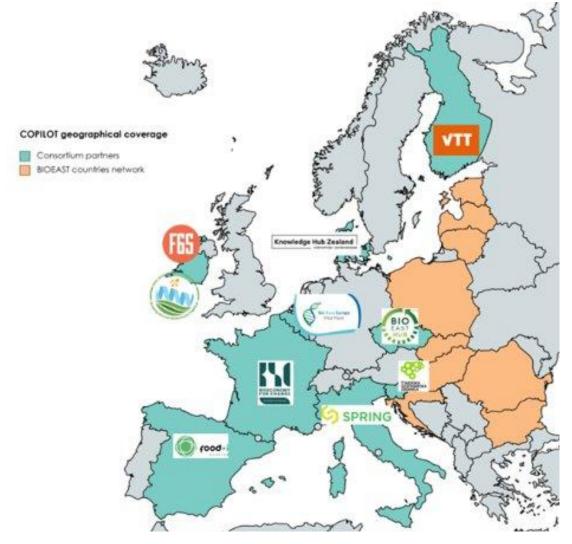


Join the Pilots4U powered by COPILOT community

Yang Zou, PhD COPILOT Coordinator

COPILOT Consortium





Pilot Plants:

- Bio Base Europe Pilot Plant, BE, Coordinator
- VTT, FI

Clusters:

- Food+i, ES, Cluster
- Irish Bioeconomy Foundation, IE
- Bioeconomy For Change, FR
- SPRING Cluster, IT
- BIOEAST Hub, CZ
- Knowledge Hub Zealand, DK

Other:

- Chamber Of Commerce And Industry Of Štajerska, SI
- F6S, IE







Open Call: Travel Voucher Program



WIN a TRAVEL VOUCHER worth €500

to visit the pilot or demo infrastructure that might scale-up your bioeconomy innovation

15 European Pilot and Demonstration Infrastructures for the bioeconomy open their doors in 2025 and 2026, offering a study visit and a thematic workshop related to scale-up for the bioeconomy.

CoPilot launches two OPEN CALLS to distribute 100 travel vouchers to attend.

CoPilet

Pilots4U

powered by
CoPilet

BIOECONOMY INNOVATION
COMMUNITY & DATABASE

Community and Database of European open access pilot and demonstration infrastructures for the bioeconomy

Open Call for Travel Vouchers

Part 1: Study Visits

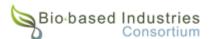
Study Visits organised in 2025

Open from: 10 March to 10 May 2025 Informative webinar on: 20 March 2025 Part 2:

Study Visits organised in 2026

Open from: 15 Sept. to 15 Nov. 2025 Informative webinar on: 23 Sept. 2025







Open Call: Travel Voucher Program

Application Deadline (A.D.):

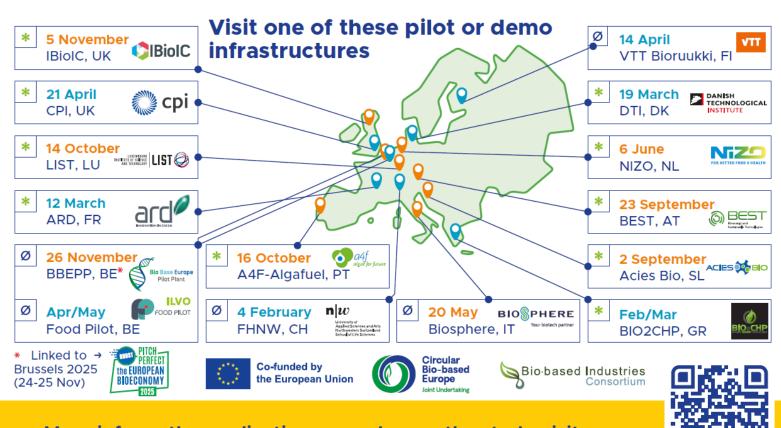




13 November 2025 Ø No vouchers available

* Vouchers available





More info on the application procedure or the study visits, scan the QR-code and go to the "Open Calls" or "Events" tab.







COPILOT Events: Pitch Perfect







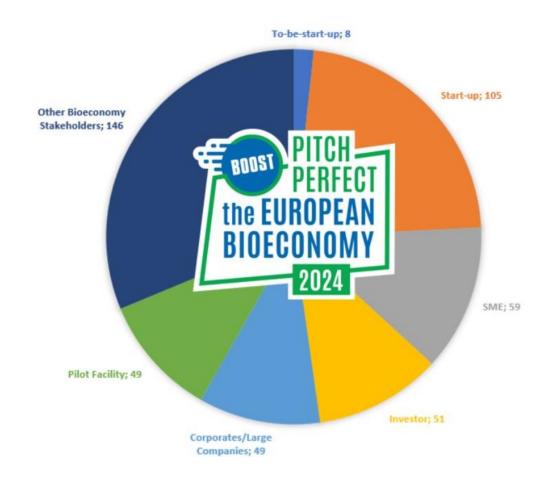






COPILOT Events: Pitch Perfect













COPILOT Webinars (May 2025 – May 2026)

| | Circular Bio-based Europe Joint Undertaking |
|--------------------------------|--|
| Pilot powered by CoPilot | IS4U BIOECONOMY INNOVATION COMMUNITY & DATABASE |

| Date | Pilot Plant and Demo Infrastructures | Topic |
|-------------------|--------------------------------------|---|
| 22 May 2025 | Bio2CHP | Pitch Training for Start-Ups in Biosolutions |
| 26 May 2025 | Acies Bio | Scaling innovative technologies - Different business models in scaling biosolutions |
| 18 June 2025 | LIST | Downstream from your Production Could be an Important Part of the Business Potential |
| 25 September 2025 | DTI | Choices Challenges and Collaboration in Process Scaling Up |
| 1 October 2025 | ARD | Scaling-Up Improvement, Environmental Integration Processes and Waste Characterization |
| 10 October 2025 | A4F | Biological Contaminants & Microalgae Crop Protection |
| 20 January 2026 | BEST | The Condensation of Liquids during Pyrolysis |
| 10 February 2026 | NIZO/BFF | Process and Microbial Modelling, Food Safety and Quality Aspects of Food Processing and Upscaling |
| 26 February 2026 | Biosphere | Intellectual Property and Patents for Biosolution Start-Ups |
| March 2026 | Food Pilot | Integrating Novel Food Dossier Preparation into Your Product Development Process |









Follow COPILOT LinkedIn Page



Pilots4U by CoPilot

Pilots4U 1,813 followers

➡ Shout out to all bioeconomy innovators: Meet and greet with 30 (!!!) European multipurpose, open-access pilot and demo facilities in one place on a single day.

Due to high demand, registration for this event is limited to start-ups, SMEs, and corporates active in the bioeconomy.

Registration: link in 1st comment field below.

In collaboration with Circular Bio-based Europe Joint Undertaking (CBE JU) and Bio-based Industries Consortium (BIC).







The European Pilot and Demonstration Infrastructure Fair

Organised back-to-back with

CBE JU Info Day 2025

4 April 2025 from 9.00am - 2pm @ CBE-JU, Brussels



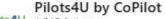












1.813 followers 1w • Edited • (S)

Around Europe in 100+ State-of-the-art Open Access Pilot and Demonstration Infrastructures for the bioeconomy: An Appetizer!

Wish to get in touch with them?

A Join our Pilot and Demonstration Infrastructure FAIR on April 4th, 2025 organised together with and in the offices of Circular Bio-based Europe Joint Undertaking (CBE JU)

Wish to visit one of them?

Win a Travel Voucher to visit.

All necessary links: see 1st comment field below!







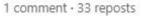




Circular Bio-based **Europe**

















Pilot and Demonstration Infrastructure Fair Match Making