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Kick-off meeting

WP1: Biomass processing

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Objectives

- Transfer of knowledge about sustainable lignocellulosic processing
 - To obtain cellulose pulp, biochar and fibres from biomass residues. In addition, energy production in rural areas obtained from the rest of fractions (lignin, hemicellulose) will be also studied.
 - The best characterisation methods will be also analysed.
 - In addition, two workshops about pretreatment methods and novel fibre production in SMEs and applications will be carried out, mainly for younger researchers.
- Create knowledge about
 - (i) novel characterisation methods of lignocellulosic materials by HPLC and FTIR;
 - (ii) novel hydrolysis and biochar production processes using deep eutectic solvents and hydrothermal processes;
 - (iii) joining processes for second-generation of ethanol production; and
 - (iv) new fibre bio-products from cellulose materials and natural additives.
- Skill development for biomass processing and characterisation in SMEs and rural areas.



Tasks

- **Task 1.1. Characterisation methods and residues.**

(Leading by LS-IWC) **M03-M11**

To choose the best raw materials (biomass residues) in rural and vulnerable areas and cellulose fibres in relation to their characterisation and opportunities of business and considering the availability of the raw materials. This objective depends also on task 2.1.

To select natural additives in biomass processing considering the availability and characteristics of these natural materials.

To give recommendations about the best characterisation methods in lignocellulosic biomass for obtaining cellulose-based products and energy. From traditional analysis of lignocellulosic fractions to novel methods for individual compounds (HPLC), FTIR and total characterisation.

- **Task 1.2. Novel and sustainable hydrolysis processes as pre-treatment.**

(Leading by UC) **M03-M17**

To study different hydrolysis processes in the chosen biomass residues from task 1.1. Acid, alkaline, deep eutectic solvents, steam explosion and autohydrolysis will be studied to separate cellulose from lignin and hemicellulose.



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Tasks

- **Task 1.3. Energy production in rural areas.**

(Leading by SGGW) M04-M23

To study energy demand and biomass energy production possibilities in rural areas.

To study the second-generation production of bioethanol from biomass residues chosen in Task 1.1. (i) bioprospection of microorganisms suitable for development of consolidated bioprocess, i.e., systems in which a) the enzyme complexes production, b) carbohydrate polymers hydrolysis and c) the fermentation, are accomplished in the same reactor by selected strains. (ii) ethanol production in SSCF (Simultaneous saccharification and co-fermentation) processes mediated by yeasts with enhanced metabolic activities to ferment pentoses, mainly xylose.

- **Task 1.4. Production of biochar and applications.**

(Leading by LUT) M08-M24

Production of biochar from pyrolysis and study of the possibilities to use biochar as soil amendment and CO₂ capture.

Production of high-quality biochar from hydrothermal processes in the cellulose fraction from the pre-treatment. Study the possibilities to use the high-quality biochar as soil amendment and CO₂ capture.



Tasks

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- **Task 1.5. Production of fibres and applications.**
(Leading by INOCURE) M08-M39

To study the best properties to be analysed in different applications of cellulose-fibres. Technical, morphological, thermal, and mechanical properties will be considered.

To give recommendations of the best nanocellulose and cellulose fibres methods and properties to be used in health products. The optimisation of a novel method of hydrolytic PSA-oxidation to obtain nanocellulose will be done.

To obtain a novel ecological SA binder fibreboard and investigate properties of fibreboard which made from natural fibres and glued with SA.

To develop a compostable, biodegradable packaging fibre material with improved mechanical and antimicrobial properties by using molecular chitosan and natural fibres.



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Secondments

• Task 1.1. Characterisation methods and residues

During the
first year

5 Secondments, 9 PM:

- UC→INOCURE 2 PM
- LS-IWC→UCC 2+1 PM
- INOCURE→UC 2 PM
- INOCURE→LS-IWC 2 PM

From M03 to M11

• Task 1.2. Novel and sustainable hydrolysis processes as pre-treatment

5 Secondments, 8 PM:

- BANGOR→FICH-UNL 1 PM
- TWI→ECORESOURCES 1 PM
- UNACH →UC 2 PM
- UC→INOCURE 3 PM
- FICH-UNL→UC 1 PM

From M03 to M17



Secondments

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- **Task 1.3. Energy production in rural areas**

7 Secondments, 14 PM:

- UCC → UC 2 PM
- UC → FICH-UNL 2+3 PM
- LS-IWC → UCC 2 PM
- SGGW → FICH-UNL 2+2 PM
- BANGOR → UCC 1 PM

From M04 to M23

During the
first year

- **Task 1.4. Production of biochar and applications**

8 Secondments, 12 PM:

- TWI → ECORESOURCES 1 PM
- UC → UNACH 2 PM
- LUT → UCC 2+1 PM
- AUTH → CCC 1 PM
- ECORESOURCES → TWI 1 PM
- UCC → TWI 2 PM
- UNACH → UC 2 PM

From M08 to M24



Secondments

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• Task 1.5. Production of fibres and applications

15 Secondments, 24 PM:

- NIBIO→INOCURE 1 PM
- INOCURE→LS-IWC 2 PM
- UPM→INOCURE 2 PM
- LS-IWC→INOCURE 2+1 PM
- SGGW→INOCURE 2+2 PM
- BANGOR→INOCURE 1+1+1 PM
- AUTH→INOCURE 1+1 PM
- INOCURE→SGGW 4 PM
- INOCURE→AUTH 2 PM
- ECORES→UC 1 PM

During the
first year

From M08 to M39



Deliverables, Milestones and deadlines

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Number	Title	Beneficiary	Type	Dissemination level	Deadline
D1.1	Recommendations about characterisation methods in lignocellulose biomass	LS-IWC	Report	Public	M11
D1.2	Pre-treatments of lignocellulosic residues to be used in SMEs and rural areascooperation	UC	Report	Public	M17
D1.3	Production of cellulose fibres, biochar, biofuels and energy to be used in SMEs and rural areas	SGGW	Report	Public	M39
Number	Title	Beneficiary	Deadline		
MS1	Fibre material prototypes	BANGOR	M39		



Other activities

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Workshop about novel pre-treatment methods (Leading by AUTH and ECORES) M21-M24.

Pre-treatment or fractionation of biomass residues by novel and sustainable methods. The use of deep eutectic solvents, ionic liquids and other methods will be shown in this workshop.

Workshop about fibre production and applications in SMEs (Leading by BANGOR) M35-M39.

Novel processes of cellulose and nanocellulose fibres for SMEs and how to study the morphology and other technical, mechanical, thermal characteristics of the cellulose fibres.