

## EUCalyptus Lignin VAlorisation for Advanced Materials and Carbon Fibres

Project number 745789

### D7.3 Meeting Minutes of Main Project / Consortium meetings 1

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## TABLE OF CONTENTS

<b>TABLE OF CONTENTS .....</b>	<b>2</b>
<b>DELIVERABLE DETAILS .....</b>	<b>4</b>
<b>1 1<sup>ST</sup> PCC MEETING .....</b>	<b>5</b>
1.1 ATTENDANTS TO MANAGEMENT MEETING .....	5
1.2 OBJECTIVES .....	5
1.3 WORK IN PROGRESS (M1-M3) .....	5
1.4 NEXT 3 MONTHS (M3-M6) .....	7
1.5 OTHER ISSUES.....	7
<b>2 2<sup>ND</sup> PCC MEETING .....</b>	<b>8</b>
2.1 ATTENDANTS TO MST MEETING .....	8
2.2 OBJECTIVES .....	8
2.3 REPORT ON SITUATION OF THE ACQUISITION OF BLACK LIQUORS .....	8
2.4 WORK IN PROGRESS .....	8
2.5 RISK MANAGEMENT .....	9
2.6 OTHER ISSUES .....	10
<b>3 1<sup>ST</sup> GENERAL ASSEMBLY MEETING.....</b>	<b>10</b>
3.1 ATTENDANTS TO GENERAL ASSEMBLY MEETING .....	10
3.2 MAIN OUTPUTS & ACTIONS.....	10
3.3 MEETING MINUTES (DAY 1).....	11
3.4 MEETING MINUTES (DAY 2).....	13
<b>4 3<sup>RD</sup> PCC MEETING .....</b>	<b>16</b>
4.1 ATTENDANTS TO MST MEETING .....	16
4.2 OBJECTIVES .....	17
4.3 WORK IN PROGRESS - 12:05 - 13:05 .....	17
4.4 RISK MANAGEMENT - 13:15 - 13:30.....	18
4.5 OTHER ISSUES - 13:30 - 13:45 .....	18
4.6 CONCLUSIONS .....	19
<b>5 2<sup>ND</sup> GENERAL ASSEMBLY MEETING.....</b>	<b>19</b>
5.1 ATTENDANTS TO GENERAL ASSEMBLY MEETING .....	19
5.2 MAIN OUTPUTS & ACTIONS.....	19
5.3 MEETING MINUTES (DAY 1).....	20
5.4 MEETING MINUTES (DAY 2).....	22
<b>6 REVIEW MEETING.....</b>	<b>23</b>
6.1 ATTENDANTS TO REVIEW MEETING.....	23
6.2 MEETING MINUTES.....	23
6.3 NEXT MEETING .....	25

## PROJECT INFORMATION

Project full title: EUCAllyptus Lignin VALorisation for Advanced Materials and Carbon Fibres

Acronym: EUCALIVA

Call: H2020-BBI-JTI-2016

Topic: BBI-2016-D03


Start date: September 1<sup>st</sup> 2017

Duration: 42 months

List of participants:

Participant No.	Participant Organisation Name	Short Name	Country
1 (Coord)	Contactica S.L.	CTA	Spain
2	Envirohemp S.L.	ENV	Spain
3	Grado Zero Innovation S.R.L.	GZI	Italy
4	Biosensor S.R.L.	BIO	Italy
5	Sächsisches Textil Forschungs Institut e.V.	STFI	Germany
6	Tampere University of Technology	TUT	Finland

## DELIVERABLE DETAILS

<b>Document Number:</b>	D7.3
<b>Document Title:</b>	Meeting Minutes of Main Project / Consortium meetings 1
<b>Period:</b>	09012017- 02282021
<b>WP:</b>	WP7. Project Management
<b>Task:</b>	Task 7.3 Overall management of the project based on KPIs tool and BSC methodology
<b>Author:</b>	CONTACTICA S.L. 
<b>Abstract:</b>	This deliverable collects the minutes from the different meetings carried out till September 2019 within the project. For each Consortium meeting attendants and minutes are included. In the personal meetings (General Assembly meetings) the agenda and main outputs are also presented.

## 1 1<sup>st</sup> PCC MEETING

DATE AND TIME	EVENT	PLACE
19th January 2018 10:00 - 11:30h	Management meeting	Skype

### 1.1 ATTENDANTS TO MANAGEMENT MEETING

	ORGANISATION	NAME
1	CTA	Manuel Román
2	CTA	Carolina Alfonsín
3	CTA	Nuria Valdés
4	ENVIROHEMP	Carlos Sanchís
5	GZI	Enrico Cozzoni
6	BIOSENSOR	Giovanni Basile
7	BIOSENSOR	M <sup>a</sup> Teresa Giardi
8	STFI	Petra Franitza
9	TTY-SAATIO	Johanna Lahti

### 1.2 OBJECTIVES

Partner CTA explained that the aim of this meeting was to review the technical activities that have been carried out during the last months of the project, in order to detect if any problem has arisen and, if so, try to find a solution.

### 1.3 WORK IN PROGRESS (M1-M3)

#### 1.3.1 WP1 - Optimisation of the lignin recovery from paper industry's black liquors (M1 - M24) (GZI, TUT, CTA)

Enrico Cozzoni (EC) mentioned that the overall objectives of WP1 were as follows:

- Characterization of the black liquor from the kraft process to be used as starting raw- material.
- Adaptation and optimisation of kraft process to produce high quality lignin from Eucalyptus waste and **purification of the extracted lignin.**
- **Techno-economic and environment assessment** using the LCC and LCA methodologies to select the optimal separation and purification processes.

#### 1.3.2 Task 1.1. Characterization of the black liquor stream and selection of scalable purification methodologies (M1 - M14) (GZI)

A work plan will be ready in the next week by GZI, that will assign the characterization activities between GZI & TUT.

##### 1.3.2.1 Task 1.1.1 Characterization of the black liquor

EC explained that GZI has begun to determine the methodology that will be used to characterized lignin. The concept behind the detergent fiber analysis is that plant cells can be divided into less digestible cell walls (contains hemicellulose, cellulose and lignin) and mostly digestible cell contents (contains starch and sugars).

This concept was experimentally used at Lab scale in GZI, to separate the less digestible fractions of wood fibres, and specifically Lignin. **A small quantity of Lignin, extracted from hardwood samples using this methodology, is going to be characterized in these days at GZI Labs.**

EC commented that at the end of this month (January) black liquor may arrive so characterization of BL can be carried out. Due to the BL acquisition issue, the end of this task is going to be postponed till M9 (May 2018).

Manuel Román (MR) explained that a Canadian company may be a potential supplier for lignin and BL. However, EC explained that it was preferable to take into account, by now, only European companies to minimise possible problems regarding the sending and costs of these products.

#### 1.3.2.2 Task 1.1.2. Extraction and purification of lignin

EC explained that this task has not started yet. It is going to be postponed until M7 (i.e. there is a 3 months' delay). EC commented that the acquisition of lignin is more complicated and GZI is looking for the better suppliers.

#### 1.3.3 **WP4 - Benchmarking, Prototyping and Standardization of the biobased materials (M1 - M42) (BIO, CTA, ENV, GZI, TUT)**

##### 1.3.3.1 Task 4.3. LCA analysis for the EUCALIVA process (M1 - M42) (CTA) and Task 4.4. Economic Feasibility Analysis (Life Cycle Costing) (M1 - M42) (CTA)

Nuria Valdés (NV) introduced Carolina Alfonsín (CA) to the partners as she will be the responsible of doing the LCA and LCC of EUCALIVA from CTA. CA explained that although these two task must have begun, due to the delay on the project, has not. CA added that she will be asking partners the required information to understand EUCALIVA project as well as data to perform LCC and LCA.

EC asked if CA wants to receive data since the first results are obtained for LCA and LCC. He said that in May, first results can be delivered.

#### 1.3.4 **WP6 - Dissemination and Communication (M1 - M42) (CTA, ENV, GZI, BIO, STFI, TUT)**

##### 1.3.4.1 Task 6.1. Project website (M2 - M42) (CTA)

NV from CTA explained that the webpage is totally operational. The webpage has a private area for EUCALIVA partners. NV asked if any of the partners had any issue entering this private area. Some partners were not able to enter and other requested the login details again. NV agreed to send again login details to partners by next week.

BIO asked to change some data about the project mentioned on the webpage. They will send the correct information to be uploaded on the web. CTA will change the information once it is received from BIO.

**D6.2. Project website** was submitted to the Participant Portal. It is also available on the private area of the website.

##### 1.3.4.2 Task 6.2. Dissemination and communication activities (M1 - M42) (ALL)

NV said that the press release of the project was prepared and sent to different media and organizations. It was translated by partners to their native languages. This dissemination material is available on the private area of the webpage. **D6.1. Press release** was submitted to the Participant Portal.

EC and Petra Franitza (PF) assisted to BBI Forum Stakeholder on 6 - 8th December, 2017. They explained that several contacts were made in this Conference with different companies as well as with other European projects related to lignin. Besides, they found potential BL and lignin suppliers.

MR commented that the Canadian company that might be a supplier of BL and lignin mentioned before, invite EUCALIVA partners to PAPTAC International Lignin Conference to be held next fall in Canada. The website of the event is: [www.ligninconference.com](http://www.ligninconference.com). NV said that more information about this Conference will be sent to partners in the following days.

#### 1.4 NEXT 3 MONTHS (M3-M6)

The work scheduled for December 2017 to February 2018 was reviewed. This review is useful in order to have a clear picture of the following activities and the deliverables that have to be submitted at the end of this period.

##### 1.4.1 WP1 - Optimisation of the lignin recovery from paper industry's black liquors

###### 1.4.1.1 Task 1.3. Optimisation of the lignin purification from the black liquors and conditioning of molecular weight to further valorisation steps (GZI)

EC explained that due to the BL and lignin acquisition issue, this task may be delayed, i.e. there is a 3 months delay in the project.

###### 1.4.1.2 Task 1.5. Study of the obtention of polyurethane from black liquor (GZI)

EC explained that due to the BL and lignin acquisition issue, this task may be delayed, i.e. there is a 3 months delay in the project.

#### 1.5 OTHER ISSUES

##### 1.5.1 Issue for BLs & lignin supplying

EC explained that several contacts have been taken, being the most promising with the **Company CELBI**, in Portugal (<http://www.celbi.pt/en/>), mainly involved in paper pulping. This company **will supply EUCALIVA project with BLs**, for starting the R&D activities at the **end of Jan 2018**.

The agreement between this company and EUCALIVA partners has to be signed. This company will supply lignin without problems concerning IPR and results publications.

##### 1.5.2 Anticipation of task 3.2.

BIO proposed to anticipate this task and begin now with the benchmarking. All partners agreed to this proposal. Besides, EC said that it was really interesting and useful for the project to determine the typology of material that there is on the market to consider these aspects when prototyping the products. So, EC asked BIO to do a study of art of carbon in electronics.

ENV partner explained that they have already started with the benchmarking of activated carbon fabrics and they will give results soon.

##### 1.5.3 BSC / KPIs

NV asked partners if they received the KPIs proposal sent to them several weeks ago. Partners answered that they received it and they have reviewed it. They will send their opinions and suggestions in the following weeks.

Concerning the management of the project, EC requested to have more meeting among partners as so much work have to be performed and help from other partners is going to be essential. It was established that a monthly skype meeting will be carried out to discuss the progress of the project and to minimize risks as soon as possible. It may be necessary to outsource part of the activities or need more help from partners. It is something that may be evaluated in these meetings.

MR suggested that as many meetings as necessary can be held between certain project partners when they have to coordinate their work. When a meeting is held, the minutes have to be send to CTA using the "Meeting minutes' template" available on the webpage.

#### 1.5.4 Next meeting

It was decided by all partners to postpone the meeting till April due to the delay of the project. CTA will be doing a doodle to determine the better date for this meeting (end of April). This meeting will be in Florence as it was established in the KOM.

## 2 2<sup>ND</sup> PCC MEETING

DATE AND TIME	EVENT	PLACE
5 <sup>th</sup> March, 2018. 12.30 - 13.30h	Management meeting	Skype

### 2.1 ATTENDANTS TO MST MEETING

	ORGANISATION	NAME
1	CTA	Carolina Alfonsín
2	CTA	Nuria Valdés
3	ENVIROHEMP	Carlos Sanchís
4	GZI	Enrico Cozzoni
5	BIOSENSOR	Mehmet Turemis
6	TTY-SAATIO	Petri Johansson
7	TTY-SAATIO	Johanna Lahti

### 2.2 OBJECTIVES

Partner CTA explained that the aim of this meeting was to review the technical activities that have been carried out during the last months of the project, in order to detect if any problem has arisen and, if so, try to find a solution.

### 2.3 Report on situation of the acquisition of black liquors

The actual situation is that GZI has received the NDA by CELBI (<http://www.celbi.pt/>) for the supplying of the Black Liquors. This NDA has been signed by GZI and CTA as the coordinator of the project. GZI expected to receive black liquor next week.

### 2.4 Work in Progress

#### 2.4.1 WP1 - Optimisation of the lignin recovery from paper industry's black liquors



GZI gave an update regarding the execution of Task 1. As it was mentioned on last meeting, this task has a delay of about 3 months. Consequently, the new timing for this task is M1 - M17.

The main aim of the characterisation of BL is to identify the composition of the black liquor, and the quantity and quality/typology of the Lignin present.

GZI indicated that they would cover extraction. Concerning the characterization of BL, GZI asked TUT if they could help in this task. GZI needed to know which tasks could be covered by TUT. Johanna commented that they directly cannot help with this task but they will ask other groups of TUT to perform this characterization. **Answer will be given in 1 or 2 weeks.** Enrico explained that they do not have lab for this characterisation. And in case it cannot be covered internally it will be an external contract. Johana asked GZI a list of parameters to be measured in order to decide if it is something that they can do or not.

GZI commented that they will try to analyse other type of feedstock (at least 2). GZI commented that they are trying to find a supplier of Lignin. CTA will contact the Canadian company to ask if they can provide different types of feedstock once GZI send info regarding lignin and other potential feedstock.

#### 2.4.2 Benchmarking (BIO AND ENV)

BIO explained the work they have carried out so far. They presented information regarding the market analysis BIO is doing, the literature review performed until now which includes different materials and production strategies as well as possible applications.

BIO had some questions regarding the use of lignin-based carbon to produce stretchable applications such as:

- What is the difference of lignin based carbon from the ones in the market?
- Why not rigid biosensors?
- Is the developed biosensor going to operate on support with dynamic conditions?

GZI answered to these questions: GZI pointed out that the challenge of the project is obtaining the right precursors from lignin to be able to produce stretchable electronics. The main difference is the feedstock because not all of them have functional application. In this project, similar features on the actual carbon based materials will be achieved but with an organic material. However, the techno-economic analysis is necessary to answer these questions.

GZI Is going to provide some materials to BIO so they can do some tests.

ENV explained as well the work they performed regarding the benchmarking. They still do not know how carbon material will behave.

They have tried to contact five companies, which produce textile from carbon and activated carbon. None of them has replied. ENV thinks that maybe is due to work in the same area so they can be competence. GZI suggested that they would contact those companies again. ENV will send an email regarding this issue.

Besides, GZI is going to send powders to be activated to ENV so they can investigate.

#### 2.5 Risk management

At the moment, it is complicated to assure that GZI will or won't be able to comply with the deadlines.

Before summer (after WP1), this issue will be studied to determine if deadlines will be fulfil; and if they cannot be fulfil, how this situation will affect the rest of the project.

## 2.6 Other issues

### 2.6.1 LCA

GZI asked if CTA wants to have data as soon as it is obtained to begin with the LCA analysis. CTA replied that they preferred to have data as soon as possible so some decisions can be taken regarding the analysis. **GZI will send an email** specifying detailed information regarding the feedstock that they are going to collect and related processes. After that, CTA will prepare an inventory for the specific case to start with data gathering.

### 2.6.2 KPI's

All partners except from GZI have sent their review on KPI. GZI will review the indicators as soon as they have some time. CTA will integrate all the proposed changes into a definitive (for the moment) version of the KPIs.

### 2.6.3 May meeting

Next meeting will be in Florence on May 10<sup>th</sup> and 11<sup>th</sup>. CTA will send a doodle to the partners to decide whether it will be a 1-day or 2-days meeting.

GZI will send an email asking for the preliminary attendance to this meeting.

### 2.6.4 Next meeting

Next Skype meeting will be between 26<sup>th</sup> and 28<sup>th</sup> of March.

## 3 1<sup>st</sup> GENERAL ASSEMBLY MEETING

DATE AND TIME	EVENT	PLACE
10 <sup>th</sup> - 11 <sup>th</sup> of May, 2018 15:00 - 18:00h 9:00 - 13:00h	General Assembly Meeting	Florence, Italy

### 3.1 ATTENDANTS TO GENERAL ASSEMBLY MEETING

	ORGANISATION	NAME
1	GZI	Enrico Cozzoni
2	GZI	Enrico Alessio De Marco
3	BIOSENSOR	Maria Teresa Giardi
4	BIOSENSOR	Giovanni Basile
5	BIOSENSOR	M. Turemis
6	TUT	Petri Johansson
7	STFI	Petra Franitza
8	STFI	Marcel Hofmann
9	CTA	Carolina Alfonsín
10	CTA	Nuria Valdés

### 3.2 MAIN OUTPUTS & ACTIONS

- Tasks 1.1, 1.3 and 1.5 have a potential delay of three months.

- After summer, GZI will give a definitive evaluation about the delays of WP1 and if these delays will affect other WPs, tasks, deliverables and milestones.
- It has to be decided if other raw materials are going to be analyzed. If more raw materials are going to be analyzed, task 1.1 will be delay until January. GZI will give an update about this decision in the following weeks (end of May)
- GZI will add a new risk related to WP1.
- D1.1 is planned to be submitted by M14 (October 2018). This deliverable will be submitted on time.
- Results of lab characterization will be available at the end of M9.
- First results from task 1.2 will be ready after summer.
- There is no benchmark in the market for this lignin. This fact is a concern to GZI. In 2019 some lignin will be coming from another BBI project
- A plan with the correct scheduled should be designed between GZI and TUT before summer to carry out tasks 1.2 and 1.3. This plan will be done before summer. Collateral meetings between GZI and TUT will be necessary.
- Task 1.4, study of residues, will be conducted in parallel to tasks 1.1 and 1.2.
- Task 1.5 will begin this month and first results may be ready by September.
- GZI will send next week BLs to BIO. BIO will carry out a study to understand what to do with GZI material at this moment.
- It is necessary to understand which process will be included in the LCA, who is going to be responsible for given data and which data can be shared. BIO will be giving information to CTA to begin with the LCA analysis.
- A template for reporting the communication and dissemination activities carry out during the project was going to be sent to the partners.
- NV asked partners to review sub-objectives that were established as "sub-tasks", which will help to achieve the objectives included in the DoA. In the following weeks, CTA will send again KPIs, including milestones and risk, so partners can review it, taking into account what was explained at the meeting.

### 3.3 MEETING MINUTES (Day 1)

#### 3.3.1 Meeting introduction & Agenda presentation

GZI and CTA welcomed partners attending to the meeting as well as CELBI (supplier of black liquors (BL) for this project) that was invited to the first day of the meeting. Besides, a round table was made to present people implicated in this project.

After that, Enrico Cozzoni (EC) from GZI explained briefly the work lines of WP1 so CELBI can understand in a better way this work package and what it is going to be carried out using their BLs.

#### 3.3.2 CELBI presentation

CELBI made a presentation about who they are and what they do. CELBI belongs to the company Altri. However, only CELBI is the provider of BLs to EUCALIVA project.

Altri is a Portuguese forest-based company specializing in eucalyptus pulp production. More than 90% of their production is exported.

They have 3 mills in Portugal (CELBI, CELTEJO and CAIMA). They produce energy (EDP Bioelétrica) too. Their main end users are: tissue 49% and printing and writing 22%.

CELBI is a worldwide reference in bleached eucalyptus kraft pulp (BEKP) and one of the most efficient mills in Europe. Currently CELBI has an annual production capacity above 720000 tones/ year. 80% of the eucalyptus comes from Portugal and Spain; the rest comes from Norway.

They explained the Kraft Chemical Recovery Process used in CELBI. Regarding to this process, they showed two samples: strong BL and BL to recovery boiler. The main difference is the Dried Solids content.

Concerning the BL, it was commented that burning lignin is not an option; they prefer to produce some added-value sub-product.

### 3.3.3 Technical issues

#### 3.3.3.1 WP1

EC from GZI presented WP1 as they are leaders of this WP. EC explained the objectives and tasks of WP1.

#### Objectives

- **Characterization of the black liquors from the Kraft process** to be used as starting raw-material
- Adaptation and optimisation of Kraft process to produce high quality Lignin, and **isolation and purification of the extracted Lignin**
- **Techno-economic and environment assessment** using the LCC and LCA methodologies to select the optimal separation and purification process

#### Tasks

- Task 1: **Characterization of the black liquors and selection of scalable purification methodologies** originally (M1-M14) → **new timing (M1-M17)** – GZI
  - Sub-task 1.1 Characterization of the black liquors, originally (M1-M6) → **new timing (M1-M11)**, ending in July 2018
  - Sub-task 1.2 Extraction and purification of the Lignin (M4-M14) → **new timing (M4-M17)**, ending in January 2019
- Task 2: Separation, extraction and chemical and physicochemical characterization of the Kraft lignins (M9-18) – GZI (other partner TUT), **started in this month**
- Task 3: Optimisation of the Lignin purification from the black liquors and conditioning of molecular weight to further valorization steps (M6-M24) – GZI (other partner TUT), **started M9. POTENTIAL DELAY OF 3M**
- Task 4: Study of the residues different from lignin present in the black liquors (M9-M20) – GZI, **started in this month**
- Task 5: Study the potential obtaining of Polyurethanes (Pus) from black liquors (M6-M24) – GZI, **started M9**

The first deliverable of this WP to be submitted is D1.1 at M14 (October 2018). This deliverable will be submitted on time.

After this introduction, EC explained what GZI was working on until now. He showed some pictures of the samples they received from CELBI (Strong BL & BL to recovery boiler), as well as an analysis report of these samples.

He continued by explaining the different tests to be performed (Task 1.1) with the samples to characterize them: BL test, BL ash test and lignin precipitation test. He commented **that results of lab characterization will be available at the end of M9**. Enrico presented the characterization and composition of BL (the analysis they performed since they received the BL).

**It has to be decided if other raw materials are going to be analyzed.** If more raw materials are going to be analyzed, task 1.1 will be delay until January. **GZI will give an update about this decision in the following weeks (end of May)**

Petri Johansson (PJ) explained that TUT will try to separate the lignin from black liquor (BL) with super critical carbon dioxide (sc-CO<sub>2</sub>). TUT might begin this task around summer: studies will start when TUT gets the BL and the sc-CO<sub>2</sub> device has the needed extra pipes and installing parameters for handling BL.

CELBI commented that they are having problems to send BL to Spain (ENV) and Finland (TUT) because of the transport.

PJ did not know how lignin will behave so it is complicated. Besides, separating pure lignin is not easy. Pure eucalyptus lignin should be used to spinning, because TUT want to use as good quality lignin as possible in melt and wet spinning to optimize the target of this project.

EC explained that it is being complicated to find lignin because there is no knowledge of which lignin is the best for this project. There is no benchmark in the market for this lignin. This fact is a concern to GZI.

In 2019 some lignin will be coming from another BBI project. So, this lignin will be analyzed. Lignin from other sources apart from eucalyptus might be used. The idea is to use lignin from other BBI projects.

Regarding Task 1.3, it will be the target of this task to optimize the Lignin recovery, conditioning its molecular weight, to allow further valorization steps.

To start this task, it is necessary to wait for the separation of the lignin. EC asked PJ if TUT were able to check the molecular weight of lignin. PJ answered that their unit did not do it, but he will ask.

A plan with the correct scheduled should be designed between GZI and TUT before summer to carry out tasks 1.2 and 1.3.

Task 1.4, study of residues, will be conducted in parallel to tasks 1.1 and 1.2.

Task 1.5 will begin this month and first results may be ready by September.

### 3.4 MEETING MINUTES (Day 2)

#### 3.4.1 Technical issues

##### 3.4.1.1 WP4

Mehmet Turemis (MT) from BIO presented this work package. MT explained that BIO has begun with the benchmarking. In order to fulfill this task, BIO has examined several published articles on the subject and BIO has communicated with leader electrode supplier companies.

He presented the literature review carried out as well as a list of companies contacted by BIO. In addition, MT showed us some flexible electrode prototypes produced. He continued by explaining the process to produce these and future electrodes.

Conclusions from BIO were that they found several carbon-based flexible electrodes in the market, but neither of them was stretchable.

Later, he explained the work plan for the following months. MT mentioned that the final prototype may be a wearable and stretchable electrochemical biosensor for medical and environmental applications, having different targets.

After MT intervention, EC asked about the potential application: in the DoA, it is mentioned using the substrate coming from the electrospinning (from lignin precursor) to give it a functionality. EC commented that producing biosensors from lignin is easier; and he asked if BIO was going to use the textile material produced from lignin to produce electrodes. MT said that it is possible to print carbon over the textile and then it can be used as an electrode. So, it is not a problem.

Maria Teresa Giardi (MTG) added that the study presented by MT was just a preliminary work. They needed the BLs from GZI to focus next steps.

Petra Franitza (PF) remarked that the Consortium has to try to find the benefit for all of the partners because it is logical that BIO needs to produce something that they can sell.

Finally, Consortium partners agreed some common uses for the material: for example, solar panels would be interesting, but it is not the market for BIO. BIO is looking for applications but in their market.

BIO proposed to perform a study to understand what to do with GZI material at this moment. In order to do this, they need materials from GZI.

**GZI will send as soon as possible materials to BIO** so they can begin to investigate with these materials. BL can be sent in one week to BIO from GZI.

#### 3.4.1.2 LCA - LCC

Carolina Alfonsín (CA) from CTA explains what a LCA analysis was briefly.

LCA is a tool for evaluating environmental effects of a product, process or activity throughout its lifetime. The purpose of an LCA can be:

- Comparison of alternative products, processes or services
- Identification of parts of the life cycle where greatest improvements can be made.

CA asked partners which process wanted to be included in the LCA & LCC. It is necessary to understand which process will be included in the LCA, who is going to be responsible for given data and which data can be shared. Moreover, in EUCALIVA, categories for the LCA have not been defined

GZI is interested in analyzing two extractions ways: the typical one and the new one.

PJ (TUT) asked the percentage of lignin extracted from BL. EC (GZI) explained that the percentage is not big. The rest is burn with the BLs. CA (CTA) commented that in the LCA has also to be considered the treatment of the wastes. CTA should know the percentage of lignin obtained and the percentage of waste.

LCI is the most costing time step in the analysis.

### **BL to extract lignin**

- CELBI will give information until BL.
- GZI will give an infographic of the process without quantity info. Energy info is complicated. The process is only going to be analyzed without oxidation.
- TUT did not know if giving this information is possible.

In the LCA for the project, transport is going to be considered. However, in reality this transport is not going to happen.

### **Pure lignin**

- GZI did not know if they are going to be able to buy lignin. Lignin is not available.
- TUT commented that this can be compare with pine lignin.

### **Separation processes (from September)**

- GZI can give information.
- TUT may give information too.

### **Carbon fibers into carbon-based materials (mats and nonwovens)**

#### **Carbon mats to electrodes, activated carbon**

- BIO will provide information now.
- ENV has to be asked about this matter.

#### **3.4.1.3 WP6. Dissemination & Communication**

Nuria Valdes (NV) from CTA presented this WP. She summarized the important activities carried out regarding the dissemination and communication of the project: webpage, roll-up, leaflets.

Besides, she commented that a European project, BIOWAYS, had contacted CTA with regards to EUCALIVA. BIOWAYS has launched a new tool (BIOWATCH) to help projects within the bioeconomy sector increase the awareness of their bio-based research findings, and they asked if EUCALIVA project would be interested in have a "seed" in BIOWATCH. The "seed" has been created and has to be completed. NV may ask partners for help regarding this issue.

NV explained briefly that a template for reporting the communication and dissemination activities carry out during the project was going to be sent to the partners. This template will simplify the gathering of this information for PR reports and deliverables, as well as, serve as tool to justify those activities if the partner has to do an audit of the project.

#### **3.4.2 BSC & KPIs**

EUCALIVA project is going to be coordinated by using the BSC methodology. NV from CTA presented a little bit about this tool and which the next steps are going to be.

The Balanced Scorecard is a management tool that provides stakeholders with a comprehensive measure of how the organization is progressing towards the achievement of its strategic goals.

It is a performance measurement tool used to translate the vision and strategy into action. This system provides feedback on internal processes and external outcomes to continually improve "team-consortia-organizational" performance and results.

The BSC is formed by the project strategic objectives, dividing each of them into sub-objectives or tasks that are necessary to fulfill in order to achieve the strategic objectives. Sub-objectives are monitor by indicators, which will have a target assigned to determine if the sub-objectives are achieved.

Potential risks associated to the different tasks were added to the BSC so they can be anticipated.

Partners need to be implicated in this strategy. For this purpose, NV asked partners to review sub-objectives that were established as "sub-tasks", which will help to achieve the objectives included in the DoA. In the following weeks, CTA will send again KPIs, including milestones and risk, so partners can review it, taking into account what was explained at the meeting.

#### 3.4.3 Risk management actions

NV from CTA reviewed the milestones and risks of the project that were included in the DoA. She commented that this revision will be made on every physical meeting, so risks can be anticipated.

She asked partners to inform the coordinator as soon as possible if they detect a risk and if they consider that the work plan may be delayed.

EC commented that he will add new risk regarding WP1. Besides, after summer, he will indicate if the delays form WP1 have been recovered or not. Depending on the answer, some measures may be necessary as inform the PO.

NV asked EC if he still thought it was necessary to have a consortium meeting once a month. EC proposed to have a meeting in three months by Skype. Next physical meeting will be in Munich. Apart from that, collateral meetings between partners can be organized when necessary.

#### 3.4.4 Financial issues

NV showed a table as an example of which information will be necessary to monitor financial statements. CTA will ask information every 6 months.

#### 3.4.5 Final considerations

It was decided that there will be a skip meeting in three months with all the partners. Moreover, next physical meeting will be in Germany the last week of November.

### 4 3<sup>RD</sup> PCC MEETING

DATE AND TIME	EVENT	PLACE
1st October, 2018. 12.00 - 14.00h	Management meeting	Skype

#### 4.1 ATTENDANTS TO MST MEETING

	ORGANISATION	NAME
1	CTA	Carolina Alfonsín
2	CTA	Nuria Valdés
3	ENVIROHEMP	Carlos Sanchís
4	GZI	Enrico Cozzoni
5	BIOSENSOR	Maria Teresa



6

TTY-SAATIO

Petri Johansson

## 4.2 OBJECTIVES

Partner CTA explained that the aim of this meeting was to review the technical activities that have been carried out during the last months of the project, in order to detect if any problem has arisen and, if so, try to find a solution

## 4.3 Work in Progress - 12:05 - 13:05

### 4.3.1 WP1 - Optimisation of the lignin recovery from paper industry's black liquors (GZI)

GZI gave an update regarding the execution of this WP.

Task 1: As it was mentioned on last meeting, this task has a delay of about 3 months. Consequently the new timing for this task is M1 - M17. The timeframe given in the last meeting remains the same:

- Characterization of the black liquor, originally (M1-M6) → **new timing (M1-M11)**, ending in July 2018. This sub-task is finished. GZI has sent a report with the results.
- Extraction and purification of Lignin (M4-M14) → **new timing (M4-M17)**, ending in January 2019.

GZI has obtained 3.5 - 4kg of lignin for each type of BL.

Task 2: GZI has contacted a biorefinery to obtain lignin. Finally the extraction of lignin is going to be carried out outside the EU using LIGNOFORCE. **Separation process will be made between Nov 2018 and Feb 2019.**

Sc-CO<sub>2</sub> will be tested at Lab scale in TUT as novel experimental route for Lignin separation. GZI has proposed TUT a planning for performing this task. TUT agreed with this plan. They will do a part of the characterization, finishing by February 2019.

**Task 3:** Optimization of the Lignin purification from the black liquors and conditioning of molecular weight to further valorization steps (M6-M24) – **GZI** (other partner TUT). Lignin optimization and conditioning of the molecular weight will be done to obtain the best quality of Lignin for the following valorization steps.

Physicochemical characterization will regard:

#### Routine tests:

- Solid of Lignin produced;
- Ash content (to 575°C, if needed, can go to 725°C);
- Na, S content;
- pH at 15% wt% in water;
- Acid-insoluble + acid soluble Lignin
- Total sugar content.

#### Extended characterization:

- Thermal properties (TGA and DSC);
- Functional groups by p31-NMR;
- Molecular weight and molecular weight distribution by GPC, and conditioning.

#### Complete characterization:

- Calorific value;
- Complete metal contents;

c) CHNSO content.

All these activities will be conducted by GZI in the following months (M24 is the end of the main task).

On the other hand, TUT will cover the following sub-tasks:

**Routine tests:**

- a) b) Ash content (to 575°C, if needed, can go to 725°C);
- b) pH at 15% wt% in water.

**Extended characterization:**

- a) Thermal properties (TGA and DSC).

Task 4: Study of the residues different from lignin present in the black liquors (M9-M20) - **GZI**. This task is as scheduled.

Task 5: Study the potential obtaining of Polyurethanes (Pus) from black liquors (M6-M24) – **GZI**. This task has a 3-month delay.

Considering the resources available, GZI do not know if resources will be enough to perform this task. They have to evaluate if with 8 kg of lignin they have enough. Regarding this issue, GZI asked TUT how much quantity of BL did they have and if they had more than enough. GZI wants TUT to send them some BLs if it is possible.

Besides, GZI is going to study if lignin will be suitable for performing this task. This should be decided in the next face-to-face meeting.

#### 4.3.2 WP4 - Benchmarking, Prototyping and Standardization of the bio-based materials (**BIO AND ENV**)

BIO explained the work they have carried out so far. BIO has produced two electrodes (one small and one big (4cm)). They have used carbon and polyurethanes to develop these electrodes. Thus, BIO commented that if GZI did not perform task 1.5, they will lose part of their work.

ENV explained that CTA helped contacting different companies that produce carbon cloths. ENV received a sample from one of these companies. ENV sent the datasheet of this cloth. They had two questions regarding this material: the utility of paying to get more samples and the definition of the testing to perform with these cloths.

GZI has an interesting non-woven that can be tested to compare. They are going to send it to ENV.

#### 4.3.3 WP6 - Dissemination & Communication (**CTA, ALL**)

GZI mentioned that it would be interesting to have a compilation of the communication & dissemination activities that had been carried out. CTA answered that in order to do it, it is fundamental that partners send back to CTA the "Activity Report" when one of these activities is performed. Besides, it would be positive if partners share their planned communication activities.

A Communication Plan is being prepared by CTA and will be discussed in the next face-to-face meeting.

### 4.4 Risk management - 13:15 - 13:30

GZI had a small delay on their tasks but this delay is not compromising at the moment.

### 4.5 Other issues - 13:30 - 13:45

#### 4.5.1 BBI request for samples

It was decided that different type of materials are going to be sent to the BBI in the following months. First of all, documents for each material, collecting the principal characteristics, are going to be sent to CTA. CTA will centralized these documents and send them to the BBI.

CTA will ask STFI if they have any carbon fiber product or material that can be sent to the BBI.

CTA will resend the e-mail with the template to fill for every product.

#### 4.5.2 KPI's

GZI proposed to update the KPIs of the project. This will be done in the following month. CTA will monitor this task.

#### 4.5.3 January meeting

During the meeting it was decided to postpone the next management meeting until January. CTA will prepare a doodle to choose the date for the meeting. The place will be discussed afterwards.

### 4.6 Conclusions

It is important to prepare a detailed prototype plan. This should be done in the following months.

In the next face-to-face meeting, which the routes are in which the Consortium wants to put more effort has to be discussed.

Several products will be sent to BBI as samples of the project.

## 5 2<sup>nd</sup> GENERAL ASSEMBLY MEETING

DATE AND TIME	EVENT	PLACE
16 <sup>th</sup> – 17 <sup>th</sup> January 2019	General Assembly Meeting	Chemnitz, Germany

### 5.1 ATTENDANTS TO GENERAL ASSEMBLY MEETING

	ORGANISATION	NAME
1	GZI	Enrico Cozzoni
2	BIOSENSOR	Mehmet Turemis
3	TUT	Petri Johansson
4	STFI	Petra Franitza
5	STFI	Marcel Hofmann
6	CTA	Carolina Alfonsín
7	CTA	Nuria Valdés
8	ENV	Carlos Sanchís

### 5.2 MAIN OUTPUTS & ACTIONS

- By the end of January GZI will send some materials to BIO.
- By the end of January, BIO will send a report regarding the type of material they need to GZI. In February they will have a skype meeting to discuss this.
- By the end of January, TUT will send a report to GZI regarding the characteristics of the material they need. In February they will have a skype meeting to discuss this.

- By the end of January CTA will prepare an Amendment of the project. The partners will help to justify it.
- By the end of January GZI will send the schemes of the extraction of lignin to CTA (both LignoBoost and LignoForce processes) so they can understand the process to begin the LCA.
- CTA establishes some deadlines to be able to prepare the report of the PR1 on time. The partners agree to this schedule.
- CTA is going to prepare a schedule to publish news monthly or every two months in the webpage. Partners will be responsible for generating the content while CTA will prepare the news.
- Every partner will send to CTA every 3 months the Communication & Dissemination activity reports.

### 5.3 MEETING MINUTES (Day 1)

#### 5.3.1 Meeting introduction & Agenda presentation

STFI welcomes partners to their facilities where the meeting is held. Due to some problems to arrive to the meeting from GZI, it was decided that first CTA presents the communication & dissemination part.

#### 5.3.2 WP6. Dissemination & Communication (CTA & ALL)

Nuria Valdés (NV) from CTA shows the compilation of communication & dissemination activities she has from all the partners of the Consortium. It is collected in a table. The activities are classified into different categories (the ones that have to be filled in the Participant Portal).

NV asks the partners to check if they did any more activities. She reminds them to send the “Activity Report” as it is necessary for preparing the PR1 report.

Besides, NV invites the partners to inform beforehand if they are going to do some communication or dissemination action so this can be published in the webpage and social networks.

NV proposes to prepare a plan to publish news on the website every month or two months. Partners agree to this idea.

#### 5.3.3 Technical issues

##### 5.3.3.1 WP3 & WP4

Mehmet Turemis (MT) from BIO presents its work for **WP3** (specifically, T3.2). It is supposed to begin on M24 but BIO has already begun with it.

Stretchable electronics prototypes will be fabricated in the form of electrically conductive hybrid polymer films and their quality will be assed. These will be made to maintain their electrical conductivity when subjected to deformation in two and three dimensions including bending, stretching and twisting. There are several situations, such as wearable electronics, flexible displays and lighting devices, skin sensors, stretchable circuits, flexible pressure gauge, etc., where elastic extensibility and/or permanent deformability are desired without significant loss of electrical conductivity.

MT explains the designs for the 2 electrodes that have been produced using commercial carbon conductive ink (one big and one small). Some samples are shown in the meeting. He explains the technical characteristics of these electrodes. Moreover, he explains the mechanical characteristics of them after performing different experiments (rolling, bending, twisting, stretching). An electrochemical characterization was also carried out and the results are presented.

Regarding WP4, MT explains that BIO is advancing in T4.5. Different final applications of the electronic devices can be selected. Within the project, real prototypes will be manufactured to demonstrate in real applications the viability of the pilot line proposed. The integration and adaptation of an existing manufacturing line type is important to manufacture novel layers at industrial scale able to be applied to different fields. However, the final applications will depend on the lignin obtained within the project. As they do not know exactly when GZI will give them the lignin, they are studying different possibilities. BIO has begun a collaboration with a Canadian Company from which they will obtain lignin.

In conclusion, the main outputs got by BIO are:

- ✓ **Newly designed electrodes printed on stretchable polyurethane substrate**
- ✓ **Stretchable screen printed electrodes were mechanically characterized (twisting, rolling, bending, stretching)**
- ✓ **Stretchable screen printed electrodes were electrochemically characterized.**
- ✓ **Stretchable electrodes transferred on wearable fabrics (gloves, socks)**
- ✓ **Laccase enzyme was entrapped on stretchable electrode and tested for catechol analysis.**

Next steps require the repetition of this study with the electrodes produced by bio-based materials.

Enrico Cozzoni (EC) from GZI points out that they need to know what material needs BIO for their experiments as it is a connected process; they will develop the products depending on the requirements of BIO.

#### 5.3.3.2 WP1 & WP2

EC explains the worked done for WP1 & WP2.

Regarding WP1, the characterisation of the black liquors from the Kraft process to be used as starting raw-material is already finished. The adaptation and optimisation of Kraft process to produce high quality Lignin, and isolation and purification of the extracted lignin is on-going (50% completed). techno-economic and environment assessment using the LCC and LCA methodologies to select the optimal separation and purification process is on-going (30% completed).

EC explains the changes to the duration of the tasks (WP has a potential delay of 3 months). This affects the due date of some deliverables.

Moreover, he explains the results from the characterization of black Liquors. GZI had to repeat the characterization and due to that D1.1 is delayed. It will be submitted **in January**.

EC explains the work performed for T1.2 & T1.3: Separation, extraction and chemical and physicochemical characterisation of lignin will be completed within **M24 (Aug 2019)**. Extracted lignin for characterisation and testing will be ready around M19/M20 (Mar 2019/Apr 2019). TUT support in Lignin characterisation will be:

- Routine tests:
  - Ash content
  - pH
- Extended characterization:
  - c) Thermogravimetric and calorimetric properties (TGA & DSC)

He also explains the work performed for T1.4 & T1.5: Study of the residues different from Lignin present in the BLs **will be completed within M23 (Jul 2019)**. Study the potential obtaining of Polyurethanes (PUs) from black liquors **will be completed within M27 (Nov 2019)**.

EC will send to CTA a scheme from the process of extraction of BLs by the end of January.

Regarding WP2, for T2.1, TUT should prepare a **plan for proceeding with the preparation and tailoring of the Lignin-blends**, proposing the evaluation of other precursors and copolymers, within **Jan 2019 (M17)**.

Carolina Alfonsín from CTA comments that as the BLs are coming from CELBI as waste, and GZI is not optimizing the process, this information is not useful for the LCA. However, EC answers that GZI will suggest how to optimize the process so a LCA is necessary to determine how these suggestions will impact environmentally. MT points out that this study will be qualitative (theoretical study) so an LCA is not useful.

#### 5.3.3.3 LCA & LCC

CA asks for information in order to begin with the first steps of the LCA. GZI explains that they will use LIGNOFORCE process. This process is supposed to cause larger impacts but the quantity of lignin obtained is higher.

Regarding BIO activities, it is decided not to be performed an LCA as it is not an “actual process”. They are just assembling without any energy/input demand, and they will do the same with biomaterials received from the project. The comparison with their current process is also disregarded because it is likely improbable to access the information of the productive process of normal lignin. Therefore, it is potentially not possible to do the LCA for this end-product.

GZ informs that some information and guidelines will be given to CELBI to try to improve its process in economic terms in case they want to focus on obtaining high-quality BL. However, it is out of the scope of the LCA-LCC of EUCALIVA performed by CTA because BL is supposed to be a waste from the main process performed in CELBI.

### 5.4 MEETING MINUTES (Day 2)

#### 5.4.1 Next 3 months

NV checks the actual Gantt to introduce the changes mentioned in Day 1. EC mentions changes related to WP1 and WP2:

- Milestones:
  - MS2 to M27.
  - MS3 to M33
- Deliverables:
  - D1.2 & D1.3 to M
- Tasks:
  - T1.2 & T1.3 to M24
  - T1.4 to M23
  - T1.5 to M27
  - T2.3 has 3 months of delay.

On the other hand, NV explains that an Amendment is necessary due to some change in the personal costs of BIO. Thus, the changes mentioned by GZI are going to be added to the Amendment, as well as, some changes in the task related to LCA. Finally, a project extension of 3 months is going to be suggested. TUT has change the name of the institution so this has to be changes too.

NV reminds that the PR1 ends the 28<sup>th</sup> of February. She suggests the following steps to prepare the technical and financial reports of this period. All partners agree with these deadlines.

#### Technical Report

1. Prepare the template of the Technical Report and send to partners (CTA) → **by 8th of March**
2. Fill the information in the Technical Report (All) → **by 22th of March**
3. Submit the Technical Report to the Participant Portal (CTA) → **by 30th of March**

#### Financial Report

1. Prepare Financial Reports (All) → **by 15th of March**
2. CTA reviews the partner's Financial Reports (decided by each partner) → **by 22 of March**
3. Submit the Financial Report → **by 30th of March**

#### 5.4.2 Risk management actions

NV from reviews the risks of the project. BIO added a new risk to the register. Besides, BIO mentions that the low conductivity of the bio-based material is the most important risk. The risks identified until now are still open and the mitigation measures are still valid.

Some changes are made to the BSC by GZI.

#### 5.4.3 Final considerations

The review meeting of the project will be in Brussels on 4<sup>th</sup> of June. GZI proposes to prepare the meeting the afternoon of the 3<sup>rd</sup> of June in Brussels. Partners agree to do this.

The next physical meeting will be in Finland between 7 – 9<sup>th</sup> of October.

## 6 REVIEW MEETING

DATE AND TIME	EVENT	PLACE
04/06/2019 8.30 – 15.30h	EUCALIVA Review meeting	BBI Headquarters

### 6.1 ATTENDANTS TO REVIEW MEETING

	ORGANISATION	NAME
1	CONTACTICA	Carolina Alfonsín
2	CONTACTICA	Nuria Valdés
3	GRADO ZERO INNOVATION	Enrico Cozzoni
4	BIOSENSOR	Maria Teresa Giardi
5	BIOSENSOR	Mehmet Turemis
6	STFI	Petra Franitza
7	TAU	Petri Johansson

### 6.2 MEETING MINUTES

The Project Officer of the EUCALIVA Project (Dieter Brigitta) welcomes everybody to the meeting. Then, he explains the review process cycle regarding the BBI's projects. He continues by remaining that this meeting is



to gather information concerning the project. The review meeting is optional but BBI decided that all the projects will have one.

#### 6.2.1 Overview/intro of EUCALIVA + WP7

Carolina Alfonsín (CA) from CTA gives an overview of the EUCALIVA project. She, then, presents the overall work carried out in PR1 related to deliverables, milestones and risks. She also comments the management procedures followed by the Consortium within the project. Finally, she also mentions the BSC methodology in which is based on the follow-up of the project, which is done by CTA.

After the presentation, the external reviewers and the PO have time to ask questions.

- They first congratulate CTA for the D7.1 as it is really clear and concise explaining the management structures of the Consortium. In this deliverable it is said that the Consortium will meet monthly, is it real? → It was real at the beginning of the project, when it was required. However, nowadays, these meetings are performed on a 3- month basis, as agreed by all the partners.
- Is the BSC accessible for every partner? Can they change the BSC? → All of the partners have the updated version of the BSC but only CTA can change this document. However, any partner can send new info or changes to be implemented in the document.
- The milestones seems to be too late as all of them are in the PR2 → The Consortium agrees with this fact and for that reason the progress of the project is carefully followed based on the KPIs. As a result, some new KPIs are going to be set within the project that have to be assessed to confirm that the project implementation is as scheduled or if it is necessary to have some mitigation measures.
- How is the internal communication procedure? → Partners communicate through email (the coordinator is always in copy) and they have Skype meetings when necessary.

#### 6.2.2 WP1: Optimisation of the lignin recovery from paper industry's black liquors

Enrico Cozzoni (EC) from GZI gives an explanation regarding WP1 and the work done during PR1. He mentions that some deliverables have delays and explains the reasons in detail. He also sets the new deadline for these deliverables. MS2 and MS3 need to be changed too.

After the presentation, the external reviewers and the PO have time to ask questions. The PO comments that 2 other BBI project are working with polyurethanes so EUCALIVA Consortium should contact them to avoid double efforts.

#### 6.2.3 WP2: Manufacture of Carbon fibre mats from high-purity lignin

Enrico Cozzoni (EC) from GZI gives an explanation regarding WP2 and the work done during PR1. As TAU is working in this WP, Petri Johansson (PJ) helps EC in the presentation. The plan prepared by GZI and TAU to carry out the work and finishing on time is explained. Furthermore, TAU explains that some preliminary work was done as preparation for when TAU has the samples. TAU is ready to try different solvents in the spinning if it is necessary for getting a good final product.

After the presentation, the external reviewers and the PO have time to ask questions. GZI explains that TAU must have a contingency plan just in case the spinning does not work.

#### 6.2.4 WP4: Benchmarking, Prototyping and Standardization of the biobased materials

Mehmet Turemis (MT) from BIO explains the work performed within WP4 in PR1. He tells that BIO decided to do a demonstration of the project with a commercial material (carbon ink). MT highlights that the most



important property of the carbonized lignin to be used in the biosensor is the conductivity. He also gives a general presentation of the LCA and LCC of the project.

After the presentation, the external reviewers and the PO have time to ask questions. First of all, they congratulate BIO for its results and all the work performed.

#### 6.2.5 WP5 Business Plan, Exploitation and market deployment of final biobased products

CA from CTA explains what was done concerning WP5 in PR1. She mentions that task 5.1 and 5.2 are the only tasks that began in PR1. She also explains what will be done in PR2. An updated version of the IP at this moment is shown. It is different from the one given in the proposal as things tend to change while developing a project.

BIO comments that in order to decide the Exploitation Strategy and the way of protection, a meeting of the Exploitation Board is required.

The external reviewers ask about the exploitable results of Envirohemp. The partners explain that it is activated carbon (ENVIROHEMP's main line) but using lignin as precursor, which is the real novelty for the company.

#### 6.2.6 After month 18: overall Outlook

EC gives an overall view of the interconnection among WPs and between PR1 and PR2.

The PO is a little bit worried regarding the fact that Carlos Sanchis, the responsible for EUCALIVA in ENVIROHEMP, left the company. CTA explains that ENV has found a substitute and all the information will be transferred to him. Moreover, the PO asks if the company keeps the interest in the project even if a different person takes the responsibility. CTA clarifies that ENVIROHEMP is completely involved in the project and they are really interested in continuing the work.

#### 6.2.7 Communication guidelines for BBI JU projects

A person working in the communication and dissemination department of the BBI presents the main issues regarding the communication and dissemination that every project financed by the BBI has to fulfil. He gives advices too and highlights that the services of the department can be used to reach a wider audience.

#### 6.2.8 WP6: Dissemination and Communication

Nuria Valdes (NV) from CTA explains the work done in PR1 concerning the WP6. She shows how the webpage looks like, describing the different sections within it. Besides, the main points of the Communication and Dissemination plan are presented. At the end of the presentation, the collection of Communication & Dissemination actions carried out during PR1 is shown, separating by partner and type of activity.

Firstly, the experts congratulate CTA on the well-done work performed in this WP. Some comments made by the PO are made regarding the use of the BBI logo old version. Besides, partners are asked if they foresee any scientific publication. TAU and STFI answer that it will depend on the actual research: if there is something interesting to publish, it will be.

### 6.3 NEXT MEETING

Next EUCALIVA meeting will be at TAU's facilities in Tampere, Finland. This meeting will be held on 8<sup>th</sup> – 9<sup>th</sup> October, 2019. It will include a visit to the laboratory the first in the meeting.