



Meeting Minutes

WP2 _ 1st Skype Meeting

Date: 23th Feb, 2016

Time: 14:00 – 15:30

Participants

DTI:	Anne-Belinda Bjerre Xiaoru Hou
DLO (WP3 leader):	Ana Lopez Contreras
DLO (for WP2):	Paulien Harmsen Nicole Engelen Jelle van Leeuwen
ECN:	Jaap Willem van Hal
MATIS:	Guðmundur Óli Hreggviðsson Bryndís Björnsdóttir Olafur H. Fridjonsson
FEXP:	Rene Schepens
AVT:	Martijn Kersbulck (<i>Shortly present due to Skype connection problem</i>) Robert-Jan van Putten (<i>Shortly present due to Skype connection problem</i>) Ben McKay (<i>Shortly present due to Skype connection problem</i>) Jan Kees van der Waal (<i>Shortly present due to Skype connection problem</i>)
SIOEN (WP1 leader):	Bert Groenendaal (<i>Absent</i>)

Agenda

- **Introduction to the meeting (Xiaoru Hou)**
 - Short summary of WP objectives
 - WP2 tasks and timeline the next 6 months
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- **Biomass Supply (Bert Groenendaal)**
 - 1st cultivated seaweed species and 1st delivery time
- **Conditioning and storage, Task 2.1 (Xiaoru Hou and Jaap van Hal)**
 - Lab scale drying and de-watering test



- Seaweed biomass species and quantity
- **Enzyme pretreatment, Task 2.3 (Guðmundur Óli Hreggviðsson and Xiaoru Hou)**
 - Seaweed biomass species and quantity
 - Type of enzymes
 - Tests of recombinant and commercial enzymes
- **Mild chemical treatment, Task 2.4 (Jaap Van Hal, Paulien Harmsen, Martijn Kersbulck, and Ana Lopez Contreras)**
 - Seaweed biomass species and quantity (Jaap, Paulien, Martijn Kersbulck)
 - Required amount of hydrolysate from WP3 and WP4 (Ana, Jaap)
- **Ensiling treatment, Task 2.2 (Xiaoru Hou and Rene Schepens)**
 - DTI and FEX's roles in this task
 - Seaweed biomass species and quantity
- **Etc.**
- **Next meeting**

Minutes

1. Objective of WP2 and purpose of the meeting

The main objective of WP2 is to develop methods for seaweed storage and pretreatment, as well as to provide substrates to WP3 and WP4 for further conversion. WP2 will officially start from March 2016 and this 1st WP2 Skype meeting is aimed to clarify the biomass supply and delivery demand for WP2, and to discuss the WP2 tasks and partners' roles in the following 4-6 months.

2. Biomass supply (WP1 status)

As WP1 leader Bert was unable to participate the meeting, Jaap gave a brief introduction of the WP1 status. Several seaweed species have been seeded and deployed. 100~200 kg FW Brown seaweed *Saccharina* and *Alaria* is firstly expected to be harvested in April~June. *Fucus* harvest can also be expected in the end of May. Green seaweed *Ulva* and red seaweed *Palmaria* and *Gracilaria* harvest is expected to be after summer.

3. Conditioning and storage

DTI and ECN are the involved partners for Task 2.1 (conditioning and storage technologies for freshly harvested macro-algae).



DTI will do the lab-scale test of screw pressing, and ECN will do the lab-scale test of drying (e.g. at several different temperatures). The investigation focus will be on the sugar loss.

This task (Task 2.1) will start as soon as the earliest batch of seaweed biomass is harvested i.e. start on *Saccharina* and *Alaria* in spring, due to that the conditioning and storage is the 1st step for handling seaweed after harvesting. The seaweed biomass needs to be delivered as fresh frozen.

DTI and ECN will deliver a small report with results and protocols on December 2016, since the results of this investigation are the components of the milestone MS3 “Safe storage method of macroalgae, with less than 5% sugar loss”.

The information of requested seaweed species, amount and delivery form from DTI and ECN will be collected in the excel sheet of “MacroFuels_seaweed request_compiled”, and Xiaoru will send the completed list to WP1.

4. Enzymatic pretreatment

Matis, DTI and DLO the involved partners of Task 2.3 enzymatic hydrolysis of macroalgal polysaccharides.

Matis will be mainly responsible for producing enzymes. DTI will be mainly responsible for comparing the produced recombinant enzymes and commercial enzymes for hydrolyzing seaweed biomass. DLO will be responsible for upscaling the enzymatic hydrolysis process.

For starting up, Matis will produce laminarinase(s), alginate lyases and xylanase. The produced laminarinase(s) and alginate lyases will be tested on *Saccharina latissima* when this seaweed biomass is received (in April-June, as expected). Produced Xylanases will be tested on red seaweed species e.g. *Palmaria* later after summer when this seaweed biomass is obtained. All the seaweed biomass before hydrolysis should be dried and milled. DTI will send dried and milled samples to Matis, to ensure exactly the same minor pretreatment of seaweed biomass between Matis and DTI.

DTI will compare the enzymatic hydrolysis efficiency of the correspondent commercial enzymes i.e. laminarinase, alginate lyase, and xylanases on exactly the same seaweed biomass i.e. starting on testing commercial laminarinases and alginate lyase working on the dried and milled *Saccharina latissima* (in April-June, as expected) and later on testing commercial xylanases on the dried and milled red seaweed species e.g. *Palmaria* after summer when this seaweed biomass is obtained. Galactan (from *Gracilaria*) hydrolysis by commercial galactanase will also be tested.

DLO will work on the upscaling process for providing the fermentation substrate to ABE fermentation in WP3. Such upscaling process will be based on the results from Task 2.3.1 i.e. DLO’s upscaling test will wait until DLO are informed by the results and protocols from Matis and DTI. For starting up the upscaling trial, DLO will first focus on *Saccharina latissima*.

Since DTI and DLO are both involved in producing enzymatic hydrolysed substrate in WP2 and fermentation in WP3 (e. g. DTI will do the ethanol fermentation and DLO will do the ABE fermentation), DTI and DLO will each take their own responsibility for providing the necessary hydrolyzed substrate for their own tasks in WP3.

DTI will contact Novozymes A/S for possible commercial enzymes supply. If the commercial enzymes can be provided by Novozymes A/S, DTI will be responsible for distributing the required enzymes to DTI and DLO.



5. Mild Chemical treatment

ECN, DLO and AVT are the involved partners of Task 2.4 “Fractionation and mild chemical treatment”, which is expected to start from June 2016. This is going to deliver the treated substrate to WP3 (to DLO for ABE fermentation) and WP4. AVT has already started preparations for pelletisation studies on dried seaweed, but do not anticipate supplying hydrolysates to WP4 in 2016, as the work in 2016 will be mainly on the effects of “synthetic” sugar mixtures. Since ECN is the task leader of this task and also the leader of WP4, ECN will take the responsibility for ensuring the supply from this task to WP4. For task 2.4.3, the combined chemical and enzymatic treatment of seaweed will be studied, and the task partner Matis will be asked to deliver required enzymes based on the results from task 2.3. Could you please add this to the minutes? The information of requested seaweed species, amount and delivery form from the involved partners will be collected in the excel sheet of “MacroFuels_seaweed request_compiled”, which Xiaoru will send the completed list to WP1.

6. Ensiling treatment

DTI and FEXP are the involved partners of Task 2.2 “Storage and pre-treatment by biological and chemical ensiling”, which will start from June.

DTI will do the lab-scale ensiling test and a protocol will be developed, using *Saccharina latissima* for the initial trials. FEXP will provide DTI with 3 freeze-dried bacteria strains for ensiling tests. FEXP will in the later stage take responsibility of the pilot scale ensiling trials. More details will be discussed in task meeting between DTI and FEXP before starting this task.

7. Next meeting

Next WP2 meeting will be held on either June 26th (Sunday) afternoon or June 27th (Monday) morning, in the same hotel where the MacroFuels’ 1st project meeting held. The exactly time for this WP2 meeting will be decided in one week before the project meeting, taking the time suitable to the majorities’ arrival. Guðmundur will reserve a meeting room for the WP2 meeting.

Noted by Xiaoru Hou, revised according to the comments from Wouter Huijgen, Jaap van Hal, Ben McKay and Bryndís Björnsdóttir