



# Meeting Minutes

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## WP2 –5<sup>th</sup> WP Meeting

*Date:* 18-Apr-2017  
*Time:* 13:30-15:00  
*Location:* Mobile-meeting

### Participants

<i>Name</i>	<i>Company/Institute</i>
Xiaoru Hou	DTI
Jelle van Leeuwen	WFBR
Wouter Huijgen	ECN
Bryndís Björnsdóttir	MATIS
Guðmundur Óli Hreggviðsson	MATIS
Olafur H. Fridjonsson	MATIS
Lilja Björk Jónsdóttir	MATIS
Jens Legarth	FEXP
Grete Brunsgaard	FEXP

### Agenda

1. Drying effects on seaweed biomass composition (Wouter)
2. Lab-scale ensiling status update (Dimitar)
3. Recombinant enzyme production and enzymatic hydrolysis (Bryndis)
4. Saccharification of seaweed biomass (Wouter, Jelle)
5. Purification and concentration of algal sugar syrups (Wouter)
6. Free discussion

### Minutes of meeting

#### **1. Drying effects on seaweed biomass composition (Wouter), for Task 2.1**

- Air-dried method did not affect the sugar content of the tested green, red and brown seaweed. It could be recommended, due to its relatively low cost and easy handling for delivery.
- However, the drying process from SAMS need to be improved, since the air-dried biomass was not dry enough when delivered to ECN. The so-called “air-dried” biomass in the presentation was actually further dried at 30~40°C in an oven for couple of hours, until the dry matter reached to ~90%.



- Draining during the drying process could cause sugar and other component loss.
- More detailed information regarding temperature, drying time, (any) draining process, ventilation condition, any acidic smell *etc.* during the air-drying process from SAMS is required by WP2 partners, for evaluation of the process suitability.

## **2. Lab-scale ensiling status update (Dimitar), for Task 2.2**

- The main purpose for ensiling process in this MacroFuels project is to find an economically feasible method to preserve sugars (to be converted to biofuels).
- Combination of organic acid (e.g. formic acid as strongly recommended by Jens due to its cheapest price) and biological ensiling process could be a strategy for this purpose (preserve as much sugar as possible),.
- DTI is developing lab-scale protocol now and will collaborate with FEXP for adapting to large scale trial in FEXP.
- MATIS (Olafur and Bryndis) presented the progress of another biological pre-treatment under the task 2.2: reduction of substrate viscosity by alginate degrading bacteria strains of *Rhodothermus marinus* and *Lactobacillus reuteri*. Where to put this biological-alginate-degrading pretreatment/treatment in the whole Macroalgae Biofuel production process was discussed and still needs to be considered. Suggestions could be like: 1) to convert the left sugars to (bacteria) protein, for residual protein concentration, 2) to convert the left alginate to uronic acid to be converted to furanic fuels.

## **3. Recombinant enzyme production and enzymatic hydrolysis (Olafur, Bryndis, Gudmundur), for Task 2.3**

- Recombinant alginate lyases (AlyRm3 and AlyRm4), as well as protocols for enzymatic hydrolysis and enzymatic activity (crude) analysis (by colorimetric quantification of uronic acids) as been sent to WFBR for their test in larger scale enzymatic hydrolysis of brown seaweed biomass.
- Recombinant laminarinases and enzyme cocktail (for simultaneously hydrolyzing different macroalgal polysaccharides) are under development. Enzymatic hydrolysis conditions e.g. pH, temperature *etc.* has to be combined with optimal Biofuel production purpose.
- More accurate quantitative analysis method (for uronic acids) are under development.

## **4. Saccharification and fractionation of seaweed biomass (Wouter, Jelle), for Task 2.4**

- Biorefining experiments have been performed on air-dried and frozen seaweed in ECN, in order to assess effect of preservation methods on sugar yields. Experiments appeared well, indicating air-dried biomass material could be recommended for sugar biorefining purpose. Unfortunately no sugar data available yet due to technical problems with ~~our~~ ECN's Dionex equipment.
- Different saccharification methods including enzymatic hydrolysis and chemical hydrolysis of *Saccharina latissima* have been run in WUR. Combination of chemical and enzymatic hydrolysis should be one strategy for optimize/maximize different polysaccharides' hydrolysis efficiencies.
- No updated information from AVT yet.



### **5. Purification and concentration of algal sugar syrups (Wouter), for Task 2.5**

- Membrane set-up has been adjusted to be able to work with higher trans-membrane pressures. First tests with model components show that concentrating up to 60 g/L mannitol, as targeted in DoA, should be feasible.

### **6. Free discussion**

- 1½ Year Progress Report template will be sent to all the task leaders in the end of May to the beginning of June, asking for input.
- Due to the maternity leave of WP leader Xiaoru in July, the next regular 3-month WP meeting will probably be held on-line (by Skype for Business) in June rather than having the face-on-face meeting in Bruges in July during the 3<sup>rd</sup> Project meeting. Xiaoru will give all the WP partners more information in May, regarding the replacement of Xiaoru's tasks during her leave.

*Noted by Xiaoru Hou, revised by Wouter Huijgen.*