



EERA-Bioenergy Workshop on
Algae for Bioenergy and Bioproducts
ENEA Office
Brussels, September 13th, 2016

A one-day EERA-Bioenergy Workshop was hosted by ENEA at the ENEA Office in Brussels 2016. 22 participants were present from 10 European institutions (6 research centers and 4 universities) listed as follows:

CIEMAT-Spain (1)
ECN- Netherlands (2)
KIT-Karlsruhe Institute of Technology-Germany (2)
LNEG, Portugal (2)
Padova University-Italy (1)
SINTEF-Norway (3)
SP Technical Research Institute of Sweden-Sweden (1)
University of Bologna-Italy (1)
University of Hohenheim-Germany (2)
Wageningen UR- Netherlands (2)

Additionally **five external key-note speakers**, representing SMEs, Research Centers and Academia were invited as special guests for presenting undergoing relevant EU Horizon2020 algal-based projects, listed as follows:

DTI-Denmark (1)
A4F-Portugal (1)
University of Almeria-Spain (1)
Seeweed Energy Solutions-Norway (1)
FCC Aqualia, SA-Spain (1)

Two apologies have been received:
IMDEA Energy-Spain (1)
Scottish Marine Institute-Scotland (1)

The goals of the workshop were networking, to identify core research questions relevant for valorization of algal biomass, algal biofuels and bioenergy, the initiation of new ideas, initial discussion about the launch of project consortia under EERA-Bioenergy umbrella for upcoming H2020 and similar calls and last but not the least, to discuss a JPMB of EERA-Bioenergy recommendation for the future of SP3 Algae within EERA-Bioenergy.

The event was organized in six main parts as follows: a general Information presentation about EERA-Bioenergy; a round table presentation; five key-note presentations about the Current Status of Algae Research in Europe; a Pressure cooker Session for Generating ideas for current H2020 and/or BBI 2016/2017 calls and identifying "Project promoters"; a Pressure cooker Session about Aligning Algae Research within EERA-Bioenergy JP; a proposal of next steps and

closure workshop. The plenary session started with welcome words which have been given by Francisco Gírio, followed by an introduction about the Joint Program of EERA bioenergy which was made by Juan Carrasco. Then, a round table was launched in which the researchers gave a short description of themselves and their area(s) of interest.

Then the key challenges in the algal exploitation for bioenergy/biofuels either from the academic or the industrial/commercial perspective were presented by the five external keynote speakers, as follows:

Zouhayr Arbib	FCC Aqualia, SA-Spain
Francisco Gabriel Ación	University of Almeria-Spain
Diana Fonseca	A4F-AlgaFuel-Portugal
Anne-Belinda Bjerre	DTI-Denmark
Jon Funderud	Seaweed Energy Solutions-Norway

Three key challenges for microalgae have been listed as follows: i) the development of suitable technologies for large scale production of microalgae in order to maximize algal growth and lower final biomass total costs; ii) the coupling the production of microalgae with treatment of wastes in order to increase the sustainability (LCA), to reduce the cost/energy of waste treatment and to be the only way to produce low-added value products from microalgae; and iii) the need to develop and optimize smart downstream processing, specifically for each microalgae species. Other challenges included the iv) closed versus open systems debate when energy is the goal, and v) the nutrient contribution for limitation in microalgal growth, especially in what concerns the phosphorus.

Regarding the macroalgae (seaweeds) the highlighted key challenges have been identified as follows: i) the applications innovation in order to create new macroalgae based products; ii) the Biology/genetics issues in order to improve macroalgae productivity and quality; iii) the need of stable and sufficient biomass availability in order to provide robust seaweed biomass supply and, iv) the need to develop robust fermentative and thermochemical process concept towards biofuels production from seaweeds.

Afternoon - pressure cooker sessions

Main activities of the day after lunch were devoted for two pressure cooker sessions. The discussions were led by the moderators Francisco Gírio, Jaap Kiel, Juan Carrasco and Berta Matas, all members of JP Management Board of EERA-Bioenergy. The discussions focused on previously defined challenges from the industrial and academia key note presenters and the complementary research addressing those challenges from the researchers. The microalgae and macroalgae/seaweeds groups were merged into one group only.

The Pressure cooker Session about “*Aligning Algae Research within EERA-Bioenergy JP*” was widely discussed among the participants. Inputs and suggestions from the Workshop participants about the main drivers for algae research within EERA-Bioenergy Joint Program were received.

The first question that arose was to what extent should be energy production from algae a commercial reality in the near future to come. All participants highlighted the non-pivotal role

of bioenergy and biofuels production from algae in the short-term. Although a huge investment in R&D is required in order to overcome hurdles, especially in order to decrease algal production costs, still prohibitive. In this sense, algae could be better exploited if directed to low volume/high-medium value applications and products, being bioenergy/biofuels considered by-products. Algal-based wastewater treatment seems to be a very attractive option for bioenergy/biofuels purposes combining environmental advantages together with by far lower biomass productions costs.

Thereafter, the discussion moved to the question concerning algae process options. The main goal of this discussion was how algal-based R&D might match EERA Bioenergy and the best way to achieve significant results.

The Workshop participants suggested that it makes sense to keep algal-based R&D inside EERA Bioenergy. Alberto Reis (Portugal) suggested that given the importance of this area of research (there are specific EU H2020 calls for algae, and algae are one of the seven EIBI value chains considered) might justify to keep a separate Algae Sub-Program within EERA-Bioenergy. However, by overwhelmingly majority, the Workshop participants did agree that the best way to highlight the relevance of algal-based R&D is to incorporate this research topic in the remaining currently active EERA Bioenergy SPs, namely, SP1 (Thermochemical), SP2 (Biochemical Platform) and SP4 (Sustainable Biomass). All group remarked a past activity of SP3 far below the expectations.

The second Pressure cooker Session for *“Generating ideas for current H2020 and/or BBI 2016/2017 calls”* was launched by Francisco Gírio, identifying upcoming opportunities in H2020 LCE Calls - Competitive Low Carbon Energy (H2020-LCE-2016-2017). The most promising calls have been presented such as LCE-6-2017, LCE-8-2016/2017 and LCE-19-2016/2017. Their deadlines and the expected impact in terms of reached TRL have been presented by Francisco Gírio.

Finally the organizing committee acknowledged all participants for a very interesting day with a lot of fruitful discussions and relevant challenges to further explore. A post-Workshop special thanks to Dr Alberto Reis (LNEG) that did actively support the Organizaing Committee for the successful of this Workshop.

Brussels, September 13th, 2016

The Organizing Committee (EERA-Bioenergy Management Board):

Juan Carrasco (JP Coordinator, CIEMAT, Spain)

Jaap Kiel (SP1 Coordinator, ECN, The Netherlands)

Francisco Gírio (SP2 Coordinator, LNEG, Portugal) – Workshop Coordinator

Gabrielle Benoit (SP4 Coordinator, INRA, France)

Berta Matas Güell (SP5 Coordinator, SINTEF, Norway)