Ref. Ares(2018)4984729 - 28/09/2018

BioMates

Deliverable D 7.5: 2nd Dissemination Report

Version 01

Grant Agreement number:	727463
Project Acronym:	BioMates
Project title:	Reliable Bio-based Refinery Intermediates — BioMates
Start date of the project:	01.10.2016
Duration of the project:	30.09.2020
Deliverable N°.:	D25
Relative Deliverable N°.:	D7.5
Work Package N°. Task N°.:	WP7, Task 2
Deliverable title	2nd Dissemination Report
Scheduled date of submission	30/09/2018
Date of submission of Version 01:	28/09/2018
Version:	01
Date of submission of this version:	28/09/2018
Dissemination Level:	Public
Project website address:	www.biomates.eu
The deliverable is elaborated on the basis of	the original Grant Agreement
Submitting party:	Fraunhofer
Responsible author:	Tim Schulzke
Co- author(s):	Volker Heil
Reviewer:	
Verification:	Report with summary

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727463.

Contents

1. Introducing BioMates

1.1. The BioMates Project

The BioMates project aspires in combining innovative 2nd generation biomass conversion technologies for the cost-effective production of *bio*-based inter*medi*a*tes* (BioMates) that can be further upgraded in existing oil refineries as renewable and reliable co-feedstocks. The resulting approach will allow minimisation of fossil energy requirements and therefore operating expense, minimization of capital expense as it will partially rely on underlying refinery conversion capacity, and increased bio-content of final transportation fuels.

The BioMates approach encompasses innovative non-food/non-feed biomass conversion technologies, including **ablative fast pyrolysis (AFP)** and single-stage **mild catalytic hydroprocessing (mild-HDT)** as main processes. Fast pyrolysis in-line-catalysis and fine-tuning of BioMates-properties are additional innovative steps that improve the conversion efficiency and cost of BioMates technology, as well as its quality, reliability and competitiveness. Incorporating **electrochemical H_2-compression** and the state-of-the-art **renewable H_2-production** technology as well as **optimal energy integration** completes the sustainable technical approach leading to improved sustainability and decreased fossil energy dependency. The overall BioMates-Concept is illustrated in Figure 1.

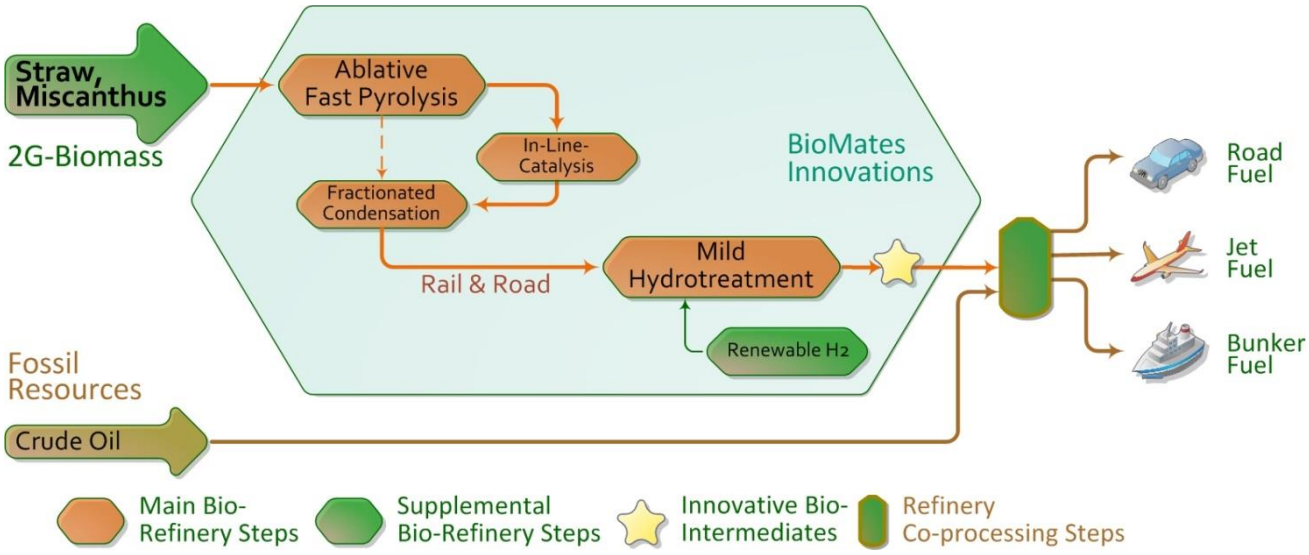

Figure 1: The BioMates-concept

The proposed technology aims to effectively convert residues and non-food/feed plants or commonly referred to as 2nd Generation (straw and short rotating coppice like miscanthus) biomass into high-quality bio-based intermediates (BioMates), of compatible characteristics with conventional refinery conversion units, allowing their direct and risk-free integration to any refinery towards the production of hybrid fuels.

1.2. European Commission support

The current framework strategy for a Resilient Energy European Union demands energy security and solidarity, a decarbonized economy and a fully-integrated and competitive pan-European energy market, intending to meet the ambitious 2020 and 2030 energy and climate targets /EC-2014a, EC-2014b/. Towards this goal, the European Commission is supporting the BioMates project for validating the proposed innovative technological pathway, in line with the objectives of the LCE-08-2016-2017 call /EC-2015/. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727463.

1.3. The BioMates team

The BioMates team comprises eight partners from industry, academia and research centres:

- Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT, Germany (Project Coordination) - *www.umsicht.fraunhofer.de*
- Centre for Research & Technology Hellas / CERTH - Chemical Process & Energy Resources Institute / CPERI, Greece - *http://www.cperi.certh.gr/*
- University of Chemistry and Technology Prague UCTP, Czech Republic - *http://www.vscht.cz*
- Imperial College London ICL, United Kingdom *www.imperial.ac.uk*
- Institut für Energie und Umweltforschung Heidelberg GmbH / ifeu, Germany - *www.ifeu.de*
- HyET Hydrogen B.V. / HyET, Netherlands - www.hyet.nl
- RANIDO, s.r.o., Czech Republic *http://www.ranido.cz/*
- BP Europa SE, Germany www.bp.com/en/bp-europa-se.html

For additional information and contact details, please visit *www.biomates.eu*.

2. Summary

The dissemination activities concerning the project and its results are based on three pillars:

- Conventional dissemination actions,
- Validation platform and
- Webpage and internal communication

Conventional dissemination activities comprise mainly participation in scientific conferences, open days at partners with technical sites, and publication of results in peer-reviewed journals. During the second project year members of the consortium participated in 10 different conferences, workshops or university courses as poster presenter or lecturer and presented a total number of 15 contributions (either poster or lecture). Six contributions to conference proceedings and one peer-reviewed article were published.

In the last year of the project duration, a comprehensive video will be produced to showcase the whole process chain, which is located at several physical sites from first conversion (ablative fast pyrolysis at Fraunhofer UMSICHT) over secondary upgrading (mild hydrotreatment at UCTP and CERTH) combined with efficient hydrogen compression and purification (at HyET and CERTH) until the final co-processing in a conventional petroleum refinery (demonstrated at CERTH and BP). Guided tours to these locations will be organized for potential customers and the interested public.

The final means of dissemination is a website which is dedicated to the project. Here the whole project is described and the participating research institutes and companies present themselves and their team members. All publicly available information on the project is gathered on the website for unrestricted access by the public. The website went online on December 23rd, 2016. Detailed description of the website is already given in deliverable report “D7.1: BioMates webpage”.

3. Conventional dissemination actions

The project has been presented at several international conferences and workshops during the second project year by means of posters as well as lectures. Table 1 lists all events, and Table 2 gives the respective titles and presenting authors of the contributions.

Table 1: Conferences visited to present the project

No.	Conference	Venue	Date	Type
1	Annual Meeting of German BMWi Funding Programme "Energetic Use of Biomass"	Leipzig, Germany	November 20th-21st, 2017	Poster
2	Inauguration days of ELP Group	Nabereshnye Chelny, Russia	November 28th-29th, 2017	Lecture
3	Seminar: Production and Utilization of Bioenergy	Ambato, Ecuador	December 4th-8th, 2017	2 Lectures
4	COST-FP1306: Valorisation of lignocellulosic biomass side streams for sustainable production of chemicals, materials & fuels using low environmental impact technologies	Thessaloniki, Greece	March 12th-14th, 2018	2 Lectures
5	6th International Conference on chemical Technology - ICCT	Mikulov, Czech Republic	April 16th-18th, 2018	3 Lectures
6	26th European Biomass Conference and Exhibition	Copenhagen, Denmark	May 14th-17th, 2018	1 Lecture, 1 Poster
7	EFCATS School on Catalysis	Liblice, Czech Republic	June 25th-29th, 2018	Poster
8	WasteEng 2018	Prague, Czech Republic	July 2nd–5th, 2018	Lecture
9	21st Conference Process Integration, Modelling and Optimisation for Energy Saving and Pollution Reduction - PRES	Prague, Czech Republic	August 25th-29th, 2018	Lecture
10	DECHEMA Annual Meeting	Aachen, Germany	September 10th-13th, 2018	Lecture

Three of these conferences, namely the 6th International Conference on chemical Technology – ICCT, the 26th European Biomass Conference and Exhibition and 21st Conference Process Integration, Modelling and Optimisation for Energy Saving and Pollution Reduction published conference proceedings, in which the consortium also contributed for every given presentation and poster for the respective conferences. All these publications will be made available freely on the project website http://biomates.eu/en/results/publications.

In this second reporting period, three peer-reviewed publication as original research article were prepared and submitted, one under the leadership of UCTP to *fuel* (Elsevier) and one under the leadership of Fraunhofer UMSICHT to *WAVE* (Springer). Both contributions are in the review phase. The third manuscript was submitted to *Energy Conversion and Management* (Elsevier) under the leadership of CERTH and accepted for publication: P. Manara, S. Bezergianni, U. Pfisterer: Study on phase behavior and properties of binary blends of bio-oil/fossil-based refinery intermediates: A step toward bio-oil refinery integration. Energy Conv Manag 165 (2018), pp. 304-315; DOI: https://doi.org/10.1016/j.enconman.2018.01.023.

Table 2: Titles and presenting authors of conference contributions

No.	Title	Presenting author	Author Affiliation	Conference No. (Table 1)
1	Intermediate aus halmgutartiger biomasse zur einspeisung in konventionelle raffinerien – BioMates (P, PS)	Volker Heil	Fraunhofer UMSICHT	1
2	Fast Pyrolysis of Residual Biomass – Wood and Straw (L)	Tim Schulzke	Fraunhofer UMSICHT	2
3	Part 4: Ablative Fast Pyrolysis of Herbaceous Biomass (L)	Tim Schulzke	Fraunhofer UMSICHT	3
4	Part 5: Upgrading of Pyrolysis Condensates and Applications (L)	Tim Schulzke	Fraunhofer UMSICHT	3
5	Straw-based bio-oil hydrotreatment over NiMo catalysts (L)	Bogdan Shumeiko	UCTP	4
6	Effect of temperature and pressure to the amount of semi-volatile oxygen compounds in the hydrotreated straw-based bio-oil (L)	Milos Auersvald	UCTP	4
7	Properties and Composition of Bio-Oil Hydrodeoxygenation Products (L)	Milos Auersvald	UCTP	5
8	Comparison of Suldic and Non-Suldic Catalysts for Pyrolysis Bio-Oil Hydrotreating (L)	Bogdan Shumeiko	UCTP	5
9	Petroleomic Characterization of Pyrolysis Bio-Oils (L)	Martin Stas	UCTP	5
10	Hydrodeoxygenation of Pyrolysis Bio-oils from Ablative Flash Pyrolysis of Straw: An Analytical Study (P)	Martin Stas	UCTP	6
11	Producing advanced fast pyrolysis bio-oils by ex-situ catalytic vapour reforming (L)	Tim Schulzke	Fraunhofer UMSICHT	6
12	CATALYTIC HYDROTREATING OF OXYGENATES (P)	Bogdan Shumeiko	UCTP	7
13	Fuels from Reliable Bio-based Refinery Intermediates – BioMates (L)	Tim Schulzke	Fraunhofer UMSICHT	8
14	A novel bio-oil hydrotreating process with emphasis on H2 recycling: a first design approach	Michael Bampaou	CERTH	9
15	Verbesserte Pyrolyseoele durch katalytische Dampfbehandlung und gestufte Kondensation fuer die Nutzung in Raffinerien (L)	Stefan Conrad	Fraunhofer UMSICHT	10

(L): Lecture, (P): Poster, (PS): Poster Slam

In addition to participating in conferences, Fraunhofer UMSICHT hosted one group of visiting students from University of Applied Sciences and Arts Hildesheim/Holzminden/Goettingen, Germany, on December 15th, 2017. During this visit, the project was presented and potential tasks for students were proposed.

On May 22nd, 2018 the IEA Bioenergy Task 34 “Direct Thermal Liquefaction” visited Fraunhofer UMSICHT and the experimental facilities. The project and its goals were presented to this group.

The consortium published a 2nd press release under the leadership of BP and it was printed or published online in at least three magazines:

1. chemie.de
   Biokraftstoffe: EU-Projekt BioMates gewinnt an Fahrt (Biofuels: EU project BioMates picks up the pace)
   http://www.chemie.de/news/1154142/biokraftstoffe-eu-projekt-biomates-gewinnt-an-fahrt.html
   23.03.2018
2. Bionity.com
   Biokraftstoffe: EU-Projekt BioMates gewinnt an Fahrt (Biofuels: EU project BioMates picks up the pace)
   http://www.chemie.de/news/1154142/biokraftstoffe-eu-projekt-biomates-gewinnt-an-fahrt.html
   23.03.2018
3. Biokraftstoffe aus Stroh und Gras - EU-Projekt BioMates® gewinnt an Fahrt (Biofuels from straw and gras - EU project BioMates® picks up the pace)
   meo – das Wirtschaftsmagazin 5/2018, p. 44
   https://www.essen.ihk24.de/blob/eihk24/servicemarken/Presse/ihk_zeitschrift/meo-magazin-2018/4054256/89085a6c3eca2e5c5da52855530f61b4/MEO-Mai-data.pdf
   https://bit.ly/2DzEKOw

Furthermore, two articles were published in German periodicals describing the BioMates-project. Both publications were prepared by independent journalists with some support by Volker Heil:

1. Dorothee Meier et al.,
   Biokraftstoff aus der Erdölraffinerie (Biofuel from the conventional refinery)
   Energie aus Pflanzen 3/2018, p.46
2. Frank Urbansky
   Zukunftsheizen.de / online-magazine of iwo – Institut für Wärme und Öltechnik; Forschungsradar neue Brennstoffe (research radar new fuels)
   BioMates
   https://www.zukunftsheizen.de/energiewende/brennstoffe-der-zukunft/forschungsradar-detailseiten/biomates.html
   https://bit.ly/2xWRkBC

4. Validation platform

The production of the video and the open days on the main technical premises are all anticipated for project year 4. Therefore, nothing is to be reported here.

5. Web-based dissemination and internal communication

The BioMates webpage www.biomates.eu is the key dissemination tool of the project objectives, results and activities, addressed to specific target groups (potential commercial implementers, scientific community) as well as to the general public. The design of the BioMates webpage has the following goals:

- User-friendly environment for the core audience

- Improved visual design and content structuring (reduced clutter)
- Project identity leveraged to establish positive recall with the visitor
- Fast and easy navigation within the website
- Core technologies/products more visible to first-time users and easily available to repeat users

The website was built by project partner CERTH in the first 3 months of the project duration and went online on December 23rd, 2016. The overall structure of the website is fully described in the previous public report "D7.1: BioMates webpage".

The main means of dissemination on the web-page is the tab "Results" with its 3 sub-categories "Publications", "Press Releases" and "Deliverables". All publications mentioned in chapter 3, either posters, lectures or contributions to conference proceedings or journal articles, are available from the "Publications" page. The page "Deliverables" provides access to all public deliverable reports as well as to the public summaries of confidential deliverable reports.

Furthermore, the webpage links to the internal communication platform between the project partners. This closed server for file exchange is operated by the partner Fraunhofer UMSICHT. After registration of a participant and approval from both his participant's co-ordinator and the BioMates project co-ordinator, the system allows secured access for the exchange of confidential information within the consortium. The system allows individual access levels and keeps track of any version of the uploaded files and offers tools to ease joint editing of files, thus avoiding loss of work due to accidental overwriting.

6. Disclaimer

This Deliverable report reflects only the authors' view; the European Commission and its responsible executive agency INEA are not responsible for any use that may be made of the information it contains.

7. Literature

EC-2014a European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - A policy framework for climate and energy in the period from 2020 to 2030, COM(2014) 15 final, Brussels, 22.01.2014, http://www.europarl.europa.eu/meetdocs/2009_2014/documents/nest/dv/depa_20140212_06/depa_20140212_06en.pdf; *http://bit.ly/1LUcJKL*

EC-2014b European Commission, Energy Union Package - Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions and the European Investment Bank - A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, COM(2015) 80 final, Brussels, 22.01.2014, http://eur-lex.europa.eu/resource.html?uri=cellar:1bd46c90-bdd4-11e4-bbe1-01aa75ed71a1.0001.03/DOC_1&format=PDF, *http://bit.ly/198SAUf*

EC-2015 European Commission, LCE-08-2016-2017 "Development of next generation biofuel technologies", Publication date: 14 October 2015, https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/lce-08-2016-2017.html, *http://bit.ly/2ndtvPc*