

Biorefinery combining HTL and FT to convert wet and solid organic,  
industrial wastes into 2<sup>nd</sup> generation biofuels with highest efficiency

# NEWSLETTER

December, 2021 - 4<sup>th</sup> Issue



## INSIDE

e-fuels workshop - 2

HtF Summer School- 2

Interview with BEST- 3

Interview with SF - 4

Interview with R2M - 5

Consortium - 6

Project Facts - 6

## STATUS OF HEAT-TO-FUEL

The Heat-to-Fuel project is progressing well and reaching its final stage. In order to overcome the difficulties and delays caused by the COVID-19 pandemic crisis, the Consortium made a risk assessment and decided to request an amendment for an extension of the project duration until April 2022, which was handled favourably by the European Commission.

All the accomplishments were shared during the 9<sup>th</sup> Project Meeting, which took place in Florence in October 2021. Among these, an innovative catalyst has been developed, novel reactors have been designed, manufactured and are being demonstrated so that the Heat-to-Fuel technological concept will be validated and brought to TRL 5 by the end of the project.

The project's partners have also organized two important dissemination events: the Heat-to-Fuel 'e-fuels' digital workshop, and the HtF Summer School.

Lastly the reader will find interviews with three project partners: Bioenergy and Sustainable Technologies (BEST), Skupina Fabrika (SF) and R2M Solution Spain (R2M).



## e-fuels digital workshop: Heat-to-Fuel Interfaces to Advanced Power-to-Gas and Power-to-Liquids Technologies

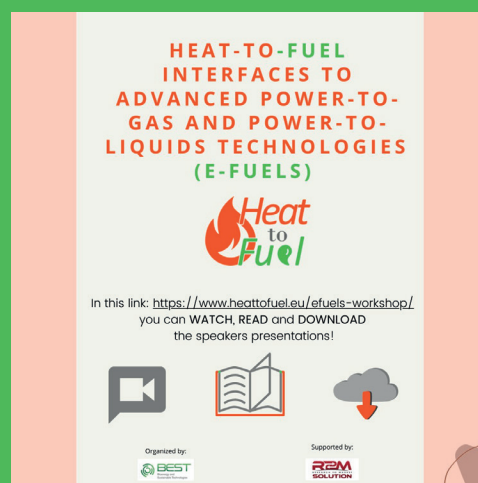
The Consortium partner Bioenergy and Sustainable Technologies (BEST), supported by R2M Solution (R2M), organized the 'e-fuels' workshop, which was held digitally on the 8th & 9th of March 2021.

The 'e-fuels' workshop was focused on "Advanced Power-to-Gas and Power-to-Liquids Technologies" (combined as Power-to-X), which represent essential future technologies in terms of CO<sub>2</sub> emission reduction by the utilization of CO<sub>2</sub> from various sources (flue gases, biogases or atmosphere) for the production of advanced fuels.

This digital workshop included both technical and market oriented keynotes. We gave a comprehensive technological overview on the key steps in the Power-to-X process chain. Also, we had the chance to discuss possible bio-based production pathways for hydrogen and fuels, as well as market opportunities of the provided e-fuels. Moreover, differences and similarities both at the technical and the political level between Biomass-to-Liquid (BtL) and Power-to-Liquid (PtL) were discussed in the framework of the workshop.

The dedicated workshop sessions gave an overview on:

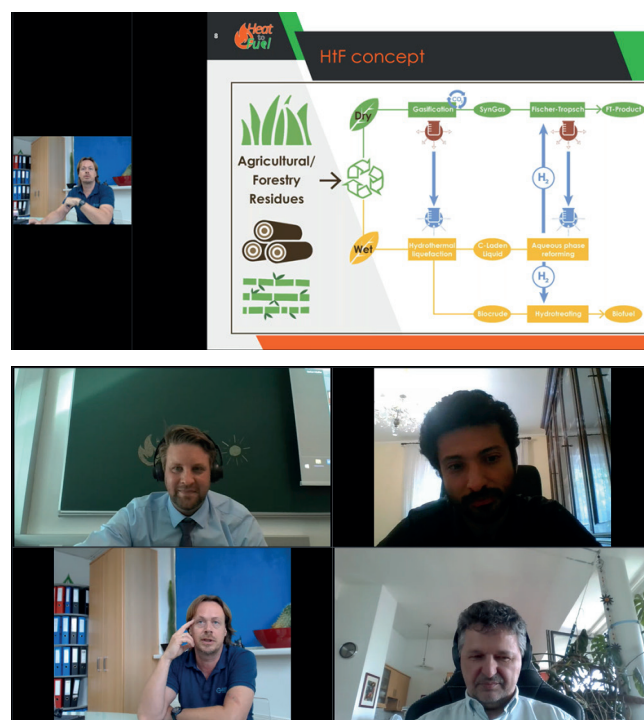
- The capture of CO<sub>2</sub> from various sources (flue gases, biogases, atmosphere).
- Options for the production of hydrogen and carbon conversion to form "Syngas".
- Fuel production technologies (SNG, Fischer-Tropsch fuels, HTL fuels).
- Results of major European demonstrations projects.



## Heat-to-Fuel Summer School

The Heat-to-Fuel virtual Summer School took place on the 5th of July 2021, organized by the industrial partner Bioenergy and Sustainable Technologies (BEST) in cooperation with the academic partners Technische Universitaet Wien (TU WIEN) and Politecnico di Torino (POLITO).

The Summer School included key lectures dedicated to give an overview of the Heat-to-Fuel process, highlighting the steps of the two innovative processes chains – the dry and wet route – which the HtF project combines. The achieved progress in each of the specific research areas was presented, concluding with an open discussion on the obtained project results. In order to identify new ideas and possibilities for the project, the participating students were invited to share their opinion and thoughts on the project outcome with the HtF members.





# INTERVIEW WITH BEST

Bioenergy and Sustainable Technologies GmbH (BEST) is a K1 Competence Centre in the Austrian COMET programme and closes the gap between academic research and industrial technology development by undertaking industry-driven applied research and development in the fields of bioenergy, the sustainable bio-based economy, and future-proof energy systems. BEST is working on the scientific and technological basis for processes which use biomass and waste to produce heat, electricity, gaseous and liquid energy carriers and sources, and basic materials for the chemical industry. The company also carries out research on the joint use of bioenergy and other renewable energy supply technologies as a means of providing efficient, sustainable and economic solutions for the energy system of the future. The head office of the Competence Centre is located in Graz in addition to a branch office for special research activities established in Vienna and Wieselburg. The research work of BEST within the HtF project is carried out in our research site in Vienna (located in Simmering). At this new location, a 1 MW DFB pilot gasifier is located, which is dedicated for the usage of a wide range of possible feedstocks for the synthesis gas production (feedstocks ranging from biomass to residues).

The plant is worldwide the first of its kind designed to demonstrate the use of this technology in a single, end-to-end process in an industrial environment. Based on the gained knowledge the basis for the planned industrial-scale implementation of the process is provided.



APR process demonstration unit (©BEST GmbH)



DI Dr. Gerald Weber,  
Head of the "Synthesis Gas  
Processes" Unit



DI Stefan Arlt,  
Junior Researcher in the "Syngas  
Processes" Unit

## Role of BEST in the project:

BEST is the leader of WP6 – HtF demonstration – and is responsible for the planning, erection and operation of the world-wide first pilot Aqueous Phase Reforming process demonstration unit, based on the research results of POLITO. The utilized wastewater of the APR process is a side product of the HydroThermal Liquefaction process. During the APR process, hydrogen as well as side products (e.g. CO<sub>2</sub>) are formed. The provided hydrogen is used in the coupled Fischer-Tropsch process route to adjust the ratio between H<sub>2</sub> and CO prior to the synthesis step. In terms of the Heat-to-Fuel project a compact micro-structured FT reactor (provided by KHIMOD and CEA) is used for the production of FT-based advanced fuels. The synthesis gas for the FT process is produced using a newly erected 1 MW DFB gasifier owned and operated by BEST.

## Expectations from HtF:

Within the HtF project, BEST focuses on the demonstration of a world-wide unique process configuration consisting of DFB gasification and APR as well as FT synthesis process for the production of advanced biofuels. This research project strengthens the position of BEST as a renowned research institute. The new research site in Simmering allows the usage of a wide range of possible feedstocks for synthesis gas production and allows the demonstration of full process chains. Furthermore, the research work of BEST contributes to developing technologies which are supporting the defossilization of the transportation sector as well as the reduction of fossil-based CO<sub>2</sub> emissions.

[www.best-research.eu](http://www.best-research.eu)

# INTERVIEW WITH SF

## Role of SF in the project:

Within the project, SF is leading the WP7 and coordinating all techno-economic, sustainability and risk assessments. This work package is an interface between technical and nontechnical aspects of the project, where technical inputs are combined with economics, environmental and risk parameters to prepare a Heat-to-Fuel business case. With the aim that the business case supports further exploitation and uptake of project results, SF is also leading the development of the exploitation roadmap, which is a key aspect of the project as it defines how project results will be used beyond the project's lifetime.

## Expectations from HtF:

As Skupina Fabrika's work is still in progress – the Heat-to-Fuel business case is to be delivered in a few months, their key expectation is to develop a solid exploitation path and a relevant business case in order to raise enough interest and engage the industry to follow this path for commercialization of the HtF concept. Also, SF expects to upscale and test the concept in a relevant environment, to bridge the so-called “valley of death”, and to learn and develop new skills and knowledge. The HtF project has allowed SF's team members to strengthen many of their competences, especially in terms of management of high inputs of data and synchronization of highly differentiated point of views during techno-economic and other assessments.

## Skupina Fabrika (SF)

Skupina Fabrika (SF) is a Slovene-based research and business development company which acts principally in the field of advanced analytics and business decision support for different sectors from industry to decision-makers. The nature of its core business allows the company to capitalize on accumulated intellectual capacities, human resources and an extensive business network, which allows for professional and competent coverage of research, business development, IP management, administrative and other key areas that are critical for the success of the highly competitive and technologically advanced projects in the field of renewable energies. SF is involved in several R&D projects where they usually focus on techno-economic, sustainability and risk assessments, supporting the commercialization of innovative ideas.



Rok Sunko

Senior Project Manager, Leader of HtF WP7

[www.skupina-fabrika.com](http://www.skupina-fabrika.com)

*"The Heat-to-Fuel project exceeded our expectations in the sense that it really connects highly capable experts from different areas of expertise, with whom it is a joy to cooperate, and learn from."*

# INTERVIEW WITH R2M SOLUTION

R2M Solution (R2M) is an integrated and multi-disciplinary consulting company that aggressively targets filling the gap between research activities and market implementation. R2M excels at helping companies grow and acting as an accelerator for bringing technologies and services to the market across the fields of Innovation Management, Engineering, Energy, and ICT/Automation. R2M stands for Research to Market and, as a strategic innovator itself, helps organizations plan and

execute their projects over a comprehensive development strategy from idea to market. In doing so, R2M provides leadership, links high performance exploitation-oriented networks, and leverages public and private funding instruments. R2M invests in opportunities, conducts research, and offers pure engineering, energy services, and ICT consulting services. R2M actively seeks spinoff creation opportunities, showcases promising technologies and builds clusters for their uptake.

## Role of R2M in the project:

R2M acts as the Innovation Manager in Heat-to-Fuel, whose main goal is to achieve the maximum exploitation and impact, while safeguarding the interests of all industrial partners. R2M is a dynamic partner that helps the HtF consortium with communication dissemination activities and with requirements identification (risk analysis, market and user needs) and market vision to develop the technical activities. In addition, R2M is specialised in analysing the market to develop exploitation plans and bring the project results together with the market and industry necessities.

## Expectations from HtF:

We aim to make a bridge in order to bring into the market the innovative technologies developed in Heat-to-Fuel, technologies which help in the EU's objectives of decarbonization of the transportation sector, one of the main polluters in the world, thus contributing to the just energy transition in Europe.

[www.r2msolution.com](http://www.r2msolution.com)



**Tatiana Loureiro**  
Managing Partner, HtF Innovation Manager



# CONSORTIUM



Gussing Energy  
Technologies  
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Institut de Recerca  
en Energia de  
Catalunya



Consorzio per la  
Ricerca e la  
Dimostrazione sulle  
Energie Rinnovabili



Commissariat à  
l'Energie Atomique  
et aux Energies  
Alternatives



Johnson Matthey  
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Skupina Fabrika



Politecnico di  
Torino



TU WIEN



BEST



Instytut  
Chemicznej  
Przeróbki  
Węgla



Centro Ricerche  
FIAT



R2M Solution Spain



KHIMOD

In the frame of the HtF project, more than 10 Open Access scientific papers have been published in the past year. To read all our Open Access publications, please visit the [HtF repository](#).

Don't miss the [Heat-to-Fuel video](#)!



## PROJECT FACTS

### Title:

Biorefinery combining HTL and FT to convert  
wet and solid organic, industrial wastes into  
2<sup>nd</sup> generation biofuels with highest  
efficiency

### Acronym:

Heat-to-Fuel

### Budget:

€ 5.896.987,50

### Type of action:

Research and Innovation Action

### Duration:

56 months



This project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement n° 764675