Press Release

**Sunlight to jet fuel: European collaboration SOLAR-JET for the first time demonstrates the entire production path of "solar" kerosene**

**28th April 2014:** With the first ever production of synthesized "solar" jet fuel, the EU-funded SOLAR-JET project has successfully demonstrated the entire production chain for renewable kerosene obtained directly from sunlight, water and carbon dioxide ($CO_2$), therein potentially revolutionizing the future of aviation. This process has also the potential to produce any other type of fuel for transport applications, such as diesel, gasoline or pure hydrogen in a more sustainable way.

Several notable research organizations from academia through to industry (ETH Zürich, Bauhaus Luftfahrt, Deutsches Zentrum für Luft- und Raumfahrt (DLR), ARTTIC and Shell Global Solutions) have explored a thermochemical pathway driven by concentrated solar energy. A new solar reactor technology has been pioneered to produce liquid hydrocarbon fuels suitable for more sustainable transportation.

"Increasing environmental and supply security issues are leading the aviation sector to seek alternative fuels which can be used interchangeably with today's jet fuel, so-called drop-in solutions", states Dr. Andreas Sizmann, the project coordinator at Bauhaus Luftfahrt. "With this first-ever proof-of-concept for 'solar' kerosene, the SOLAR-JET project has made a major step towards truly sustainable fuels with virtually unlimited feedstocks in the future."

The SOLAR-JET project demonstrated an innovative process technology using concentrated sunlight to convert carbon dioxide and water to a so-called synthesis gas (syngas). This is accomplished by means of a redox cycle with metal-oxide based materials at high temperatures. The syngas, a mixture of hydrogen and carbon monoxide, is finally converted into kerosene by using commercial Fischer-Tropsch technology.

"The solar reactor technology features enhanced radiative heat transfer and fast reaction kinetics, which are crucial for maximizing the solar-to-fuel energy conversion efficiency" said Professor Aldo Steinfeld, leading the fundamental research and development of the solar reactor at ETH Zürich.

Although the solar-driven redox cycle for syngas production is still at an early stage of development, the processing of syngas to kerosene is already being deployed by companies, including Shell, on a global scale. This combined approach has the potential to provide a secure, sustainable and scalable supply of renewable aviation fuel and more generally for transport applications. Moreover, Fischer-Tropsch derived kerosene is already approved for commercial aviation.

"This is potentially a very interesting novel pathway to liquid hydrocarbon fuels using focussed solar power", said Professor Hans Geerlings at Shell. "Although the individual steps of the process have previously been demonstrated at various scales, no attempt had been made previously to integrate the end-to-end system. We look forward to working with the project partners to drive forward research and development in the next phase of the project on such an ambitious emerging technology."

SOLAR-JET (**S**olar chemical reactor demonstration and **O**ptimization for **L**ong-term **A**vailability of **R**enewable **JET** fuel) was launched in June 2011 and is receiving financial support from the European Union within the 7th Framework Programme for a duration of four years. In a first step, the technical feasibility of producing solar kerosene was proven. In the next phase of the project, the partners will optimise the solar reactor and assess the techno-economic potential of industrial scale implementation. The outcomes of SOLAR-JET will put Europe to the forefront of research, innovation and production of sustainable fuels directly from concentrated solar energy.

For more information, visit www.solar-jet.aero

**Bauhaus Luftfahrt** (project coordinator):

Bauhaus Luftfahrt is an interdisciplinary research institution funded by the four aerospace companies Airbus Group, Industrieanlagen-Betriebsgesellschaft (IABG), Liebherr-Aerospace and MTU Aero Engines as well as grants of the Bavarian Ministry for Economic Affairs, Media, Energy and Technology. The non-profit association is an internationally-oriented think tank. The team of around 50 employees deals with the future of mobility in general and with the future of air travel in particular. The goal of the research work is to consider the complex system of aviation from different points of view. In every project, the technical, economic, social and ecological aspects are considered holistically. www.bauhaus-luftfahrt.net

**Deutsches Zentrum für Luft- und Raumfahrt (DLR):**

DLR is the national aeronautics and space research centre of the Federal Republic of Germany. Its extensive research and development work in aeronautics, space, energy, transport and security is integrated into national and international cooperative ventures. In addition to its own research, as Germany's space agency, DLR has been given responsibility by the federal government for the planning and implementation of the German space programme. DLR is also the umbrella organisation for the nation's largest project execution organisation.

DLR has approximately 7700 employees at 16 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Goettingen, Hamburg, Juelich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen, and Weilheim. DLR also has offices in Brussels, Paris, Tokyo and Washington D.C. www.dlr.de

**ETH Zurich (Swiss Federal Institute of Technology, Zurich)**:

ETH Zurich is one of the leading international universities for technology and the natural sciences. It is well-known for its excellent education, ground-breaking fundamental research and for putting its new findings directly into practice. Founded in 1855, ETH Zurich today has some 18,000 students from over 100 different countries, 3,800 of whom are doctoral students. It offers researchers an inspiring working environment and its students a comprehensive education. 21 Nobel Laureates have studied, taught or conducted research at ETH Zurich, underlining the excellent reputation of the institute. The Professorship of Renewable Energy Carriers conducts research aimed at the advancement of the thermal and chemical engineering sciences applied to solar power and fuels production, decarbonization and metallurgical processes, CO2 capture and recycling, energy storage and sustainable energy systems. www.prec.ethz.ch

**Shell Global Solutions International:**

Shell's Projects & Technology organisation manages the delivery of major projects and drives research and innovation to develop new technologies. It provides technical services and technology capability in upstream and downstream activities. Royal Dutch Shell plc is incorporated in England and Wales, has its headquarters in The Hague and is listed on the London, Amsterdam, and New York stock exchanges. Shell companies have operations in more than 70 countries and territories with businesses including oil and gas exploration and production; production and marketing of liquefied natural gas and gas to liquids; manufacturing, marketing and shipping of oil products and chemicals and renewable energy projects. www.shell.com

**ARTTIC:**

Created in 1987, ARTTIC is an independent European provider of management services, especially in the area of large international collaborative R&D projects. ARTTIC is a set of companies based in France, Belgium, Germany and Israel. ARTTIC is an SME with a total workforce of about 60 persons.

ARTTIC provides specific and practical help with all aspects of international R&D projects. Services include establishing project feasibility; finding partners; establishing consortia; managing the proposal development activities; helping negotiate contracts; in charge of all management aspects of live projects and helping to disseminate and exploit successfully project results. www.arttic.eu

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