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News

Innovation and Industry

Biofuels and e-fuels



**In a groundbreaking development, Axens, in collaboration with IFP Energies nouvelles (IFPEN) and SMS group, has successfully homologated the Carboverseo™ technology. This innovative reverse water-gas shift process, which converts CO<sub>2</sub> into CO, is now live and ready to revolutionize the e-fuel industry by providing a robust and scalable solution for transforming CO<sub>2</sub> into valuable products.**

The Carboverseo™ technology was developed in a fast-track mode, leveraging the extensive expertise of each partner. Axens contributed with its process features and integration capabilities, drawing from its rich history in oil and gas. IFPEN was responsible for reactor conception and modelling, industrially proven catalyst selection, kinetic modelling based on pilot testing in their R&D facilities based on previous experience on application. SMS group brought its expertise in high-temperature processes and material selection, derived from their historical involvement in the blast furnace industry. This collaboration has resulted in a robust process that has been thoroughly validated, ensuring that each development step meets the highest standards followed by Axens and IFPEN in the oil and gas sector. Additionally, SMS group constructed a 0.5 MW electrical heater

demonstration unit, successfully controlling and scaling the heating of gases above 1000°C.

Carboverseo™ is a critical component of Axens' comprehensive e-fuel scheme, which includes carbon capture (DMX™), an amine technology that efficiently captures CO<sub>2</sub> from flue gases, a CO<sub>2</sub> conditioning section to remove impurities, and the reverse water-gas shift process itself to convert CO<sub>2</sub> into syngas. This is followed by syngas conditioning to optimize it for further processing, and finally, Fischer-Tropsch synthesis and upgrading (Gaseol®) to produce and refine synthetic fuels. This integrated approach positions Axens at the forefront of the e-fuel industry, offering a seamless, integrated, and optimized solution from carbon capture to fuel production.

By homologating Carboverseo™, Axens has significantly reduced the technology risk for investors, licensees, and project stakeholders. This assurance is crucial for accelerating the adoption of e-fuels and advancing the energy transition, especially in the aviation sector with the production of sustainable aviation fuels.

Jacinthe Frecon, Process Equipment Innovation Director at Axens, said: "The successful homologation of Carboverseo™ technology marks a pivotal moment for Axens, enabling us to offer a fully integrated e-fuel scheme. This missing brick completes our comprehensive solution, allowing us to license a robust and scalable process that transforms CO<sub>2</sub> into sustainable synthetic fuels, particularly targeted by the aviation sector. Developed through our rigorous standards and in collaboration with IFPEN and SMS group, Carboverseo™ is a testament to our commitment to innovation and excellence".

Ludivine Piezanowski, Head of Hydrogen at SMS-Group, said "SMS group is proud to have contributed with its know-how to the development of the Carboverseo™ technology in collaboration with Axens and IFPEN. This achievement marks a key milestone in the production of sustainable synthetic fuel for aviation and we are honored to play a role in building a more sustainable future alongside Axens and IFPEN".

Raphaël Huyghe, Director of Energy Products Business Unit at IFP Energies Nouvelles, said: "The Carboverseo™ technology is a key technology for the decarbonization of the transport sector. Thanks to IFPEN's expertise in catalytic process development, the technology was scale-up in a very short time by fully committed engineers and technicians which was a challenge to answer the demand of the aviation sector. IFPEN is proud to contribute, together with all the partners, to bringing the Carboverseo™ technology to market."



**About Axens :** The Axens Group ([www.axens.net](http://www.axens.net)) offers a complete range of solutions for the conversion of oil and biomass into cleaner fuels, the production and purification of major petrochemical intermediates, the chemical recycling of plastics, natural gas treatment and conversion options, water treatment and carbon capture. Their offer includes technologies, equipment, furnaces, modular units, catalysts, adsorbents and related services. Axens is ideally positioned to cover the entire value chain, from feasibility studies to start-up and monitoring of units throughout their lifecycle. This unique position guarantees optimum performance and a reduced environmental footprint. Axens' international offering is based on highly qualified human resources, modern production facilities and an extensive global network for industrial, technical support and sales services. Axens is an IFP Energies Nouvelles Group company.

To find out more, visit our [website](#), and follow us on [LinkedIn](#).

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**About Paul Wurth (SMS Group) :** SMS group is renowned worldwide for its future-oriented technologies and outstanding service for the metals industry. The company applies its 150 years of experience and its digital know-how to provide the industry continuously with innovative products and processes – even beyond its core business. Paving the way for a carbon-neutral and sustainable metals industry is the company's stated goal.

As a member of SMS group, Paul Wurth is an established technology provider and plant builder for the global ironmaking industry. Presently, the company is focusing on the development of innovative solutions to lead the green transformation of the (steel) industry, as well as actively shaping the production of e-fuels in order to enable the aviation industry reach its net-zero emission targets.

Learn more on our [website](#), and follow us on [LinkedIn](#).

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**About IFPEN :** IFPEN is the French national institute for research and training in the fields of energy, mobility and the environment. Its teams develop innovations for a low-carbon, sustainable world, covering the entire chain from scientific concepts through to technological solutions. From technologies and software to equipment and services, the institute's low-carbon innovations are

paving the way for the transition and facilitating the emergence of the industrial sectors of the future. IFPEN boldly imagines and meticulously designs solutions for tomorrow's world.

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Axens, IFPEN, and SMS group Launch Carboverseo™: Essential Technology for e-fuels deployment  
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