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News

Innovation and Industry

Climate, environment and circular economy | CO2 capture, utilization and storage

CHEERS, a Sino-European consortium of leading researchers and manufacturers, has announced the construction of the world's largest demonstration unit for Chemical Looping Combustion (CLC). This new stage will bring the project to a pre-industrial scale and confirm the potential of this key technology in driving down the cost of carbon capture and promoting the decarbonization of industry.

Today the project reached a new milestone when TotalEnergies, Dongfang Boiler Group Co. (DBC), Tsinghua University and IFP Energies Nouvelles made the decision to build the 3MWth demonstration unit, with the potential to deliver 4-5 MWth.

Lowering the cost of carbon capture in power generation

CLC is an oxy-combustion technology used to convert biomass and fossil fuels in order to obtain a flow of pure CO2 suitable for low-cost capture.

This integrated CO_2 capture solution minimizes the use of costly gas separation processes like those retrofitted on existing combustion facilities. CLC generates heat that can be used to produce carbon-neutral electricity and/or steam.

> "This unique project paves the way for the decarbonization of industries that currently generate a significant proportion of global carbon emissions. It could open the door to more cost-effective biomass and fossil fuel emission reductions at facilities around the world," said project leader Dr. Nils Erland L. Haugen from SINTEF.

> "Decarbonizing energy production is a major challenge. The TotalEnergies R&D teams carried out the research and design phases that enabled the CHEERS project partners to take this step and green-light the construction of a pre-industrial unit to validate the technical, economic and environmental performance of the CLC technology," said Philip Llewellyn, Carbon Capture, Utilization and Storage Program Manager, TotalEnergies.

Developing technology from concept to reality

The investment decision marks the transition from the research and design phases to the engineering and construction phases, led by DBC at their technology development site in Deyang, near Chengdu in China.

The test campaign, planned for 2023, will bring the new concept to near-commercial maturity (Technology Readiness Level TRL 7) and form the basis for further upscaling and commercial project development.

The initial investment in the Deyang demonstration unit will total almost €10 million, in addition to the €10 million already invested in the research and development activities.

> “The CLC process is the result of 13 years of research conducted by IFPEN and TotalEnergies on a laboratory scale and on a 10 KW pilot unit in IFPEN's laboratories. The building of a demonstrator on a pre-industrial scale is therefore a very important step that will allow us to verify the performance of this CO2 capture technology and to prepare its implementation in power plants and biomass plants in particular,” said Florence Delprat-Jannaud, CO_2 Coordinator, IFPEN.

About CHEERS

CHEERS is a partnership between European participants supported in part by the EU Horizon 2020 program, and Chinese participants, supported by the Chinese R&D support program MOST. The

Norwegian research institute SINTEF coordinates activities in the CHEERS consortium from Trondheim, Norway, as well as delivering substantial content in the CHEERS R&D program from both Trondheim and Oslo (Norway).
Additional research partners in CHEERS are The Silesian University of Technology in Gliwice (Poland), Zhejiang University in the city of Hangzhou, Zhejiang province, and The Bellona Foundation in Oslo (Norway), Brussels (Belgium) and several other European cities.

Facts and figures

- The planned CLC facility will convert a flow of solid fuels of about 4 MW measured in thermal energy content. The footprint of the facility will be about 270 square meters, and the highest process units will be about 40 meters tall.
- The project aims at a carbon capture rate of 96%.
- The capabilities of the CLC facility include enhanced system monitoring and data collection to enable a complete understanding of the system performance. This will be used to improve future designs.
- The CLC facility design includes special adaptations to use at least two different types of solid fuels.

About Dongfang Boiler Group Co. (DBC)

Dongfang Boiler Group Co., Ltd. (DBC) is a principal subsidiary of Dongfang Electric Corporation (DEC). DEC is one of the most influential enterprise groups under the direct administration of Chinese Central Government.DBC, with its headquarters in Zigong City, Sichuan Province and its R&D, marketing and service center in Chengdu City, Sichuan Province, is the first-class supplier of thermal power equipment, nuclear power equipment, environmental protection equipment, power plant auxiliaries, chemical vessels, and coal gasification equipment in China.

About SINTEF

SINTEF is one of Europe’s largest independent research organisations. SINTEF is a broad, multidisciplinary research organisation with international top-level expertise in the fields of technology, the natural sciences, medicine and the social sciences. Our 2000 employees conduct contract R&D as a partner for the private and public sectors.

About TotalEnergies

TotalEnergies is a global multi-energy company that produces and markets energies: oil and biofuels, natural gas and green gases, renewables and electricity. Our 105,000 employees are committed to energy that is ever more affordable, cleaner, more reliable and accessible to as many people as possible. Active in more than 130 countries, TotalEnergies puts sustainable development in all its dimensions at the heart of its projects and operations to contribute to the well-being of people.

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