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C1Or2A-04: TurboBrayton systems for low and high temperatures

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In the context of the energy transition, numerous cryogenic applications - both historical and emerging - such as the long-distance transport of electricity from offshore wind generation or hydrogen mobility, require the use of compact, flexible and efficient cryogenic systems.

The TurboBrayton technologies proposed by Air Liquide advanced Technologies for more than fifteen years have met with resounding success in the field of Boil-Off Gas recondensation on board LNG carriers in particular, but also via high-temperature superconductivity applications.

This technology, widely referenced with over two hundred cryogenic systems sold, is based on the thermodynamic concept of reverse Brayton cycles, providing a low-temperature refrigeration and/or liquefaction solution with a wide and high-efficiency flexibility range.

Very low-temperature applications call for the use of light molecules in processes. Conventional compression technologies are generally based on single- or multi-stage volumetric compression, which is mostly oil lubricated and a source of operating and start-up problems. As centrifugal compression technology is mastered within Air Liquide via TurboBrayton technologies, among others, the presentation will address the prospect of integrating the major advantages of AL-aT's TurboBrayton technologies down to very low temperatures, as well as an assessment of centrifugal compression for cycles handling low molar mass fluids.

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