

Cryogenic Solutions to Address Net Zero Emissions Targets

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Abstract—Cryogenics will play a critical role in achieving net-zero emissions targets. Cryogenics can contribute to reducing emissions through various technologies including the development of cryogenic energy storage systems using low-temperature liquids such as liquid nitrogen, to store excess renewable energy generated during times of low demand. The stored energy can be used during times of high demand, reducing the need for fossil fuel power generation, and increasing the use of renewable energy.

Cryogenic technologies can also be used in industrial processes to reduce emissions. For example, the use of cryogenic cooling during the manufacturing process can reduce the energy required to produce products and can reduce emissions from manufacturing processes.

Liquid hydrogen is emerging as a principal player in managing the reduction of carbon emissions from transport and electrification but also enabling superconducting applications operating at 20 kelvins for diverse applications.

Achieving net-zero emissions will require a combination of strategies, including renewable energy development, superconducting applications, and energy efficiency improvements. There are many initiatives on the use of cryogenics for a cleaner economy. This presentation will provide an overview on the role of cryogenics in addressing net zero emission targets.

Keywords (Index Terms)—Cryogenics, Net-Zero Carbon Emissions, Superconductivity Global Alliance, Superconductivity for the Future, Electrification