



## R&D in the field of electronic gases

**Environmental sustainability and cost-efficiency were the main drivers of a research project conducted by our subsidiary Eco-Snow™ Systems in collaboration with a Belgian research centre for nanotechnology.**

### Reliable cleaning results

Linde joined forces with IMEC, a leading European research institute in the field of nanotechnology based in Leuven, Belgium, to assess the effectiveness of cleaning electronic components with carbon dioxide (CO<sub>2</sub>) snow in conjunction with solvent-based, non-oxidising chemicals.

One of the main aims of the research project was to ascertain whether CO<sub>2</sub> snow could be used as a reliable and cost-effective method of removing photoresist after it has been implanted with high doses of ions (electric charge created as a result of ionising radiation).

### Sound ecological and economical sense

Rigid care must be taken during cleaning to ensure that exposed, nanoscale semiconductor structures are not damaged during cleaning. These structures are key enablers in the drive to enhance manufacture of silicon-based electronic components.

Cleaning is also important to minimise the number of defective components due to foreign particles.

Research has shown that our Eco-Snow™ solution meets all of these requirements, removing unwanted particles without damaging the board.

In comparison with traditional wet cleaning, this Linde-engineered process is cost-effective and reduces environmental impact, as it eliminates the need for solvents. Two major MEMS (microelectromechanical systems) manufacturers have already installed our Eco-Snow™ solution. MEMS components are used in a wide variety of applications, ranging from ink-jet printer heads to airbags.

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