

Decarbonizing the industry: Air Liquide announces the three winners of its Scientific Challenge

Air Liquide has selected the three winners of its 2023 Scientific Challenge, out of 119 proposals from 29 countries. This 3rd edition of the Scientific Challenge aimed at identifying and accelerating the development of innovative solutions for the decarbonization of industrial ecosystems, in an open innovation approach. The laureates' projects will receive funding from Air Liquide to develop their proposed solutions and to transform them into market-ready technologies.

Can LI, Davidson School of Chemical Engineering, Purdue University, USA, is the Laureate of the "Data sharing for decarbonization" topic. **The sharing of data** between the different stakeholders of an industrial basin using the same utilities connected by physical networks is **crucial to meet shared sustainability targets**. Can LI's proposal focuses on the development of algorithms facilitating data sharing, ensuring transparency as well as data privacy and security, to achieve industrial optimizations and reduce CO₂ emissions.

Luis Miguel MADEIRA, Faculty of Engineering, University of Porto, Portugal, is the Laureate of the "Energy storage using Essential Small Molecules" topic. Renewable energies are intermittent by nature. To ensure their widespread adoption and contribute to the decarbonization of the energy sector, it is essential to **develop new ways of storing and reusing electricity, using Essential Small Molecules**. Luis Miguel MADEIRA's project focuses on a new technology development based on an innovative cyclic system, to produce methane (CH₄) as an energy carrier, from industrial captured CO₂ and renewable hydrogen (H₂).

Enrico TRONCONI, Department of Energy, Politecnico di Milano, Italy, is the Laureate of the "Electric Heating for Hydrogen (H₂) production" topic. One way of decarbonizing hydrogen production would be **to electrify the heat generation required for steam-methane reforming**. Yet achieving the reaction temperature (800°C) with electric power is a challenge. Enrico TRONCONI's proposal consists in a new technological solution enabling an efficient electrified Steam Methane Reforming process. Based on a new conductive device harnessing the resistive heating, this solution helps reduce the energy consumption and the CO₂ emissions of the hydrogen production process.

The three laureates were selected by a Jury of 8 members, headed by Air Liquide Vice-President Research & Development **Jérôme Christin**. It included in particular **Professor Isabelle Ryl**, Director of PRAIRIE at INRIA (PaRis Artificial Intelligence Research InstitutE), and **Professor Steven Chu**, Nobel Prize Laureate in Physics, former US Secretary for Energy, Professor at Stanford University, USA.

The three winners of the Scientific Challenge will receive the "Air Liquide Scientific Prize" endowed with 50,000 euros. In addition, **their scientific works will be supported by Air Liquide expertise and equipment, as part of a 3-year partnership, in order to develop their innovative proposals and to transform them into market-ready technologies**.

Armelle Levieux, member of Air Liquide's Executive Committee and Vice President of Innovation, stated: **"The Air Liquide Scientific Challenge has generated strong interest from the worldwide scientific community. This illustrates the relevance of our open innovation approach. Previous editions led to fruitful collaborations with our academic partners, materializing in scientific publications, patents and even the creation of start-ups. This new edition will contribute to accelerating the development of pioneering technologies to promote progress and the transition to a low-carbon society, in line with Air Liquide's ADVANCE strategic plan."**

The Jury of the Air Liquide Scientific Challenge:

Jérôme Christin, Vice President Group R&D Air Liquide, Chairman of the Jury, **Professor Isabelle Ryl**, Director of PRAIRIE at INRIA (PaRis Artificial Intelligence Research InstitutE), **Professor Steven Chu**, Nobel Prize Laureate in Physics, former US Secretary for Energy, Professor at Stanford University, USA, along with five Air Liquide Fellows and International Senior Experts, distinguished in the Group's internal recognition program: **Régis Réau**, Air Liquide R&D Scientific Director, Air Liquide Senior Fellow; **Emmanuel Garnier**, Director Large Industry, Hydrogen & Energy Transition digital Fab, Air Liquide Fellow; **Sabine Mittelstädt**, Technology Director Petrochemicals, E&C, Air Liquide International Senior Expert; **Richard Dubettier**, Cryogenic technology Director, E&C, Air Liquide Fellow; **Thomas Wurzel**, Chief Technology Officer, Air Liquide Large Industries WBL, Air Liquide Fellow.

CONTACTS

Corporate Communications
media@airliquide.com

Investor Relations
IRTeam@airliquide.com

A world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 73 countries with approximately 67,100 employees and serves more than 3.9 million customers and patients. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902.

Taking action today while preparing the future is at the heart of Air Liquide's strategy. With ADVANCE, its strategic plan for 2025, Air Liquide is targeting a global performance, combining financial and extra-financial dimensions. Positioned on new markets, the Group benefits from major assets such as its business model combining resilience and strength, its ability to innovate and its technological expertise. The Group develops solutions contributing to climate and the energy transition—particularly with hydrogen—and takes action to progress in areas of healthcare, digital and high technologies.

Air Liquide's revenue amounted to more than 29.9 billion euros in 2022. Air Liquide is listed on the Euronext Paris stock exchange (compartment A) and belongs to the CAC 40, CAC 40 ESG, EURO STOXX 50, FTSE4Good and DJSI Europe indexes.