Eni Awards 2023: Eni's scientific research prizes awarded in the presence of the President of the Republic

'Eni Joule for Entrepreneurship' special mention also awarded to honour the best innovative and sustainable business ideas.

Rome, 16 October 2023 – The Eni Awards ceremony was held today at Palazzo del Quirinale in the presence of the President of the Republic **Sergio Mattarella**, Eni's Chairman of the Board of Directors **Giuseppe Zafarana** and Eni's CEO **Claudio Descalzi**.

Now in its fifteenth year, the prize is considered an international benchmark for research in energy and environment. It is testament to the importance of scientific research and innovation and Eni's commitment to foster sustainability and energy access, in accordance with the United Nations Sustainable Development Goals. Over 11,000 applications were made since the Awards' inception in 2008. The Scientific Committee, which assesses the submissions, is made up of scientists from top global research institutions and has included 6 Nobel laureates over the years.

Moreover, through **Joule**, Eni's Business School, the firm has awarded the Eni Joule for Entrepreneurship special mention. This is meant for teams, university spin-offs, and start-ups focused on the **application, enhancement and transfer of technologies** aimed at creating a **sustainable innovation** ecosystem.

In the 2023 edition of the Eni Awards:

- The **Energy Transition Award**, dedicated to research on energy efficiency as well as carbon capture, utilization and storage, was given ex aequo to **Yu Huang,** from the **University of California (Los Angeles, USA)**, for research on affordable, sustainable hydrogen fuel cells for transport decarbonization, and **Jeffrey R. Long,** from the **University of California (Berkeley, USA)**, for research on cooperative adsorption in MOF materials for gas capture.
  Yu Huang has made serial breakthroughs in the design of highly efficient Hydrogen Fuel Cell (HFC) catalysts, improving performance, cost-effectiveness, and sustainability. In particular, she devised a nanoscale protective layer that prevents the catalysts from rapidly deteriorating during use, and an innovative nanowire-based approach that drastically reduces the need for critical and expensive elements such as platinum. HFCs are a valid alternative to combustion engines and one of the key levers to decarbonize transport.
  Jeffrey R. Long has designed and developed innovative crystalline-nanoporous materials of the family of the metal-organic frameworks (MOFs) which are capable of selectively separating specific molecules from complex mixtures. This is particularly relevant in the case of carbon dioxide, which can be separated from fuel gases and the air itself. These are novel materials, characterized by high absorption capacity and low regeneration

energy, which operate in ways never seen before. They will play an important role in industrial processes for capturing carbon dioxide from the air (Direct Air Capture, DAC).

- The **Energy Frontiers Award** for research on renewable energy sources and energy storage has been given to **Matthew Rosseinsky,** from the **University of Liverpool (UK)** for his work on digital techniques for the design and discovery of next generation energy materials. Matthew Rosseinsky and his colleagues have shown how to accelerate the discovery of high-performance materials by combining artificial intelligence, machine learning, and physics-based computation tools with automation to explore uncharted chemical solutions faster than previously possible**.** New materials are needed to meet the Net Zero challenge. These include solar absorbers free from toxic components as well as new solid electrolytes for batteries and inorganic material with the lowest thermal conductivity known for thermoelectrical applications.

- The **Advanced Environmental Solutions Award**, given for enhancing scientific and technological innovation for the protection and sustainable use of natural resources, was awarded to **Thalappil Pradeep,** from the **Indian Institute of Technology, Madras (India),** for his research on water purification technologies using advanced materials. Thalappil Pradeep discovered advanced, sustainable, and affordable nanoscale materials for the removal of toxic contaminants such as arsenic and uranium with low maintenance and no environmental impact. Currently, 1.3 million people in India benefit every day from drinking water at a cost of only 2.1 paise (US$0.00028) per litre. This technology, characterized by ease of maintenance and disposal, has been approved for nationwide roll-out across India.

The **Young Talents from Africa** category, established in 2017 on the 10th anniversary of Eni Award and dedicated to young talent from the African Continent, awarded four prizes this year. The honorees are **Gloria Amo-Duodu**, from Durban University of Technology (South Africa), **Elshaday Mulu Fetene,** from Moi University (Kenya), **Tsion Ayalew Kebede**, from Addis Ababa University (Ethiopia), and **Natnael Tilahun Sinshaw**, from Addis Ababa Science and Technology University (Ethiopia). They will each receive a 3-year PhD scholarship to continue their studies in Italy.

- **Gloria Amo-Duodu** studied magnetic nanoparticles as catalysts in anaerobic digestion for treating wastewater sources and upgrading biogas production.

- **Elshaday Mulu Fetene** investigated how to upgrade biogas using catalysts from low-cost natural and synthetic materials, such as natural zeolites, clays, dolomite, sepiolite, fly ash and wood ash.

- **Tsion Ayalew Kebede** focused on the influence of land use and land cover changes on the urban climate, using remote sensing data and machine learning algorithms.

- **Natnael Tilahun Sinshaw** developed a predictive model using deep learning algorithms to automatically detect potato leaf diseases.

For the ***Young Researcher of the Year Award***, which honors two students who have completed their PhDs at Italian universities, the prizes were awarded to **Michele Ghini** and **Hilmar del Carmen Guzmán Medina.**

- **Michele Ghini** has completed his PhD at Italian Institute of Technology in collaboration with the University of Genoa, where he studied how metal oxide nanocrystals can be used to harvest, store, and release light energy. His findings pave the way for a wide range of applications in the optoelectronics and self-powered devices fields, as well as in the development of direct solar energy storage solutions.
- **Hilmar del Carmen Guzmán Medina**, from the Polytechnic of Turin, studied techniques to transform CO_2 into commercially viable products, such as ethanol and methanol. Hilmar's work focuses in particular on electrodes that can operate in special environmental conditions and can be produced at scale. The production of these substances can support a faster transition to a low-carbon economy as they are already compatible with existing energy infrastructure.

For the ***Eni Innovation Award***, which selects the most innovative projects developed by Eni researchers and experts, prizes were awarded to:

- **Aldo Bosetti** and **Carmen Samà (Eni), Luca Madia** and **Massimo Zampato (Eniprogetti)** for patenting processes for shell & tube reactor and redox at high temperatures;
- **Antonio Amico, Giulio Assanelli, Lucia Bonoldi, Marcello Notari, Riccardo Po' and Luca Serbolisca (Eni)** for developing a paint containing Few Layer Graphite liquid dispersions (FLG-LD), which has antimicrobial, antibacterial, antiviral, anticorrosive and anti-fouling applications;
- **Francesco Argento and Andrea Vignali (Eni), Mauro Favaretto (Eniprogetti)** for developing an ATEX certified drone that can operate in potentially explosive atmospheres, so as to detect methane leaks in oil and gas plants.

The "Eni Joule for Entrepreneurship" special mention was awarded to three start-ups that distinguished themselves for innovation and sustainability across their business projects:

- **RECO2**, a Pontecorvo (Frosinone)-based startup, has patented a circular economy process for a wide range of useful sustainable building and street furniture applications through the reuse of industrial waste materials.
- **Ohoskin**, a Catania-based startup, has created and patented an alternative to animal leather for applications in fashion, automotive, and furnishing, produced from orange and prickly pear waste, whose production chain is located entirely in Italy.
- **20energy**, a Spoleto-based start-up, has developed, produced and commercialized an intelligent device that converts kinetic energy dissipated by cars when slowing down into electrical energy that can be used on-site or distributed to the grid.

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