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## Preface

Indonesia recognizes the critical importance of transitioning toward green energy. The country's commitment to sustainable development, environmental stewardship, and energy security represents a proactive response to global challenges such as climate change and the ongoing energy transition. Achieving a sustainable future requires collaboration and action at all levels—ranging from individuals and communities to corporations, governments, and international partnerships. In this context, education, innovation, and technological advancement play pivotal roles in supporting sustainability efforts and driving meaningful change.

The International Conference on Upstream Energy Technology and Digitalization (ICUPERTAIN) was held for the second time on November 5–6, 2024, at Aston Hotel and Convention Simatupang, Jakarta. The conference was organized by the Faculty of Exploration and Production Technology and the Faculty of Science and Computer Science, Universitas Pertamina. The event was conducted primarily offline, with several keynote speakers participating online. Building on the success of the inaugural ICUPERTAIN conference in December 2022, the 2024 conference adopted the theme “Building a Sustainable Future: Upstream Energy and Digitalization.” It served as a forum for researchers, professionals, and academics to exchange knowledge and insights on topics including green chemistry, geoscience, artificial intelligence and data science, computational methods, and drilling technologies in support of sustainability goals in the upstream energy sector.

ICUPERTAIN 2024 was proudly supported by leading industry sponsors and partners, namely the Global Greenchem Innovation & Network Program (GGNIP), PT Pertamina, and PT ITS Science Indonesia. We are also honored to have Universitas Islam Riau (UIR) as the co-host of the conference. Through this collaboration, selected peer-reviewed papers from ICUPERTAIN 2024 are published in JGEET (Journal of Geoscience, Engineering, Environment, and Technology), thereby strengthening the academic contribution of the conference at both national and international levels.

Out of seventy-eight paper titles presented during the conference, a rigorous peer-review process resulted in multiple publication pathways. Twenty-nine (29) articles were published in the IOP Conference Series: Earth and Environmental Science in July 2025, ensuring broad international visibility. In addition, twenty-one (21) selected articles are published in this special issue of JGEET, reflecting the strong collaboration between Universitas Pertamina and Universitas Islam Riau and further disseminating high-quality research outcomes to the wider geoscience and engineering community.

The conference featured distinguished keynote speakers, including Nicke Widyawati, CEO of PT Pertamina, and Dwi Soetjipto, Head of SKK Migas. Plenary sessions were delivered by esteemed experts and scholars such as Uthaiporn Suriyaphadilok, Ph.D. (Chulalongkorn University), Yudistian Yunis (PT Geo Dipa Energi), Henricus Herwin (Senior Vice President of Strategy and Investment, PT Pertamina), Prof. Atle Rotevatn (University of Bergen), Dr. Junjuda Unruangsri (Chulalongkorn University), Prof. Antonio Patti (Monash University), Prof. Yasuhiro Yamada (Kyushu University), Dr. Abdul Halim Abdul Latiff (Universiti Teknologi PETRONAS), and Prof. Ahmad Hoirul Basori (King Abdulaziz University).

Participants of ICUPERTAIN 2024 represented a diverse range of academic institutions, research centers, and industry organizations from Indonesia and abroad. These included Universiti Teknologi PETRONAS, Heriot-Watt University, BRIN, BINUS University, Halu Oleo

University, Institut Teknologi Bandung, Institut Teknologi Sepuluh Nopember, Jakarta Drilling Society, as well as numerous subsidiaries of PT Pertamina such as Pertamina EP, Pertamina Hulu Energi OSES, Pertamina Hulu Kalimantan Timur, Pertamina Hulu Mahakam, PT COSL Indo, PT Pertamina Hulu Indonesia, PT DFI Indonesia, Arka Data, and Elnusa Petrofin.

We extend our sincere appreciation to all authors, keynote and plenary speakers, reviewers, sponsors, partners, and participants whose valuable contributions have made ICUPERTAIN 2024 a success. We hope that the articles published in this JGEET volume will serve as a meaningful reference, foster further collaboration, and inspire continued innovation toward a sustainable future for the upstream energy sector.

Jakarta, 12 January 2026

Prof. Ir. Eddy Ariyono Subroto, Ph.D.

Chairman of ICUPERTAIN 2024

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## Documentation



Opening remark from Prof. Dr. Ir. Wawan Gunawan A. Kadir, M.S. (rector of Universitas Pertamina)



Plenary Session with Uthaiporn Suriyaphradilok, Ph.D. of Chulalongkorn University



Plenary Session with Mr. Yudistian Yunis, CEO of PT Geo Dipa Energi



Plenary Session with Mr. Henricus Herwin of PT Pertamina



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Traditional Dance Performance



Plenary Session with Dr. Junjuda Unruangsri of Chulalongkorn University



Convention Session



Hybrid Plenary Session with Prof. Yasuhiro Yamada of Kyushu University



Hybrid Plenary Session with Prof. Antonio Patti of Monash University



Plenary Session with Dr. Abdul Halim Abdul Latiff of Universiti Teknologi Petronas



Technical Session



Technical Session



Participant Documentation



Opening Remark (Day 2) from Prof. Ir. Eddy Ariyono Subroto, Ph.D. as Chairman



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