Special Issue

Sustainability and Challenges of Underground Gas Storage Engineering

Message from the Guest Editors

With intermittent renewable energy integration and rising energy demands, UGS ensures supply stability, reduces emissions, and supports strategic reserves. However, complex geological conditions, leakage risks, material corrosion, and wellbore integrity issues threaten long-term sustainability, demanding innovative solutions. This special issue aims to advance multidisciplinary research on sustainable UGS engineering, focusing on safety, efficiency, and environmental impact. It aligns with journals covering energy storage, geomechanics, and civil engineering. In this Special Issue, original research articles and reviews are welcome. Research areas may include (but not limited to) the following:

- Geostorage Integrity: Fault activation, multi-scale leakage mechanisms, and caprock stability
- Wellbore & Seal Integrity: Corrosion control, microbial degradation, and risk quantification
- Smart UGS Systems: AI-driven monitoring, reservoir digital twins, and cluster management16.
- Low-Carbon Technologies: H_2/CO_2 storage, methane purification materials, and repurposed mines
- Regulatory Frameworks: Safety standards and lifecycle sustainability assessments

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I encourage you to contribute a research or comprehensive review article for consideration for publication in *Sustainability*, an international Open Access journal which provides an advanced forum for research findings in areas related to sustainability and sustainable development. *Sustainability* publishes original research articles, review articles and communications. I am confident you will find the journal contributes to enhancing understanding of sustainability and fostering initiatives and applications of sustainability-based measures and activities.

Editor-in-Chief

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