



Report on

Educational Field Visit on Hydropower Infrastructure and Renewable Energy Systems

Event Name: Educational Field Visit on Hydropower Infrastructure and Renewable Energy Systems

Event Type: Educational Visit

Mode of activity: Offline

Target Group: Students of School of Engineering & Technology

Date: April 25–29, 2024

Venue: Atal Tunnel, Tosh Dam, and Jirah Hydro Power Plant, Himachal Pradesh

Coordinator: Dr. Kaushal Kumar, Professor, SOET, K.R. Mangalam University

Participants: 60

Introduction

In line with the National Education Policy (NEP 2020), K.R. Mangalam University promotes experiential and industry-integrated learning. To strengthen practical understanding of energy-efficient engineering systems, the School of Engineering and Technology organized a field visit on Hydropower Infrastructure and Renewable Energy Systems.

The visit aimed to expose students to real-world operations of dams, tunnels, and hydropower plants. Through direct interaction with industry experts, students gained valuable insights into clean energy technologies, fostering academic–industry collaboration in support of SDG 7.

Objectives

- To provide hands-on exposure to large-scale renewable energy projects and civil infrastructure systems, strengthening students' understanding of real-world energy efficiency practices.
- To understand the working principles and operational efficiency of hydropower plants, tunnel systems, and other energy-efficient mechanisms contributing to sustainable industrial performance.
- To bridge the gap between academia and industry by facilitating knowledge exchange—enabling students to apply theoretical insights to industrial settings and allowing professionals to benefit from academic perspectives on innovation and sustainability.
- To enhance collaboration between the University and industry for promoting clean energy solutions and energy-efficiency services, directly contributing to SDG 7: Affordable and Clean Energy and Indicator 7.4.3.
- To build student capacity for future roles in designing and managing energy-efficient industrial systems, contributing to national and global sustainability goals.

Highlights of the Visit:

Day 1–2: The visit commenced with an on-site observation of bridge construction along the Manali–Rohtang Highway, where students engaged in an interactive session with site engineers at the Barsi Bridge Project. Discussions focused on project coordination, safety protocols, quality control, and material management in high-altitude infrastructure projects. Students learned how energy efficiency and precision planning are integrated into construction processes to enhance productivity and sustainability in challenging terrains.

Day 3: The team visited the Atal Tunnel, a 9.02 km long engineering marvel constructed through the Pir Panjal Range under the Rohtang Pass. Students studied its advanced ventilation, monitoring, and illumination systems, which enable energy-efficient operations and controlled air circulation at an altitude of 10,000 feet. The visit highlighted the importance of technological innovation in ensuring safety, sustainability, and energy conservation in large-scale infrastructure.

Day 4: At the Tosh Dam Project, students gained educational exposure to dam architecture, water flow regulation, and sustainable construction techniques applied in hydropower generation. Experts explained how hydrodynamic efficiency and material sustainability play vital roles in optimizing water resource management and energy output, aligning with modern clean energy standards.

Day 5: The final visit was to the Jirah Hydro Power Plant, where Er. Jai, Senior Mechanical Engineer, provided an in-depth technical demonstration of the plant's penstock system, turbine mechanisms, generator assembly, and control unit operations. The facility generates 4.4 MW of renewable energy for local use. Students observed how the integration of mechanical and electrical systems enhances industrial energy efficiency and operational reliability, bridging theoretical learning with real-world application.

Event Outcomes

The educational field visit provided students with first-hand exposure to industrial energy-efficiency systems implemented within hydropower and infrastructure projects. By observing the design, operation, and maintenance of the Atal Tunnel ventilation systems, Tosh Dam water-flow mechanisms, and the Jirah Hydro Power Plant's turbine-generator setup, students gained practical insights into how engineering innovations help optimize energy use, enhance system reliability, and minimize resource waste in large-scale industrial processes.

The experience fostered interdisciplinary learning—integrating civil, mechanical, and electrical engineering knowledge—to understand the synergy required for sustainable and energy-efficient infrastructure development. The visit also created a collaborative platform where industry engineers exchanged their field experience with students, thereby allowing the industry to gain fresh academic perspectives and innovative ideas emerging from university research. This two-way learning reinforced the University-Industry partnership in advancing energy-efficiency services for industry.

Conclusion

Through these real-world interactions, participants became more aware of how clean-energy technologies and efficiency-driven design principles can contribute to sustainable industrial transformation. The visit enhanced students' professional readiness to apply such concepts in future projects while also helping industries reflect on the evolving academic approaches toward sustainability and energy optimization.



Photo 1: Students interacting with industry experts during the Educational Field Visit on Hydropower Infrastructure and Renewable Energy System