KINGS COLLEGE OF ENGINEERING AUTONOMOUS

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**DEPARTMENT OF MECHANICAL ENGINEERING**
**ACADEMIC YEAR 2024-25 (EVEN)**
**INTERNAL STAFF SEMINAR REPORT**

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| Date& time | : 20.03.2025 & 12.30 P.M. |
| Venue | : Department Smart Classroom |
| Topic | : Seminar on "Carbon Capture & Utilization in Thermal Power Plants" |
| Resource person | : Dr. H. Agilan,<br>Assistant Professor,<br>Mechanical Engineering,<br>Kings College of Engineering-Punalkulam. |

On behalf of the Department of Mechanical Engineering organized an Internal Seminar on "Carbon Capture & Utilization in Thermal Power Plants" for faculty members of the Mechanical Department on 20.03.2025 at smart class room. The main objective of the internal seminar is to provide exposure to our faculty members on various research areas of thermal science and relevant applications.

**The Following Points were Discussed During the Session:**

- Carbon Capture and Utilization (CCU) refers to the process of capturing carbon dioxide ($CO_2$) emissions from industrial sources, including thermal power plants, and converting this captured $CO_2$ into valuable products or services. As climate change concerns escalate, the transition to low-carbon energy systems is crucial.
- Thermal power plants, traditionally powered by fossil fuels such as coal and natural gas, contribute significantly to global $CO_2$ emissions. CCU technologies present an opportunity to mitigate these emissions, reduce environmental impact, and even provide economic benefits by transforming $CO_2$ into usable resources.
- In a thermal power plant, $CO_2$ is a byproduct of burning fossil fuels to generate electricity. The CCU process begins by capturing this $CO_2$ before it is released into the atmosphere. This can be achieved through various methods, including post-combustion, pre-combustion, and oxy-fuel combustion. Each method involves separating $CO_2$ from other gases in the exhaust stream, typically through physical or chemical processes.
- The captured $CO_2$ is then compressed, transported, and either stored underground (carbon capture and storage - CCS) or converted into useful products (CCU).
- Carbon Capture and Utilization represents a promising solution to one of the biggest challenges in the energy sector—reducing $CO_2$ emissions from thermal power plants. While the technology is still evolving and faces several hurdles, the potential for creating a circular carbon economy is significant. By capturing and converting $CO_2$ into valuable products, thermal power plants can contribute to a more sustainable future, reducing their environmental impact while opening up new avenues for economic growth.

- Moving forward, collaboration between industry, government, and research institutions will be essential to advancing CCU technologies and scaling their implementation in the fight against climate change.



**Snapshots of the Session**

**Chapters Discussed:**

- Utilization of Captured $CO_2$
- Enhanced Oil Recovery (EOR)
- Production of Chemicals
- Building Materials:
- Algae Cultivation
- Carbon-Infused Products:
- Challenges and Opportunities

Upon listing of this seminar the participants can able to

- Provided valuable insights into the transformative potential of CCU technologies in reducing greenhouse gas emissions and contributing to a more sustainable energy future.
- Enhanced Understanding of CCU Technologies.
- Awareness of Environmental Benefits.
- Economic Opportunities.
- Technological Advancements and Challenges

**References:**

1. Mitul Prajapati, et all. "Carbon capture, utilization, and storage (CCUS): A critical review towards carbon neutrality in India" Case Studies in Chemical and Environmental Engineering, Volume 10, December 2024, 100770.
2. Kathryn H, et all. "Biomass and coal cofiring gasification with pre-combustion carbon capture: Impact of mixed feedstocks on CO2 absorption using a physical solvent" International Journal of Greenhouse Gas Control. Volume 141, February 2025, 104300.

**Feedback Analysis:**

| Parameter | Excellent | Good | Satisfactory | Yet to be Improved |
|---|---|---|---|---|
| Content of the Session | 12 | 01 | - | - |
| Resource person delivery towards the prescribed content within the given time | 13 | - | - | - |
| Audio/Video Clarity | 11 | 01 | 01 | - |
| Overall feedback about the session | 12 | 01 | - | - |

**Coordinator** **HOD/MECH.** **Principal**