Discussion on CCUS and Carbon Neutrality

1. Technological Innovations and Trials: CO2 Capture and Utilization: The potential for capturing CO2 from exhaust gases and converting it into products like ethanol or methanol is being explored. This could address some CO2 emissions, but the energy used for this conversion needs to come from zero-emission sources to be truly carbon-neutral.- Absorption Towers for CO2: The discussion suggests that CO2 absorption towers could be added to steel-making units to capture CO2, which could then be used in other applications or processed for emission reductions. - Hydrogen and Green Methanol: The use of green hydrogen and the conversion of captured CO2 into green methanol are potential solutions being tested. However, these technologies are currently expensive, with pilot projects like the 10 TPD CO2 capture plant at NTPC demonstrating high capital costs.

2. Challenges to Achieving Carbon Neutrality: Achieving carbon neutrality or a net-zero economy is acknowledged as a difficult goal. The cost of technology to capture and convert CO2, combined with the energy required for these processes, could result in more emissions than are saved. - The cost of green hydrogen, the energy used to convert CO2 into chemicals, and the inherent inefficiencies of such processes remain significant barriers to achieving zero emissions, especially for smaller-scale operations like DRI plants.

3. Global and National Efforts: The Paris Agreement and subsequent COP26 have set ambitious climate goals, including limiting global warming to 1.5°C. Countries are under increasing pressure to reduce their carbon footprints, with industries like DRI facing scrutiny. - India has committed to reducing emissions by 2030 and 2050, and pressure from ministries is pushing the steel and iron industries to reduce CO2 emissions. Rotary Kilns (RK) are identified as critical in this effort, and ongoing research is focused on how to adapt RK operations to meet these targets.

4. Future Considerations: While out-of-the-box ideas like briquetting coal fines or experimenting with hydrogen are explored, there is consensus that current efforts should focus on practical emissions reduction rather than aiming for full carbon neutrality in the immediate future.- As the industry moves forward, there is a call for continued research on technologies like carbon capture, the use of solar power to offset emissions, and innovations in coal efficiency to reduce the carbon footprint.

Conclusion: Reducing CO2 emissions in DRI plants is critical for meeting global climate targets. While technologies like CO2 capture, green hydrogen, and green methanol offer potential, their high costs and energy requirements remain barriers. The focus for the near future should be on practical and cost-effective measures such as improving coal efficiency, utilizing waste heat for power generation, and exploring incremental innovations. Achieving a carbon-neutral economy is a long-term goal, and current efforts should balance technological advancements with economic feasibility.

Dr. Krishna Kant Prasad discussed the under-bed fuel injection system, initially explored by SAIL-RDCIS for improved efficiency in rotary kilns. The pilot tests with oil injection showed promising results in terms of sponge iron quality but were found to be cost-ineffective, leading to the abandonment of further trials.