Department of Environmental Science and Engineering
Delhi Technological University

Reimagining Landfills as Sustainable Resource Repositories

Sustainability Integration in University Activities (SIUA) and Department of Environmental Science and Engineering, Delhi Technological University, Delhi, organised it 4th Distinguished Lecture on 21st November, 2025, from 12:00 noon to 02:00 PM at Pragyan Hall, Administrative Block, DTU. Prof. Krishna R. Reddy, a distinguished expert in environmental engineering and sustainable waste management, delivered a lecture on "Reimagining Landfills as Sustainable Resource Repositories." The session began with the National Anthem, which set a unified tone for the event. Following this, Dr. Harsh Pipil, Assistant Professor, welcomed the distinguished guest be presenting a flower pot to Prof. Reddy as a gesture of respect and appreciation. Prof. Reddy opened his talk by introducing his research laboratory and giving an overview of the extensive work he has undertaken over the years in the field of geoenvironmental engineering, landfill management and sustainable waste systems. He highlighted that many existing studies on the landfill resource recovery present conceptual ideas but fail to quantify how much material is actually available and how much can realistically be recovered. He also spoke about his long career in the United States, where he has been working for over 30 years. Prof. Reddy continued his lecture by presenting data that illustrated how waste generation has increased steadily over time. He explained that the amount of wase produced annually is rising sharply, and future projections indicate an even greater surge. This escalating trend raises significant concerns about how societies manage the growing volume of waste. Using historical data from the United States- dating back to the 1860s- he showed that early waste streams were minimal and primarily composed of simple materials. However, as decades passed, waste quantities grew and became more complex. He contrasted this with developing countries, many of which still lacks fully engineered landfills systems. Prof. Reddy emphasized that within the integrated waste management hierarchy, landfill sits at the bottom, meaning they should be the last resort. Ideally, waste should undergo sorting, recycling, compositing, reuse and energy recovery before disposal. Prof. Reddy then further stressed that sustainability must involve optimizing three pillars: Economic feasibilities, Environmental protection, and social acceptance. Successful waste management systems must

balance all three aspects simultaneously. According to him, the biggest misconception is that focusing on a single method- such as maximising the recycling or aiming for zero waste- can solve the global waste crisis. Instead, he highlighted that the true essence of sustainability is integrated waste management, where multiple strategies work together. Prof. Reddy clarified that landfills, regardless of advancement in technology or policy, will continue to play an essential role in waste management systems worldwide. He explained that in the U.S., landfills are engineered with- linear systems, leachate collection systems, gas collection systems, cover and closure systems, and strict regulatory design requirements.

Prof. Reddy explained that the bioreactor landfill concept emerged as a more sustainable alternative to conventional landfill operations. The core principle is simple, instead of removing leachate and sending it to treatment, the leachate is collected, stored, and then re-injected back into the waste mass. The purpose of leachate recirculation was to increase the moisture content, redistribution of essential nutrients and stimulating the biological activity. This combination accelerates waste degradation, which is key to solving many long-term landfill problems. Prof. Reddy further outlined several major advantages of leachate recirculation: re-injected leachate acts as a catalyst, enhancing the breakdown of organic matter rapidly in a shorter time and gas production will become more predictable and concentrated. The waste stabilizes faster, shortening the monitoring period and once the gas generation and recovery increases and becomes more uniform, it becomes easier to capture methane efficiently, convert it into energy, optimize the gas production rate to match energy systems requirements. This ensures energy plants are neither overloaded nor under-supplied. The session aimed to challenge the traditional perceptions of landfills as mere waste-disposal sites and present innovative approaches that transform them into productive, resource-generating systems. The session was enriching which was attended by collectively 50 faculties, under graduate, post graduate, and research scholars of the university. The session was ended with a round of questions and answers followed by a group photograph. The entire lecture was ended with delicious great hospitality and food along with networking session during lunch time.

Glimpse of the event