

Mohamed Sathak College of Arts and Science

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Sholinganallur, Chennai - 600 119.



REPORT ON WEBINAR

Topic: Energy Conversions and Sustainability

Date: 03 August, 2026.

Venue: Seminar Hall (Room No 6)

Mode: Online, University of Houston, Texas, USA

SDGs Addressed

- ❖ **SDG 7:** Affordable and Clean Energy
- ❖ **SDG 9:** Industry, Innovation and Infrastructure
- ❖ **SDG 12:** Responsible Consumption and Production
- ❖ **SDG 13:** Climate Action

Greetings to All,

The **School of Biological Sciences**, in association with the **Internal Quality Assessment Cell (IQAC)**, Mohamed Sathak College of Arts and Science, Sholinganallur, successfully organized a **Webinar on "Energy Conversions and Sustainability"** on **03 August 2026**. The webinar was conducted to familiarize students and faculty members with emerging renewable energy technologies, sustainable bioenergy production, and innovative bioconversion strategies for addressing global energy and environmental challenges. The programme served as an excellent platform for understanding the role of biotechnology in developing sustainable fuels and promoting a circular bioeconomy.

Objective

The objectives of the webinar were to:

- Familiarize participants with the fundamentals of renewable energy conversion and sustainable bioenergy technologies.
- Provide an overview of biomass resources and their utilization for the production of renewable fuels and bio-based chemicals.
- Introduce the concept of integrated biorefineries and modern bioconversion technologies.
- Highlight recent advances in biofuels, bioelectricity, microbial biotechnology, and genetic engineering for sustainable energy production.
- Encourage students to explore research opportunities in renewable energy, industrial biotechnology, and environmental sustainability.

The programme commenced through an online session streamed live from the University of Houston, Texas, USA. **Dr. M. S. Mohamed Jaabir**, Principal, Mohamed

Sathak College of Arts and Science, welcomed the gathering and introduced the distinguished resource person, **Prof. Dr. Venkatesh Balan**, Associate Professor in Biotechnology, Department of Engineering Technology, Cullen College of Engineering and Technology Division, University of Houston, Houston, Texas, USA. The Principal highlighted the speaker's outstanding academic achievements and internationally recognized research contributions in renewable energy, bioprocess engineering, and sustainable biotechnology. He encouraged students to strengthen their scientific knowledge in emerging areas of clean energy and sustainable technological development.

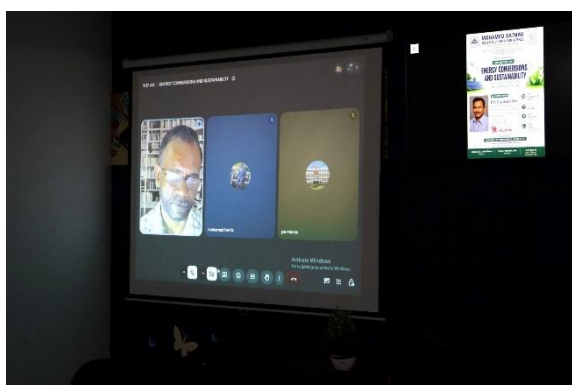


The invited talk was delivered by **Prof. Dr. Venkatesh Balan**, who presented a comprehensive overview of modern energy conversion technologies and their significance in achieving global sustainability. He began the session by discussing the increasing demand for renewable energy and the limitations associated with fossil fuels, emphasizing the need for environmentally friendly alternatives. The speaker introduced different categories of fuels, including conventional solid fuels and bioelectricity, and explained the evolution of bioenergy technologies from first- to fourth-generation biofuels. He highlighted the advantages and challenges associated with each generation and described how advancements in biotechnology have significantly improved the efficiency and sustainability of biofuel production.

The resource person further discussed the expanding global market for bio-based chemicals and explained the differences between fossil fuel conversion and biological conversion processes. He described various biomass resources and their chemical composition, illustrating how cellulose, hemicellulose, lignin, lipids, and other biomass components can be converted into valuable fuels and industrial products. The concept of an integrated **biorefinery** was presented by comparing it with a conventional crude oil refinery, demonstrating how biomass can be efficiently utilized for producing multiple value-added products while minimizing waste generation.

The lecture also covered important bioenergy production technologies, including bioethanol production from edible feedstocks and lignocellulosic biomass,

biogas generation through anaerobic digestion of agricultural, animal, and industrial wastes, microbial production of biohydrogen, and biocrude production through pyrolysis and hydrothermal liquefaction. Recent developments in biodiesel production from lipids and microalgae, bioelectricity, electrofuels, and the application of genetic engineering for developing efficient microbial strains were also discussed. The speaker concluded by highlighting future trends in sustainable bioconversion technologies and the circular economy, emphasizing resource recovery, waste valorization, carbon neutrality, and integrated bio-based industries as key strategies for achieving long-term environmental sustainability.



An engaging interactive session followed the lecture, during which students and faculty members actively participated by raising questions related to bioenergy technologies, biomass conversion processes, industrial applications, and future research opportunities. The resource person addressed each query with detailed explanations and practical insights, making the session highly informative and inspiring.

Outcomes of the Webinar

At the end of the programme, the participants were able to:

- Understand the principles of renewable energy conversion and sustainable biofuel production.
- Gain knowledge of biomass resources, biorefineries, and modern bioconversion technologies.
- Appreciate the applications of bioethanol, biogas, biohydrogen, biodiesel, bioelectricity, and biocrude in sustainable energy systems.
- Recognize the role of biotechnology and genetic engineering in improving renewable energy production.
- Develop awareness of the circular bioeconomy and future research opportunities in renewable energy and industrial biotechnology.

The programme concluded with a heartfelt **Vote of Thanks** delivered by **Dr. M. S. Mohamed Jaabir, Principal**, who expressed his sincere gratitude to the Management, the distinguished resource person, the organizing committee, faculty members, non-teaching staff, and all the participants for their enthusiastic cooperation and contribution to the successful conduct of the programme. The session concluded leaving the participants motivated to contribute towards sustainable scientific innovations and clean energy technologies.

Thank You.

Dr. M. Syed Ali
Vice-Principal & Head,
PG & Research Department of Biotechnology,
Mohamed Sathak College of Arts and Science.