ISSCT Co-Products Commission Webinar
by

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The ISSCT Co-Products Commission webinar, "From Sugar Cane By-products to Breakthroughs: Integrated Fuels, Bioproducts, and Carbon Accounting" was held on 28 July 2026. It brought together 21 participants from 10 countries and four speakers from Australia, Thailand and the United States to discuss how sugar cane by-products can be transformed into valuable resources that support a more diversified, sustainable, and economically resilient sugar industry. The webinar explored innovative approaches to valorizing sugar cane by-products, producing high-value bio-based products, developing integrated sugar biorefineries, improving carbon management and strengthening climate-related sustainability reporting.

The presentations demonstrated that by-products such as bagasse, molasses, filter cake, cane residues, and process streams are valuable feedstocks capable of producing functional sugars, specialty ingredients, biofuels, chemicals, and biomaterials. Advances in enzymatic conversion, fermentation, and biorefinery technologies are creating new opportunities for sugar mills to diversify into renewable hydrogen, sustainable aviation fuel, and other low-carbon products while making better use of existing biomass resources and infrastructure.

The webinar also highlighted the importance of improved bagasse management as a pathway to reducing greenhouse gas emissions, supporting bioenergy production, and integrating carbon-removal strategies into sugar cane processing. In addition, practical insights from Australia's mandatory climate-related sustainability reporting demonstrated the growing importance of robust governance, reliable emissions data, effective risk management, and cross-functional collaboration in meeting evolving environmental, social, and governance (ESG) requirements.

A recurring message throughout the webinar was that innovation alone will not be sufficient to drive industry transformation. Continued investment, supportive policies, market development, and collaboration between researchers, industry, and governments will be essential to scale promising technologies from research to commercial applications. Overall, the webinar reinforced that innovation in sugar cane co-products presents significant opportunities to create new revenue streams, improve resource efficiency, reduce environmental impacts, and strengthen the long-term sustainability of the global sugar industry.

The topics discussed were:

1. Sugar Cane By-products, Carbon Management and Emissions Reduction

Dr. Anurag Mandalika (Associate Professor-Research, Louisiana State University, USA) focused on improving the management of sugar cane bagasse to increase its value while reducing greenhouse gas emissions and supporting carbon removal. His presentation examined the environmental impacts associated with conventional bagasse storage, including methane emissions, and assessed alternative pathways that improve biomass utilization through bioenergy production, conversion into higher value bioproducts, and the integration of carbon dioxide removal technologies.

While these approaches offer significant opportunities to reduce emissions and improve resource efficiency, Dr. Mandalika noted that technical complexity, operational challenges, investment requirements, and the need for supportive policy frameworks remain important considerations for large-scale implementation. He emphasized that continued research, investment, and enabling policies will be critical to unlocking the full potential of sugarcane biomass as part of a low-carbon bioeconomy.

2. Revealing the Hidden Wealth in Sugar Factories

Dr. Boontiwa Ninchan (Assistant Professor of Biotechnology and Head of Sugars and Derivatives Analytical Laboratory (SuDAL) at Kasetsart University, Thailand) highlighted the untapped potential of sugar factories by encouraging the industry to view by-products as valuable resources rather than waste. She introduced the concept of "waste anatomy," which involves analyzing the composition and characteristics of sugar cane by-products to identify the most suitable conversion technologies. Bagasse, molasses, filter cake, cane residues, and wastewater streams were presented as renewable feedstocks that can be transformed into biofuels, chemicals, biomaterials, and other high-value bio-based products.

Dr. Ninchan also demonstrated the versatility of sucrose as a renewable raw material that can be converted through enzymatic and fermentation processes into functional ingredients such as prebiotic sugars, fructo-oligosaccharides, allulose, lactosucrose, and sugar alcohols. She emphasized that while these technologies present significant commercial opportunities, successful implementation depends not only on technical feasibility but also on production costs, existing factory infrastructure, market demand, and supportive regulatory frameworks.

3. Sugar Mills as Integrated Biorefineries

Dr. Gabriel Fraga (Research Fellow, Queensland University of Technology, Australia) presented a vision for transforming conventional sugar mills into integrated biorefineries capable of producing a diverse range of renewable fuels and bio-based chemicals alongside sugar. He explained that sugar mills already possess many strategic advantages, including abundant bagasse supplies, renewable electricity generation, established industrial infrastructure, and access to ethanol, biogas, and renewable carbon sources.

His research explored emerging technologies for producing renewable hydrogen from ethanol and biogas, noting that hydrogen derived from biogas has the potential to become economically competitive at larger production scales through collaboration among neighboring mills. Dr. Fraga also highlighted opportunities to convert bagasse into valuable platform chemicals such as 5-chloromethylfurfural, which has applications in plastics, resins, and renewable fuels. Sustainable aviation fuel was identified as another promising opportunity, although challenges related to feedstock availability, seasonality, production scale, and economics remain to be addressed.

4. Climate-related Sustainability Reporting

Ms. Natasha Mallise (ESG Lead at Makay Sugar Limited, Australia) shared Mackay Sugar's experience in preparing one of Australia's first mandatory climate-related sustainability reports for a sugar milling company under the Australian Sustainability Reporting Standards (AASB S2). Her presentation outlined the company's approach to climate governance, strategy, risk management, climate-related metrics, and emissions reporting, illustrating how sustainability reporting is becoming an essential component of business management.

Drawing on practical experience, Ms. Mallise highlighted the importance of robust emissions data, effective governance structures, cross-functional collaboration, and early engagement with auditors throughout the reporting process. She also stressed that climate-related reporting should be integrated into broader business planning and risk management, enabling organizations to better manage climate risks, meet regulatory requirements, and strengthen long-term business resilience.

The panel discussion focused on the evolving role of sugar cane within the global low-carbon bioeconomy and the practical pathways for translating research into commercial applications. Participants discussed opportunities to transform sugar cane by-products into renewable fuels, specialty chemicals, biomaterials, and carbon-removal products that can strengthen both industry profitability and environmental performance.

Several common themes emerged throughout the discussion:

- Sugar mills have strong potential to become integrated biorefineries producing multiple high-value products alongside sugar.
- Technically proven innovations now require greater commercial investment and demonstration at industrial scale.
- Feedstock seasonality, production scale, and capital costs remain major barriers to widespread implementation.
- Government policies, incentives, and market development will play an essential role in accelerating adoption of low-carbon technologies.
- Collaboration between researchers, industry, technology providers, and policymakers is critical for moving innovations from laboratory research to commercial deployment.
- Climate-related reporting and ESG requirements are becoming increasingly important drivers of investment, business resilience, and market competitiveness.

The panel concluded that innovation in sugar cane co-products offers significant opportunities to diversify income, improve resource efficiency, reduce emissions, and strengthen the long-term sustainability of the global sugar cane industry. Continued international collaboration through the ISSCT Co-Products Commission will be essential in supporting knowledge exchange and advancing practical solutions for the industry.