

ENVIRONMENTAL BIOTECHNOLOGY NETWORK

Process Integration and Sustainability Assessment WG



Process Integration & Sustainability

Assessment (PISA WG)



Led by [Prof Jhuma Sadhukhan](#), University of Surrey

The goal of this WG is to identify grand challenges in *Pollutants & Media* and *Biosciences for Engineering* and propose ways to address them.

ACTIVITY SYNOPSIS

This WG ran a pair of webinars in 2022 and 2023 on *Life Cycle Assessment Tools* and *LCA for Biotechnology Problems*, with guest speakers Dr James Joyce of Unilever, Dr Adrian Higson of the National Non-Food Crops Centre (NNFCC) and Dr Siddharth Gadkari, University of Surrey. Presentations from these workshops have been widely viewed on EBNet's [YouTube](#) channel.

Webinar [LCA for Biotechnology Problems: targeted fundamental methodology](#)

Webinar [Life Cycle Assessment Tools for Environmental Biotechnology](#)

This was followed by three oversubscribed 'live' workshops and training events for members. The first, held at the University of Surrey in October 2023, examined [LCA for the EBNet Industrial AD Community](#). Two more events took place in 2024 – a workshop on [LCA for Practitioners and the Industrial Community](#) in Southampton and a 3-day Training Course on [LCA in Practice](#).



This group has collaborated with several others, especially the AI and Machine Learning (AI/ML) WG and the Anaerobic Fermentation WG. It has been involved in successful applications for large-scale follow-on funding, including EPSRC grant Artificial Intelligence Enabling Future Optimal Flexible Biogas Production for Net-Zero ([AI4AD](#), EP/Y005600/1) in which Prof Sadhukhan is a Co-Investigator; [ELEMENTAL Engineering Biology Hub](#) BB/Y008456/1 which she co-leads; and NSF/UKRI-funded [Global Center for Sustainable Bioproducts](#) for which Prof Sadhukhan is the UK Lead. The group has also submitted a proposal for a follow-on Network to a recent BBSRC [call](#).



LCA workshop at the University of Surrey

WG Publications

The WG has published four journal papers as a result of its activities in EBNet, two in conjunction with the AI/ML WG; and has contributed to two others as part of the AI4AD project.

Strategic navigation of world-leading biorefineries and Mexico's policy landscape: A gateway to a sustainable circular bioeconomy

Sadhukhan, J., Martinez-Hernandez, E., Allieri, M.A.A., Eguía-Lis, J.A.Z., Castillo, A., Domingullo, D., Torres-García, E. and Aburto, J., 2023. Journal of cleaner production, p.140386.

Novel Life Cycle GHG Formulations of Anaerobic Digestion Systems Aligned with Policy

Zhang, R., Sadhukhan, J., Zhang, D., Short, M., McKechnie, J., Liu, Y., Bywater, A., Murali, R., Dolat, M., Zhang, D. and Zarei, M. Available at SSRN 4837715. *(with AI/ML WG)*

Carbon credits monetary value for anaerobic digestion systems and energy policy implication in the UK

Zhang, D., Li, D., Bywater, A., Short, M. and Sadhukhan, J., 2025. The Innovation Energy, 2(1), pp.100066-1.

Framework for optimal energy storage duration for maximum-reliability renewable electricity

Sadhukhan, J., Sen, S. and Randriamahefasoa, T.M.S., 2024. Frontiers in Energy Research, 12, p.1430413.

Dynamic feed scheduling for optimised anaerobic digestion: An optimisation approach for better decision-making to enhance revenue and environmental benefits

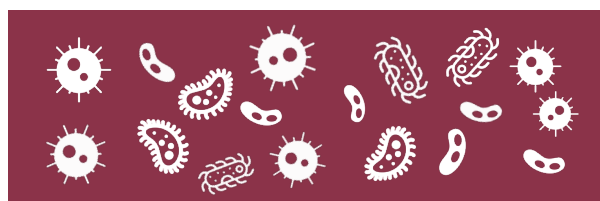
Dolat, M., Murali, R., Zarei, M., Zhang, R., Pincam, T., Liu, Y.Q., Sadhukhan, J., Bywater, A. and Short, M., 2024. Digital Chemical Engineering, 13, p.100191. *(with AI4AD)*

Optimal feed scheduling and co-digestion for anaerobic digestion sites with dynamic demands

Dolat, M., Murali, R., Zhang, R., Zarei, M., Zhang, D., Zhang, D., Sadhukhan, J. and Short, M., 2024. In Computer Aided Chemical Engineering (Vol. 53, pp. 1705-1710). Elsevier. *(with AI4AD)*

The activities of this WG were also popular at EBNet's ECR events, with many presentations directly or indirectly concerned with process optimisation and comparative assessment of economic and environmental benefits and impacts.

In recognition of leading Engineering Biology activities in tandem with scale-up, sustainability analysis and further industrial projects, Prof Sadhukhan received the University of Surrey's Vice Chancellor's Award for Researcher of the Year 2024.





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