EBNet
Environmental Biotechnology

The Environmental Biotechnology Network

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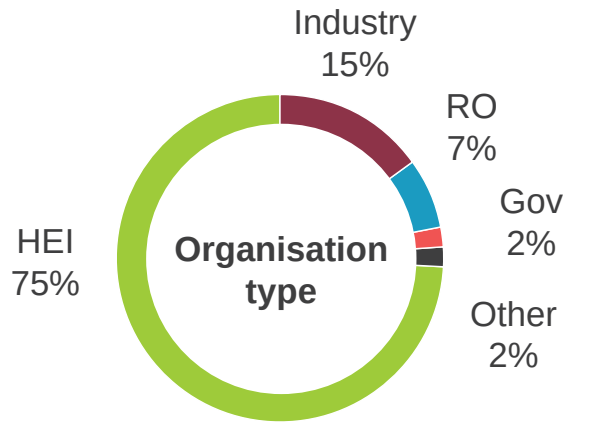
Welcome

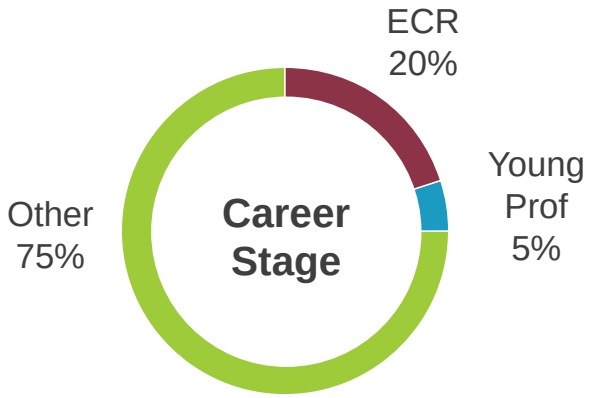
Welcome to the Environmental Biotechnology Network (EBNet) Activities Update.

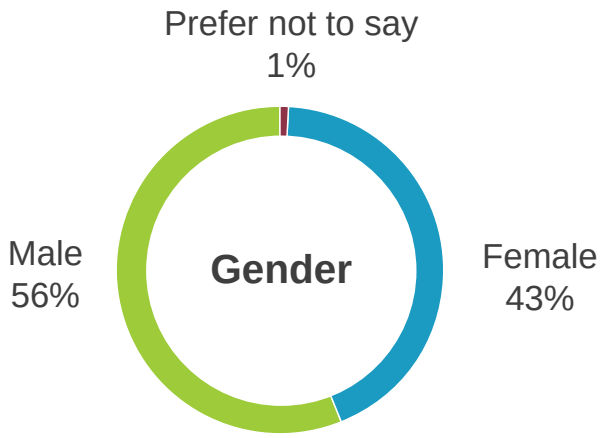
In 2014 BBSRC launched 13 Networks in Industrial Biotechnology and Bioenergy (NIBB). These were succeeded in 2019 by **phase two**, consisting of 6 new sister-NIBBs. The Networks aimed to foster collaboration between academic researchers and businesses at all levels, using excellent research to tackle challenges and help deliver key benefits in industrial biotechnology and bioenergy. With the support of BBSRC, and with additional funding from EPSRC, each Network organised conferences and events, provided funding for Proof-of-Concept (POC) projects and collaboration with businesses whilst also offering a route for individuals to network, share expertise and contribute.

Within EBNet our community of academics and industry works on microbially-driven systems for environmental protection, bioremediation and resource recovery. These include waste or wastewater treatment and biorefining, and biodegradation of oil, plastics or other emerging pollutants. We encompass three interrelated themes: Pollutants and Media, covering both traditional and emerging pollutants; Biosciences to Engineering to develop and improve technology for pollution control, resource recovery and bioenergy generation; and Technology interfaces for process integration, techno-economic and sustainability assessment.

Over time we have built a membership of more than 1300, with 56% Male, 41% Female, 1% Other. We cover a wide range of institutions, with members from over 100 Universities across the UK. 74% of our members are in the HEI sector. The rest come from industry, research organisations, NGOs and government bodies. Our monthly **Newsletter** has wide readership, with 30% from outside the UK.







We've reached hundreds of people through LinkedIn, X (formerly Twitter), Eventbrite and YouTube. Our followers have been provided timely, tailored updates on the latest opportunities in Environmental Biotechnology.

Thanks to our funders we have been able to support a broad range of research projects, covering topics integral to our core themes. We are grateful for the efforts of our small army of volunteer reviewers who laboured behind the scenes to evaluate bids and inform our assessment panel. Likewise, we appreciate the generosity of our industry panel members who have devoted time to read through bids and then help inform our panels' decision-making. As a result, over 100 POC bids were evaluated leading to 14 **funded projects** across 10 universities. In addition, our 7 Business Interaction Vouchers (BIV) have helped to engage industry with academics to investigate specific challenges.

Impact from our activities can be measured not just in publications and career progression but also in the formation of 13 specialist **Working Groups** (WG) set up by members *for* members. These cover topics from *Aerobic Granulation Processes to Environmental Biotechnology and Social Sciences*. Each has evolved independently, based around the specific interests and needs of its members – resulting in a wide array of structures and initiatives. We expect to see more progress in these fields, as a continuing benefit from the formation of an active core of enthusiasts!

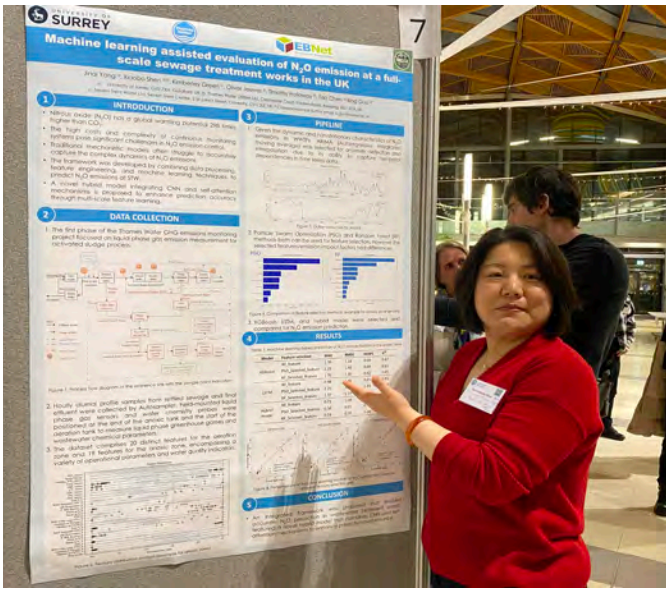
EBNet has organised a host of events and activities – most open-to-all, some specific to specialist groups and yet others held jointly with other NIBBs or organisations. Our biggest events have supported our large Early Career Researcher (ECR) membership, with six annual ECR conferences. Our webinars have had international reach, with invited speakers from across the globe sharing up-to-date expertise with members. Other workshops and conferences have sought to connect different research communities and groups to foster stronger collaborations.

As part of our general outreach, we have contributed articles to trade associations and participated in industry events. To become more accessible, we created various competitions designed for wider public participation (including photography and short story competitions). An array of articles, books and reports will act as resources going forward. Recognition for Environmental Biotechnology as a developing field has been a key focus, with reports and journal papers which can be accessed **online**.

Building on our conferences, we have dedicated attention and effort to our ECR membership by providing international conference travel bursaries, placement funds and further opportunities to get involved via the ECR Scientific Committee. Our friendly, supervisor-free, academic conferences have helped

EBNet ECR - huge opportunity for career development.

Emmanual Atai



hundreds of researchers to network and showcase their research to a receptive audience. It has been a privilege to see the work being conducted by research groups across the UK. By providing a forum for researchers from different universities but related fields we have connected people at the very start of their careers. Meanwhile, our **ECR WG** – composed of ECRs - has worked hard to provide numerous opportunities for targeted career and professional skills support. Nurturing this geographically dispersed talent pool can only be beneficial to a developing UK IB base.

We are optimistic that you will find something of interest in this update. There are vibrant research communities working everywhere in Environmental Biotechnology. While our formal UKRI funding period has finished, EBNet remains active. And look out for more opportunities to stay professionally connected via initiatives like the **Environmental Biotechnology Innovation Centre** (EBIC), the **National Biofilms Innovation Centre** (NBIC) and other new Networks and Hubs. Or contribute to a professional association or society like the **Microbiology Society**, **CIWEM**, **CIWM** and more. In the fast-moving field of Environmental Biotechnology, maintaining strong professional connections is more important than ever.

Working Group Stories

In 2021 we invited members to contact us if they would like EBNet support to set up a Working Group around specific topics. Four years later there were 13 specialist groups, tackling different topics in different ways. Sometimes providing mutual support, but more often acting independently, these expert communities conducted a range of activities including, but not limited to: interactions and visits with industry, webinars, workshops, training events, supported sessions at conferences, presentations, reports, animations and more…

Find out more
https://ebnet.ac.uk/wg-details/

Aerobic granulation processes

Led by **Dr Yongqiang Liu**, University of Southampton.

The purpose of this WG is to extend knowledge and awareness of aerobic granulation (AG) processes from microbiological fundamentals to engineering application and control, in order to improve performance and promote adoption of this technology.

Aerobic granular sludge (AGS), pioneered in the 1990s, represents an advancement in traditional aerobic suspended growth systems such as activated sludge (AS), by using granules rather than flocs. This innovation results in a rapidly settling, high-density biomass that offers a smaller footprint and higher levels of nutrient removal due to the different redox zones across the granules and process cycle, all while requiring less energy.

Since the first full-scale implementation in 2005, there have been over 120 applications of AGS systems, with 14 operational plants in the UK and more under contract. Europe's largest AGS application at the Ringsend STP in Dublin serves a population of 2.4 million. The development of AGS has also advanced the concept of process intensification, which uses selection pressure to enhance sludge settleability in existing infrastructure

After two decades of design and engineering experience, there remains potential for scientific insights that could lead to further future improvements. Moreover, microbial granules without a carrier medium offer a unique perspective for studying biofilms traditionally associated with surface attachment. In the context of the circular economy, there is growing interest in recovering valuable resources from AGS, such as alginate-like exopolysaccharides, tryptophan, phosphorus, and polyhydroxyalkanoates.

Activity synopsis:

This WG started with three international webinars, with more than 240 attendees, to gauge interest from and share knowledge with our membership and beyond. A fourth followed in 2025.

An EBNet BIV with Plantwork Systems Ltd, and sampling visits to industry sites (thanks to Severn Trent, Southern Water, Thames Water), led to journal publications in Chemosphere and Processes, with more to come. EBNet has also facilitated ongoing contacts with other companies. Current studies are investigating how functional microorganisms in AGS and CAS respond to seasonal change.

The WG edited a Special Issue: Environmental Protection by Aerobic Granular Sludge Process which was reprinted as a **book** on AGS. Outreach included activities on resource recovery from wastes at Southampton Science and Engineering Day 2025, and the production of a short **animation** illustrating the engineering and microbiological aspects that underpin the use of these granules.

As follow-on funding, an NBIC **research award** with Plantwork Ltd was obtained for *Novel hybrid biofilm technology to remove nutrients from wastewater.*

A comprehensive comparison of microbial communities between aerobic granular sludge and flocculent sludge for nutrient removal in full-scale wastewater treatment plants

Tararag Pincam, Yong-Qiang Liu, Alexander Booth, Yi Wang, Guihong Lan, Ping Zeng. Chemosphere. Volume 362, August 2024, 142644.

https://doi.org/10.1016/j.chemosphere.2024.142644

AI & ML in the Bioeconomy

Led by **Dr Oliver Fisher** and **Prof Rachel Gomes**, University of Nottingham.

The bioeconomy continues to grow, offering an alternative to fossil resources and facilitating the transition to net zero, circular economy and/or industrial symbiosis. However, bioprocesses have complex dynamics and are subject to disturbances, which makes modelling them challenging yet necessary for process understanding, model-based optimisation and scale-up. This is further compounded when utilising waste-based feedstocks, which have variable composition and characteristics in time and space.

Artificial intelligence (AI) and machine learning (ML) represent solutions for tackling emerging challenges in bioprocesses, such as resource specification and availability, parameter dimensionality, nonlinearity, risk mitigation, and complex metabolisms. Multivariate data analysis, deep learning, reinforcement learning, and other novel machine learning techniques start to complement and replace traditional data analysis approaches to accelerate bioprocess development and application.

As AI and ML are increasingly deployed within the bioeconomy, it is important to understand the social impact of their use. This WG also aimed to understand the equality, diversity and inclusion considerations of using AI and ML learning to progress bioprocesses development and application.

Activity synopsis:

This WG ran a very popular webinar in early 2024: Unlocking AI and Machine Learning's Potential for Environmental Biotechnology. Group members also worked on the £1.4M EPSRC grant Artificial Intelligence Enabling Future Optimal Flexible Biogas Production for Net-Zero led by the University of Surrey. Several publications ensued, including joint papers with the Process Integration & Sustainability Assessment WG. Stakeholder inputs from activities with the PISA and AD WGs are now being taken forward by the **BiofuelAi** start-up incubated at the University of Surrey.

I am an Environmental Biotechnologist because I have a passion for renewable energy solutions. My focus lies in Anaerobic Digestion Modelling and Control, as I firmly believe in the transformative potential of this alternative energy source to enhance our world.

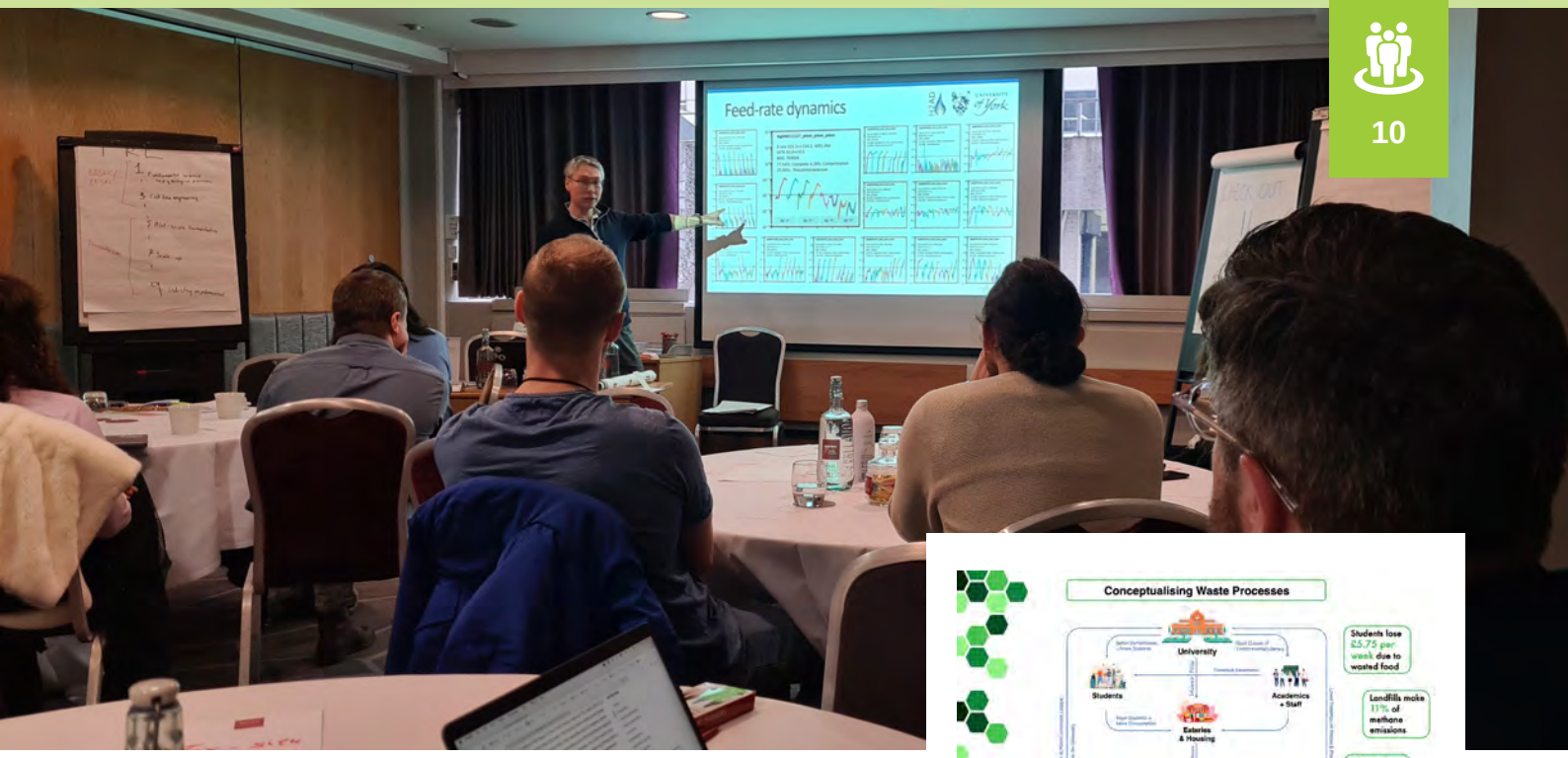
Benaissa Dekhici, University of Surrey

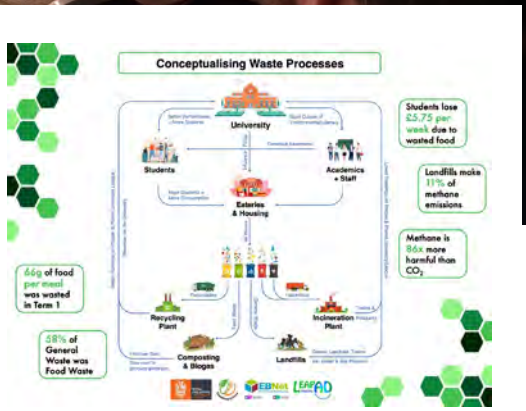
Breaking barriers to modelling biotechnologies with machine learning

Fisher, O. J., Short, M., Zhang, D., Guo, M., & Gomes, R. L. (2025). Resources, Conservation and Recycling, 215, Article 108071.

Anaerobic digestion site-wide optimisation and decision-making: An industrial perspective and review

Murali, R., Bywater, A., Dolat, M., Dekhici, B., Zarei, M., Hilton, L., Sadhukhan, J., Zhang, D. and Short, M., 2026. Renewable and Sustainable Energy Reviews, 226, p.116402





Anaerobic Digestion

Led by **Dr Mark Walker**, University of Hull.

Anaerobic digesters provide sustainable and low-carbon treatment of liquid and solid organic wastes using a mature technology, with growth in the sector predominantly determined by the increased capture of AD-appropriate waste materials. Despite this there remain exciting opportunities both in the improvement of existing AD technologies (e.g. emerging feedstocks, pre-treatment, process intensification), and in development of novel applications and new markets (e.g. biorefining/ high value products, green hydrogen, CO_2 biomethanation). The WG brings together interdisciplinary expertise to explore 'What's next for AD?' and how the wealth of historical and current research can contribute to the next generation of anaerobic biotechnologies across the energy, food, agriculture, water and biomanufacturing sectors. It aims to strengthen links between the AD research community, policy makers and industry to ensure activities support both near- and long-term industrial needs.

Activity synopsis:

This highly active WG benefited from the legacy of ADNet: a large number of EBNet members work in or around AD. The WG has actively engaged with other groups in multiple joint activities and invited national and international speakers from academia and industry. EBNet funding calls featured many applications in this area, with one POC grant and four BIV projects completed. The group carried out a critical review on CO2 Biomethanisation as an enabling process for carbon recycling and utilisation, jointly funded by Carbon Recycling Network and EBNet; and another study on food waste behaviour. It was instrumental in supporting the joint EBNet / Carbon Recycling Network Gas Fermentation workshop in 2024; and led the cross-WG New Biomethane workshop in early 2025. Further support fed into a workshop on Residual Biogas Emissions for DESNZ. Highlighted work with external organisations includes production of the RASE Farm of the Future Report, and interaction with IEA Task 37 – Energy from Biogas.

For these and other reports and outputs, see the EBNet **Resources** page.

Anaerobic Fermentation

Led by **Dr Yue Zhang**, University of Southampton and **Dr Luca Alibardi**, Cranfield University. Core team: Prof Raffaella Villa (Lancaster University), Dr Jaime Massanet-Nicolau (University of South Wales), Dr Özge Eyice-Broadbent (University of Birmingham).

Mixed culture anaerobic fermentation (AF) is a relatively new area compared to anaerobic digestion (AD), although they are linked in terms of process and biochemistry. Recovery of organic products including fatty acids is the core task for AF, and it also offers potential for plant nutrient recovery and bio-hydrogen production.

One of the key processes to unlock the potential of AF for the circular bioeconomy is direct product recovery from fermentation broth. This is important for steady-state continuous operation, in contrast to the over-explored topic of batch experiments. It is also a good example of the interaction between the biological system and its engineering envelope, which is a key area of interest for EBNet. Product-induced feedback inhibition can also be explored in continuous operation, to produce longer chain acids which are more valuable and easier to recover. Feedstock characteristics also affect the product composition, and the topic has strong links to BBNet. AF thus has upstream, central and downstream aspects: if we would like to see it adopted, then all these components must work together.

Activity synopsis:

Anaerobic fermentations are an essential aspect of many successful Environmental Biotechnologies, and a recurring topic amongst those ECRs at our annual ECR conference working on resource recovery of products like Volatile Fatty Acids (VFAs) or biohydrogen.

In January 2025 the WG organised an Anaerobic Fermentation workshop, jointly supported by EBNet and BBNet, to gather top UK and international experts together and discuss the state-of-the-art in AF. It also produced an **animation** to explain the principles of AF for non-specialists and the public. In collaboration with other WGs, it co-led the New Biomethane workshop, and carriedout work on microbially-influenced degradation of bioreactor materials. Industry interactions abound and plans include further webinars in Autumn 2026.
The WG is also seeking follow-on funding for an AF/Biorefinery Network.

Biochars for Pollution Prevention

Led by **Dr Meredith Barr**, LSBU.

This WG focuses on the use of biochar for pollution prevention, environmental remediation and waste valorisation – particularly through removing or killing harmful microorganisms, or through hosting microorganisms for the purpose of pollutant degradation and other bioconversion processes.

Activity synopsis:

With the current interest in environmental applications of biochars, the development of a group looking at their microbial interactions was timely. This WG led with a **webinar** on Biochar in Environmental Biotechnology, organised a lab visit to Heriot Watt University for members, and supported further knowledge exchange by chairing a session and presenting research at top international conferences in Japan (WasteEng 2024) and Colombia (Bio-Char IV).

With support from EBNet and BBNet, the WG ran a 2-day workshop on Integration of thermal, thermochemical, and biological conversion technologies in London in early 2025, with initial outcomes presented at the 2025 BBNet Conference.

EBNet funded two POCs associated with this WG in 2020 and 2024, both of which presented as invited talks at the AMIGO-Biochar project symposium at Teeside University in 2025.

See the WG YouTube **Playlist**

Bioelectrochemical Systems Development for Environmental Technology

Led by **Dr Sharon Velasquez Orta**, Newcastle University.

This WG aims to promote education, collaboration and research by merging microbiology, engineering, material and biotechnology disciplines in the study of bioelectrochemical systems. This knowledge area continues to expand with several environmental applications such as monitoring, waste gas conversion to biocompounds, waste liquids remediation and biohydrogen production.

I am an Environmental Biotechnologist because I am passionate about finding engineering solutions to e nvironmental issues.

Hannah Bird, Newcastle University

Activity synopsis:

This was a hands-on WG which delivered two bespoke training events at Newcastle University in 2023 and 2024 on Bioelectrochemical Systems. They ran two webinar series with top invited speakers from the UK and around the world. EBNet funded two POC projects on this topic, one at our maximum value of £100k. In collaboration with the AF WG, they supported a study on bioreactor materials degradation including Microbially-Influenced Corrosion, co-led the New Biomethane workshop, whilst also contributing to the *Exploring the Past, Present and Futures of Environmental Biotechnology as a Field* workshop in 2024.

Biofilms in Water: from catchment to tap

Led by **Dr Francis Hassard**, Cranfield University.

This WG aims to explore and advance the positive applications of biofilms in environmental biotechnology, particularly focusing on engineered microbial communities in water treatment processes. Biofilms play a crucial role in technologies such as slow sand filtration, contributing to efficient water treatment and resource management. By bringing together experts from academia, industry, and government, it seeks to enhance understanding of beneficial biofilm formation and function, develop innovative engineering strategies, and promote best practices for harnessing biofilms in sustainable water treatment systems.

Activity synopsis:

This WG has an active outreach role, with Dr Hassard headlining at our ECR24 conference and producing an **animation** on Slow Sand Filtration processes for our Microbiology/Engineering Interactions theme. In collaboration with the National Biofilms Innovation Centre (NBIC), two webinars asked What are biofilms doing in our drinking water pipes? and examined Granular Activated Carbon Biofilms for Biomethanation from Wastewater. A by-invitation workshop at the Royal Society of Chemistry, London gathered top experts to discuss Slow Sand Filter Futures. EBNet supported two POC projects in this area which have led to several journal papers, conference presentations and follow-on funding grants.

Microbial stratification and DOM removal in drinking water biofilters: Implications for enhanced performance

Shi, X., Pereira, R., Savage, L., Poursat, B., Quinn, D., Kostrytsia, A., Cholet, F., Smith, C.J., Gauchotte-Lindsay, C., Sloan, W.T. and Ijaz, U.Z., 2024 . Water Research, 262, p.122053.

Find the *Slow Sand Filtration Futures* Workshop report and Position Statement on our **Resources** page.

I am working to minimize the overall public health risk due to microbial processes occuring within drinking water distribution systems.

Dinesh Singh Bhandari, University of Glasgow

Bioinformatics Training for Microbial Environmental Biotechnologies

Led by **Professor James Chong**, University of York.

This WG aims to develop opportunities for stakeholders to engage with bioinformatics pipelines for understanding microbial community dynamics; providing insight into the potential of 'omics techniques in Environmental Biotechnology, the design of these types of experiment and the development of online training resources for the analysis and visualisation of the resulting data. Work has been supported by the UKRI grant Cloud-SPAN: Specialised analyses for environmental 'omics with Cloud-based High Performance Computing (MR/V038680/1) led by Prof Chong.

Cloud-SPAN
Cloud based High Performance Computing
SPecialised ANalyses for 'omics

Activity synopsis:

Opening webinars underpinning this WG included *Why bioinformatics training is important and Using Big Data Approaches to Understand Microbial Communities*. The WG has provided speakers to EBNet-supported sessions at various events (particularly the European Biosolids and Organic Resources conferences). It coordinated a cross-WG meeting that led to an interdisciplinary workshop and a follow-on Network funding proposal. Working with other WGs, it co-led on the New Biomethane workshop. EBNet has supported a BIV and two POCs on this topic. EBNet also put the group into contact with the *Oracle for Research program* 2023 leading to US$100k support in cash, cloud credits and technical collaboration – underpinning later proposals.

Environmental Biotechnology and Social Sciences

The purpose of this WG is to examine the histories, contemporary dynamics and potential futures of the field of environmental biotechnology, drawing on insights from the social sciences. The WG has conducted exploratory research, summarised and shared findings, and made recommendations on future interdisciplinary projects.

Activity synopsis:

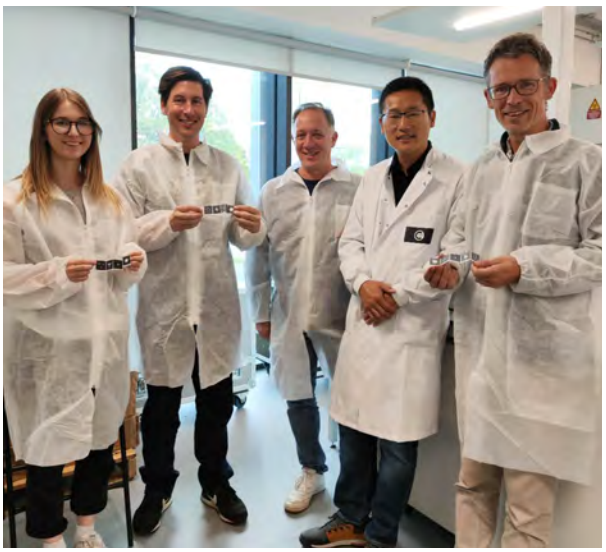
The Environmental Biotechnology and Social Sciences WG was formed as a 'closed' group consisting of members from the University of Edinburgh and the University of Sussex with expertise in the social sciences aspects of Science, Technology, Engineering and Mathematics (STEM). Together they held interviews, performed bibliometric analysis and held a by-invitation workshop to examine a single topic - Exploring the Past, Present and Futures of Environmental Biotechnology as a Field. The full report and summary is available on EBNet's **Resources** page, and the WG page.. We now know that, whilst research in the wider area of EB is increasing as a proportion of all research activities, the term itself is variously defined and used by different communities who may benefit from a common understanding for enhanced cross-disciplinary interaction.

Environmental Sensors and Wastewater Surveillance

Led by **Professor Zhugen Yang**, Cranfield University and **Dr Martin Spurr**, Newcastle University.

The Environmental Sensors and Wastewater Surveillance (ESWS) WG promotes state-of-the-art sensors to enable point-of-use analysis of pollutants in water, soil, and air at sites of sample collection. Wastewater surveillance (particularly wastewater-based epidemiology), has emerged as a novel monitoring mechanism for early warning of infectious disease, including Covid-19, and is growing as a global technique to monitor public health at the community level.

The WG has gathered a multidisciplinary group of researchers with interests in new environmental sensors development, including the underpinning principles, design, materials, methods, devices and applications particularly in wastewater analysis, but also water, air, soil, food, healthcare, biosecurity and beyond. This group provides an opportunity to exchange knowledge and ideas, present early findings, build collaborations and explore interdisciplinary funding opportunities. The WG also aims to enable training for early-career researchers and industry sectors.



Activity synopsis:

Timing is everything and this WG came about in a busy period for biosurveillance. A series of six webinars tackled everything from *Developing the Next Generation of Monitoring for Human and Environmental Protection to Gout, bigger muscles and a sweet tooth – what other than Covid-19 have we been monitoring in wastewater?*. Several joint events were held at Cranfield, and the WG organised major conferences - *Testing the Waters 6* in 2023 and *Microfluidics for single cell sensing and sequencing* in 2025. EBNet supported three POCs on this topic.

My PhD focused on the development of paper-based microfluidic sensors for live bacteria detection of live waterborne pathogens.

Carla Spatola Rossi, Cranfield University

CRISPR-enabled sensors for rapid monitoring of environmental contaminants

Wang, Y., Pan, Y., Han, W., Rossi, C.S., Hui, Q., Guo, Y., Owoseni, M.C., McAdam, E., Yong, Y.C., Wang, B. and Yang, Z., 2024. TrAC Trends in Analytical Chemistry, p.118128.

Environmental DNA clarifies impacts of combined sewer overflows on the bacteriology

of an urban river and resulting risks to public health

Zan, R., Blackburn, A., Plaimart, J., Acharya, K., Walsh, C., Stirling, R., Kilsby, C.G. and Werner, D., 2023. Science of the Total Environment, 889, p.164282.

BODIPY-labeled estrogens for fluorescence analysis of environmental microbial degradation

Felion, C., Lopez-Gonzalez, R., Sewell, A.L., Marquez, R. and Gauchotte-Lindsay, C., 2022. ACS omega, 7(45), pp.41284-41295.

N_2O emissions from Environmental Biotechnologies

Led by **Professor Tom Curtis** and **Dr Ben Allen**, Newcastle University.

This group aims to bring nitrous oxide (and subsequently methane) emissions from environmental biotechnologies onto a sound methodological footing – with a particular emphasis on quantifying the role of key microorganisms.

I am an Environmental Biotechnologist as my project concerns the production and emission of greenhouse gases from wastewater treatment, which is linked to microbial activity.

Zachary Thompson, Newcastle University

Activity synopsis:

Over the course of this WG, webinars on the topic of N2O emissions brought multiple speakers together with insight from industry and academia worldwide. In 2022 EBNet supported a POC project on Mitigating N2O emission from wastewater treatment processes, at our highest funding level. A 3-day by-invitation workshop in Leeds on GHG emissions in Sanitation gathered more experts together to discuss and scope a path forward. The workshop results were fed into the **EMISI** project, and WG members took part in the EMISI Findings and Dissemination final webinar.

PFAS ‘forever chemicals’

Led by **Dr Tao Lyu**, Cranfield University.

Per- and Polyfluoroalkyl Substances (PFAS), known as ‘forever chemicals’, are extensively used in industrial and consumer applications. Attributed to the enduring characteristics, these substances have a detrimental impact on human health when their residues persist in the environment.

Unveiling the truth of interactions between microplastics and Per- and Polyfluoroalkyl Substances (PFASs) in Wastewater Treatment Plants: Microplastics as a carrier of PFASs and beyond

Ma, M., Coulon, F., Tang, Z., Hu, Z., Bi, Y., Huo, M. and Song, X. Environmental Science & Technology, 59(4), 2211-2221.

Partitioning and removal of per- and polyfluoroalkyl substances (PFAS) in full-scale surface flow treatment wetlands with different upstream wastewater treatment

Sarti, C., Souleymane, A.A., Dotro, G., Cincinelli, A. and Lyu, T., 2025. Journal of Water Process Engineering, 71, p107236.

Comprehensive strategies for the remediation of per- and polyfluoroalkyl substances (PFAS): mechanisms, technologies, and future perspectives

Thakur, A., Khusnutdinova, A.N., Navarro-Márquez, M., Kumar, V., Ma, H., Golyshin, P.N., Lyu, T., Yakunin, A.F., Kumar, G., Nithya, K. and Soto, G.G., 2025.Ecotoxicology and Environmental Safety, Vol306, Nov 2025, Article no. 119374.

Activity synopsis:

A 2020 POC project on *Enhancing PFASs Attenuation in Coastal Brownfield Soils* fed into a webinar, a journal paper and the EU H2020 EiCLAR project.

In 2024 EBNet funded a second POC on *Molecular docking and molecular dynamics simulations for assessing biodegradation of PFAS*, with multiple outputs disseminated throughout the community. This POC has received follow-on funding from Cranfield University and from the EBIC Hub, and contributed to other proposals (in review at time of writing). There has been a steady stream of workshop and conference presentations, with an EBNet Travel Bursary supporting an ECR to the IWA Young Water Professionals European Conference 2024. The WG has also produced a Position Statement on Addressing PFAS ‘*Forever Chemicals’ contamination in the Environment*.

I am an Environmental Biotechnologist because I am passionate about harnessing nature-based solutions for the virtuous management of wastewater.

Chiara Sarti, Cranfield University

Process Integration and Sustainability Assessment

Led by **Professor Jhuma Sadhukhan**, University of Surrey.

The goal of this WG is to create awareness of the tools and methodologies available to optimise from the unit process through to whole systems.

Even though a process may look promising at a laboratory scale, its scale-up can be challenging, as can its integration and optimisation. Sustainability assessment is necessary through life cycle (ISO 14040-44) and social responsibility analysis (ISO 26000) to ensure a process is sustainable across the scales (temporal: life cycle; spatial: supply chain).

Applying such tools will help researchers and practitioners provide convincing support for industrial uptake of technologies, and assist policy-makers through systematic evidence-based decision analysis.

I am an Environmental Biotechnologist because some of the most environmentally beneficial and cost-effective solutions come through utilising living systems.

Nicholas Davison, University of Reading

Activity synopsis:

A pair of webinars in 2022 and 2023 on *Life Cycle Assessment Tools and LCA for Biotechnology Problems* led into three oversubscribed 'live' workshops and training events for members. The first workshop, held at the University of Surrey, examined *LCA* for *the EBNet Industrial AD Community*. This was followed by two more events in 2024 – a workshop LCA for Practitioners and the *Industrial Community and a 3-day Training Course: LCA in Practice*.

This group also contributed to the Anaerobic Fermentation workshop in 2025. Prof Sadhukhan is now UK Lead for the **Global Center for Sustainable Bioproducts**

Biogas Beyond Boundaries: Novel Algebraic Equations for Global Warming Standardization in Anaerobic Digestion Systems with Critical Life Cycle Analyses

Zhang, R., Sadhukhan, J., Zhang, D., Short, M., McKechnie, J., Liu, Y., Bywater, A., Murali, R., Nnorom, M.A., Dolat, M. and Guo, B., 2014. Available at SSRN 4745165.

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., 2024. Available at SSRN 4837715.

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., Dominguillo, D., Torres-García, E. and Aburto, J., 2024. Journal of cleaner production, p.140386

Supporting the future - Early Career Researchers

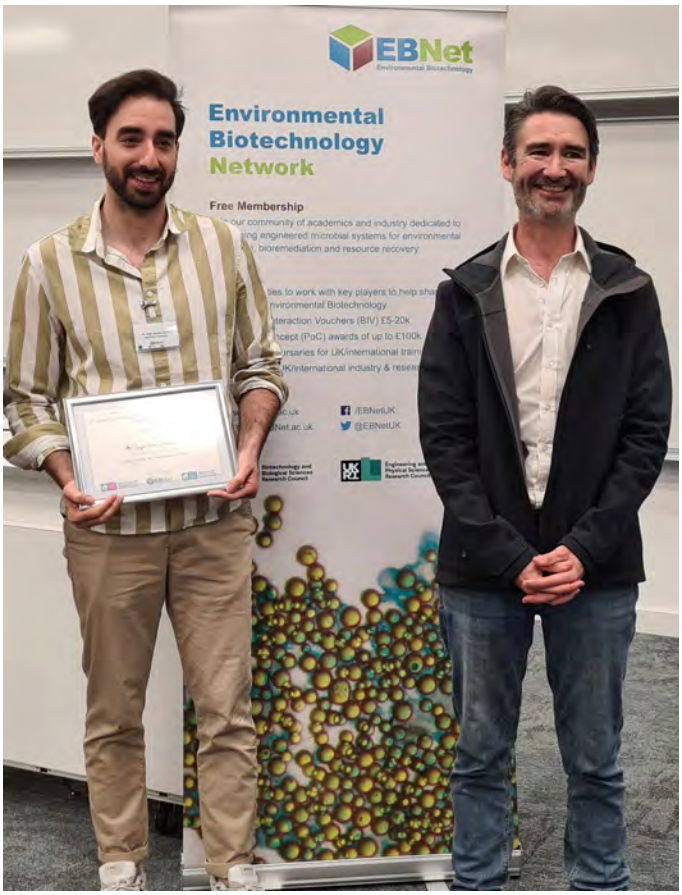
EBNet is proud to have had the chance to meet and support so many early career researchers (ECRs) with a genuine passion for Environmental Biotechnology. These are future leaders in training who will shape the direction of the field abroad and in the UK. We have offered grants to support their participation at more than 20 international conferences, allowing training and skills transfer and showcasing the work to the widest possible audience. Our annual 2/3-day summer ECR conference ran from 2019-2024. It showed steady growth over the years, doubling in size to the point of needing parallel sessions in its final year, where we finally broached the 100-delegate mark!

This was not a passive event: everyone attending contributed with presentations or posters, making it not only a great chance to network but also the best place to keep abreast of on-going work in research groups across the UK. Our thanks go to all the supporters and invited speakers for the prizes, site visits, career or industry-focussed keynote talks and workshops offered to the attendees. We benefited from some inspirational international speakers and thank them for generously sharing their time and experiences.

By participating in joint careers events with other NIBBs, we hope to have opened up the wider possibilities of a career in industrial biotechnology to our ECR members as they look towards the academic and commercial sectors for employment. Our ECR WG has done its part, creating several events and professional skills support workshops for all to access. EBNet even ventured into the world of social media by providing a hands-on video training workshop to support content creation by this new generation of science communicators.

This has to be the most welcoming, accessible, and inclusive conference I've been to. A really nice group of like-minded people

Deborah Hall



Annual ECR conference - ECR19 to ECR 24

2019 In-person, Sheffield Hallam University – 1-2 July

2020 Held online, all day, 25 June

2021 Held online from Monday, 28 June 2021 - Thursday, 1 July

2022 Jubilee Conference Centre, University of Nottingham - 12-14 September

2023 Edinburgh Conference Centre, Heriot-Watt University - 30 August - 1 September

2024 The Frederick Douglas Conference Centre, Newcastle University – 24-26 July

Early Career Researcher (ECR) Working Group

Led by **Dr Anjali Jayakumar**, Newcastle University.

The WG arose naturally from EBNet's inclusion of an ECR Scientific Committee to help behind the scenes at our ECR conferences. These ECR enthu

siasts were helpful, willing and provided thoughtful feedback and suggestions. But, limited by the 2/3-day conference format, we were initially unable to include all the 'extras' that they would have found useful.

The ECR WG wanted to create a supportive space for ECRs who work in environmental biotechnology to support, inspire, and empower each other. Specifically, this was an opportunity to bring together the geographically dispersed – as members were spread amongst different universities, departments, and disciplines across the UK.

Activity synopsis:

Career development is a top priority for ECR members, and the group led two webinars with invited speakers from academia and then industry to share experiences: *In Conversation with Environmental Biotechnologists Career Talk #1: Journeys of Academic Pursuits and In Conversation with Environmental Biotechnologists Career Talk #2: The Road from Academia to Industry.* They also organised a joint 2-day training workshop with the Institute of Water in Coventry: *The Next Wave: Skills Development for Emerging Professionals*. This involved facilitated skills sessions chosen by the ECRs. At ECR24 they also ran an afternoon masterclass on *Using LinkedIn for Professional Development* by a member of the group – to great acclaim.

EBNet also supported several joint events specifically targeting ECRs. These included the 2023 joint NIBB event: *Realising the potential of your ideas through partnership and funding,* the *2021 ECR Women in Water Conference* and the *2022 ECR People in Water Conference.*

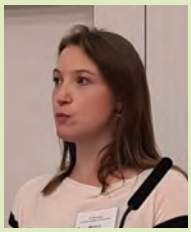
I am an Environmental Biotechnologist…

Part of the purpose of a network is to foster a shared sense of identity. The term Environmental Biotechnology may be defined in many ways – an issue highlighted in our **WG report** and **joint paper**. As part of our community-building efforts we encouraged attendees of our annual ECR conference to complete the sentence 'I am an Environmental Biotechnologist because…' in their own words.

Simultaneously we have been privileged to follow the career journeys of many people over the lifetime of the network. In counterpoint to the 'snapshots' from our ECRs, these professionals have developed their career paths over time in different directions. We hope these profiles offer a window into the activities of our diverse membership base.

I am an Environmental Biotechnologist because I am passionate about restoring contaminated soils. I believe that finding solutions to environmental problems today will create a better world for tomorrow.

Okelani Aworabhi,
Cranfield University



I work with microorganisms capable of degrading environmental pollutants such as plastics, pesticides and petrochemicals. My aim is to improve degradation efficiencies and enable the conversion of waste and pollutants into added-value products.

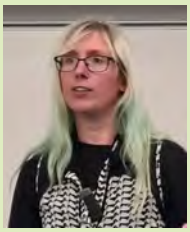
Alice Banks,
Imperial College London

My research aims at developing a sustainable process to treat industrial effluent from pulp and paper mills, which is rich in Lignin and harmful to the environment if released untreated into receiving waters.

Himani Taneja,
Canterbury Christ Church University

I work on anaerobic digestion of organic wastes to produce biogas and bio-fertiliser. My research aims to optimise dry digestion of high-solid organic wastes by engineering the percolate composition.

Nnenna Chukwuekezie,
Cranfield University



My job is all about generating awareness of brand new innovative and advanced analytical solutions and to steer these technologies from trial to implementation in the water industry.

Natalie Lamb,
Spring Innovation/University of Sheffield

I specialise in the production and recovery of valuable chemicals from wastes. I am an Environmental Biotechnologist because it allows me to help solve some of the most pressing concerns of our time.

Rhys Jon Jones,
University of South Wales

My work involves experimental and modelling evaluation of biochar in anaerobic digestion of food waste and biomethanation of hydrogen. As a researcher, I hope I can contribute to the future clean energy by improving methane yields in stable digestion processes.

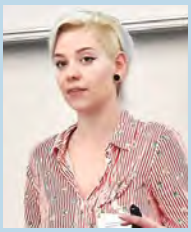
Wenjun Peng,
University of Sheffield

I aim to reduce the environmental impact of poultry litter by using anaerobic digestion, ammonia stripping and electro-coagulation to aggregate nitrogen, phosphates and potassium into a stable, bioavailable fertiliser.

Deborah Hall,
Harper Adams University

I believe we can harness the natural interaction of microbes and minerals to develop sustainable water treatment technologies targeting micro-pollutants, and that such low-carbon approaches are critical if we are to achieve net zero by 2050.

Maggie White,
Newcastle University



I am an Environmental Biotechnologist with a passion for using marine natural products to improve the environment from which they can be sourced. I work with oil-degrading marine bacteria, which in the right conditions can be used to help clean up oil spills and restore polluted environments.

Georgia Waldram,
Heriot-Watt University

My work aims to optimize microbial communities within biofilters, improving water treatment processes and ensuring safe and high-quality drinking water for communities worldwide.

Xiang Shi,
University of Glasgow

I work with environmental bacteria for sustainable and scalable outputs. Sometimes the environment itself has the solution, we just need to look thoughtfully!

Manpreet Bagga,
Newcastle University

My primary focus is the complex interplay between factors that affect the performance of wetlands in treating stormwater. I use sensors for monitoring and hybrid models and digital twinning for evaluation.

Chinedu Ekechukwu,
University of the West of England

I am an Environmental Biotechnologist working on polymer biodegradation. My ultimate goal is to protect the environment from plastic waste by substituting petro-based plastic with more sustainable bio-based materials.

Prabodhi Preethika Dehiwalage Dona, Newcastle University

I hope my research on marine bacteria will help replace our everyday personal care products with environmentally friendly compounds, helping to reduce pollution from wastewater treatment plants at its source.

Karen Fung, Heriot Watt University

I am an Environmental Biotechnologist because I think environmental stewardship is an important part of human flourishing. My work focuses on balancing the nitrogen cycle by implementing ANAMMOX bacteria into wastewater treatment. I use metabolic engineering to work out how we can apply and grow them better.

Roman Bielski, Loughborough University

I am passionate about using microorganisms to find innovative and green solutions for dealing with environmental pollution. I believe that through my work in this field, I can contribute to the development of sustainable practices that promote environmental protection.

Peirou Li, University of Exeter

I use bacteria to try to help solve some of the climate change issues our generation is facing. In particular, I engineer bacteria to improve biohydrogen yield, which could be a more sustainable alternative to traditional hydrogen production methods in future.

Kathleen Dunbar, University of Surrey

I'm passionate about using interdisciplinary research to develop solutions for environmental challenges. By using biotechnological approaches in collaborative teams, we can address major issues and create new opportunities for sustainable development, biodiversity conservation, and a healthier planet.

Sergio Serrano Blanco,
Newcastle University

I research micro-organisms that can be used to upgrade and valorise biomass and waste streams to useful chemicals, with an aim of replacing petrochemicals with bioderived ones.

Laura Martin,
University of Oxford

I am an Environmental Biotechnologist blending microbiology, water treatment, and engineering. This interdisciplinary approach allows me to connect diverse fields and apply them to real-world issues. For example, I am doing work on plastic degrading bacteria and new engineering approaches to improve sustainable water treatment.

Francis Hassard,
Cranfield University

I believe in the transformative power of science and technology to solve pressing environmental issues. My research interests focus on utilizing the latest technologies for net zero training, digital twinning, and immersive technologies in biotechnology research.

Zahid Iqbal,
Teesside University

I am an Environmental Biotechnologist working on applications in biophotoelectrochemistry to produce carbon-negative solar energy from cyanobacterium. Cyanobacteria both extract carbon dioxide from the atmosphere and generate high energy electrons from light, which can be utilised to power small electronic devices.

Nathan Wright,
QMUL

My current research centres on the conversion of spent coffee grounds (SCG) into valuable products using bio-electrochemical systems. With this research, I hope to contribute to sustainable waste management and address some environmental concerns caused by current SCG disposal methods.

Olaoye Oludotun,
University of Surrey

I am an environmental biotechnologist because I am interested in the circular economy of critical metals. My research aims to reduce harmful/energy intensive mining practices and enhance recovery of rare earth elements from waste sources using bioleaching.

Fiona Bunn,
The University of Edinburgh

The aim of my PhD project is to develop an understanding of how phosphorus dynamics - between the water, sediment and vegetated compartments of surface flow wetlands - can be manipulated to enable prediction of treatment performance and determine the compatibility of phosphorus removal with key co-benefits.

Ayisha Affo Souleymane,
Cranfield University

Career Journeys

Move over!

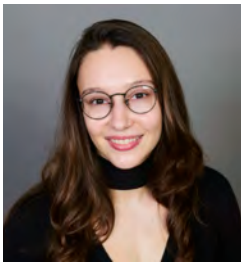
Dr Anjali Jayakumar joined EBNet as an Early Career Researcher based at the University of Edinburgh in 2020, one year after obtaining her PhD. With our return to live events, she promptly won ‘best presentation’ at the EBNet ECR Conference 2022, Nottingham, for her work on *Nature-based solutions for water treatment using Biologically Enhanced Biochar*. As an active volunteer for the annual ECR conference Scientific Committee it was a natural progression for Anjali to then lead the ECR Working Group. She has since organised numerous much appreciated support events and workshops for other ECRs working in EB whilst continuing to contribute behind the scenes with input into other arenas – like our Environmental Biotechnology and Social Sciences WG Report. She is now a Lecturer in Chemical Engineering at Newcastle University teaching and supervising the next generation of ECRs.

https://www.ncl.ac.uk/engineering/staff/profile/anjalijayakumar.html

Career development

Based at Northumbria University, Dr Angela Sherry joined EBNet as an Early Career Researcher in 2019. A year later she was the first recipient of our maximum level of research funding - a £100k cross-disciplinary award - for her project with Dr Jane Scott, Newcastle University on *Fibre Highways: translocation of the microbiome for pollutant bioremediation.* She then won ‘best presentation’ at the EBNet ECR conference in 2021.The research delivered a published paper, and then served as a platform for exhibitions, invited talks and follow-on bids. Her career blossomed and by 2023 she had moved from Senior Research Fellow to Associate Professor in Microbial Environments, currently supervising 3 PGRs.

https://www.northumbria.ac.uk/about-us/our-staff/s/angie-sherry/



Chance encounters

Dr Meredith Barr joined EBNet in 2023 after meeting our PI at a joint NIBB ECR event on: *Realising the potential of your ideas through partnership and funding*. Having impressed everyone with her enthusiasm she quickly set up our Biochars for Pollution Prevention Working Group and followed up with a webinar from top speakers, lab visits for members, and has represented us with a chaired session at WasteEng24 on Japan, making valuable international connections. Together with the rest of the Working Group she organised a joint 2-day workshop with BBNet to explore integration of thermal, thermochemical, and biological conversion technologies in waste biomass valorisation. As a new lecturer at London South Bank University (LSBU), she continues to devote time input into other EB initiatives.

https://researchportal.lsbu.ac.uk/en/persons/meredith-barr

Ongoing impact

As a senior Lecturer Dr James Chong was amongst the first to join the original 13 BBSRC NIBBs, starting as a management board member for biomolecular tools with the Anaerobic Digestion Network in 2014. His successful POC project *Shotgun metabolomics in anaerobic digestion* led to a realisation that bioinformatics would be crucial to unlocking the power of large datasets. Becoming a full Professor at the University of York in 2019, he joined EBNet, conducted research with Carbogenics Ltd via a Business Interaction Voucher award in 2020, and then set up the Bioinformatics Working Group organising webinars for EBNet members and sessions at the industry-focused European Biosolids conferences. Networking led to him becoming an Oracle for Research Fellow in 2023. All this fed into his successful Cloud-SPAN project to provide 'omics training for researchers. His research group, the Centre of Excellence for Anaerobic Digestion (CEAD), combines a suite of AD reactors with powerful computing resources to enable world-leading research of relevance to the wider water sector.

https://www.linkedin.com/in/james-chong-475570a/details/experience/

International Reach

Dr Zhugen Yang, Cranfield University, joined EBNet in 2020 – at a time when biosensors suddenly became a hot topic. In 2022 he won an EBNet POC award to work on *CRISPR/Cas-enabled paper-based sensors for rapid monitoring of antimicrobial resistance*. He then went on to form a highly active Working Group tackling the topic of Environmental Sensors and Wastewater Surveillance. Under this umbrella, he organised well-attended specialist webinars for our members with speakers from Spain, Australia, the USA, and organisations from across the UK. EBNet was happy to provide substantive support for him to host the Testing the Water 6 international conference in Oxford in 2023. Now a Professor, he followed this with a mini symposium that brought together more top speakers from the USA, China and Australia to meet their UK counterparts at Cranfield in 2024, and the Microfluidics and Sensing conference from 2025. Networking on an international scale!

https://www.cranfield.ac.uk/people/professor-zhugen-yang-23276478

The EBNet ECR Working Group was a safe space that enabled us to grow and thrive. The group also gave many of us the confidence to experiment, to take on responsibility on a larger stage, and to step beyond our comfort zones with the reassurance of genuine support.

Dr Anjali Jaykumar, ECR WG Lead

Reputation Building

Dr Sanjay Nagarajan has been an active member of two consecutive NIBBs. He first joined ADNet whilst still a research fellow at Queen's University Belfast and won ‘best poster’ first time around at the 2018 ECR conference. On joining EBNet, he stayed fully engaged with our annual conferences - participating over many years with posters and presentations, Later, as a valued Scientific Committee member hechaired sessions and assessed abstracts. In 2022 he moved to the University of Bath and joined the management board of our sister-NIBB, HVBNet. He is now deputy director of the Centre for Sustainable Energy Systems (CSES), putting his experience to good use on biorefineries.

https://researchportal.bath.ac.uk/en/persons/sanjay-nagarajan

Pathways to industry

Natalia Jawiarczyk joined EBNet in 2019 as an EngD Research Engineer based at Cranfield University. She won ‘best in session’ at the EBNet ECR Conference 2019, Sheffield for her presentation on Remediation of oil- rich wastewater: managing sewer Fat, Oil and Grease (FOG) deposits with bio- additive products. At the European FOG Summit 2021 she showcased her work to a large industry gathering. Whilst still a student at Cranfield she organised two highly successful conferences, part-sponsored by EBNet: the Early Career Women in Water Conference 2021 and the Early Career People in Water Conference 2022. Meanwhile, she was an active member of the ECR Scientific committee and the ECR Working Group, continuing to attend our conferences. Natalia has now taken her skills to Isle Utilities where she is a Technology Consultant delivering projects for water utilities and industrial clients globally. Here she continues to work on transforming decentralised power-to-methanol production via the UP-TO-ME consortium - an EU-funded project.

https://isleutilities.com/team-member/natalia-jawiarczyk/

Outputs and Impacts

Supported Research

EBNet has funded **Business Interaction Vouchers (BIV)** and **Proof of Concept (PoC)** awards through calls between 2020 and 2024. We also provided our ECR members with **Travel Bursaries** supporting conference attendance and placements.

BIV

BIV are intended to support interactions between academia and industry to research a specific industry need. Lasting up to 6 months, these awards required a matched funding contribution from industry in the form of 50/50 *in cash/ in kind* support. With up to £20k available we enabled 7 companies to connect and engage with relevant academic expertise.

POC

Our 14 Proof of Concept awards allocated £750k to novel or innovative research. With a success rate of around 15%, there was no shortage of good ideas to choose from. Drawing on the good will of a multitude of volunteer reviewers, and the expertise of our management board members, we were able to assess these in a series of funding calls open to all BBSRC-eligible academics in the UK. Our broad remit is reflected in the diverse array of funded projects. Three awards attracted our maximum level of funding at £100k:

Fibre Highways: translocation of the microbiome for pollutant bioremediation - a joint cross-disciplinary collaboration between Dr Angela Sherry, Northumbria University and Dr Jane Scott, Newcastle University which looked at translocation of the microbiome along 'fungal or fibre highways' to facilitate pollutant biodegradation.

Pure biomethane - rather than biogas - from a single waste stream – a joint cross-disciplinary collaboration between Dr Elizabeth Heidrich, Newcastle University and Dr Jan Dolfing, Northumbria University which combined anaerobic digestion with a bioelectrochemical reactor to separate gaseous products.

As a Network we are committed to reduce inequalities in the workplace. To ensure inclusion and safeguard the quality of funded research we worked to eliminate, wherever possible, opportunities for bias in our processes. With this in mind, EBNet moved to 'double-blind' reviewing for our 2022 Proof of Concept funding call. The purpose of a double-blind system is to remove identifiers from the decision-making process, leaving the scientific proposal to stand or fall on its merits. Our final fast-track 'wrap up' call focussed on small-scale/desk-based projects between £5-£25K and reverted to unblinded. **Outputs** from our earliest awards are now coming through in the form of publications and follow-on funding.

Mitigating N2O emission from wastewater treatment processes – a joint cross disciplinary collaboration between Dr Bing Guo, University of Surrey and Prof Tao Chen, University of Surrey which looked at the challenges facing mitigation of N2O emissions, e.g., monitoring and measurement, data quality, biological mechanisms, and understanding process factor impact and control points.

Funding Stories

Working with Industry - BIVs

Business Interaction Vouchers (BIV) aimed to encourage and support collaboration between academic and industrial partners. They were used to undertake a defined piece of work by the academic partner for the industrial partner. Awards up to £20k were made to the academic, and matched funds (at least 50% in cash) were sourced from the industry partner – making this a true collaboration.

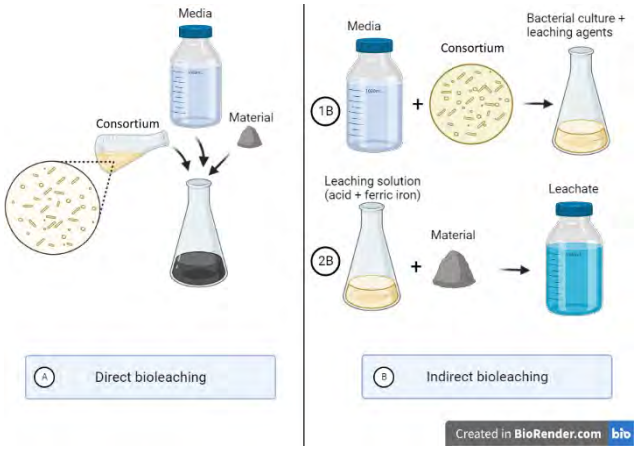
Funded Projects

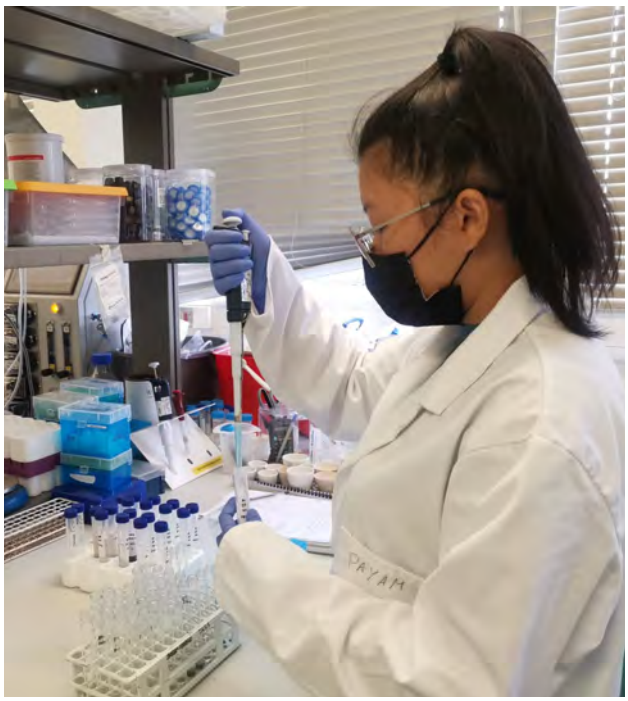
Feasibility study for the recovery of precious metals from incinerated bottom ash (IBA) using bioleaching technology

Professor Sebastien Farnaud, Coventry University / Fortis IBA Ltd.

Improving the accuracy, reliability and user experience of low-flow gas meters for research and development in anaerobic digestion and biotechnological processes

Dr Mark Walker, University of Hull / CJC Labs Ltd





Bioleaching application for the recovery of Minor and Rare Earth Metals from Complex Nickel Alloys Dust

Professor Sebastien Farnaud, Coventry University / Advanced Alloy Services Ltd.

Sludge dewaterability: improved tools for the emerging biotech industries

Dr Yue Zhang, University of Southampton / Triton Electronics Ltd.

Determination of microbial communities of laboratory anaerobic digestion tanks and impact of the CreChar additive on the microbial community dynamics

Prof James Chong, University of York/Dr Adam Ostrowski, Carbogenics Ltd

Understanding anaerobic biodegrability of organic menstrual care products: technical feasibility and sector receptivity

Dr Yadira Bajon Fernandez, Cranfield University/ Kimberley Dobney, Turn and Flow

Meeting the nutrient neutrality challenge using newly developed biological technology

Dr Yonqiang Liu, University of Southampton/ Adam White, Plantwork Systems Ltd

The BIV project has provided an invaluable opportunity to work closely with an academic partner in both progressing our understanding and optimising performance of our unique BNR technology.

Adam White,
Plantwork Systems Ltd

Scientific Exploration – POCs

Our Proof of Concept awards (PoC) supported academic research and were allocated via a series of annual open calls with funding from £25k to £100k. They were used to investigate exciting new concepts with a view to create a launchpad for future development of the ideas and technologies.

Funded Projects

Elucidating mechanisms of bacterial adsorption to biochar by 3D X-ray image analysis

Dr Meredith Rose Barr, London South Bank University

Molecular docking and molecular dynamics simulations for assessing biodegradation of PFAS

Dr Tao Lyu, Cranfield University

Simultaneous Bioremediation of Nutrient Pollution and Carbon Fixation Through a Novel, Integrated Anammox and Acetogens-Based Bio-Electrochemical System

Dr Ahsan Islam, University of Loughborough

Mitigating N2O emission from wastewater treatment processes

Prof Bing Guo, University of Surrey

Pure biomethane – rather than biogas – from a single waste stream

Dr Elizabeth Heidrich, Newcastle University

CRISPR/Cas-enabled paper-based sensors for rapid monitoring of antimicrobial resistance

Prof Zhugen Yang, Cranfield University

Faecal pollution source tracking and quantitative microbial risk assessment methods for a suitcase laboratory

Prof David Werner, Newcastle University

Bio-engineering of water biofilter communities for enhanced degradation of DOM

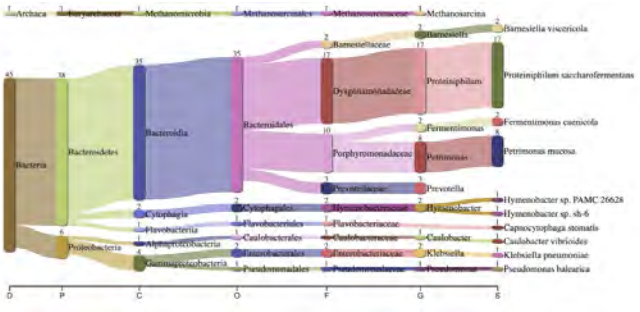
Dr Marta Vignola, University of Glasgow

Real time monitoring of Anaerobic Digestion microbial community as a foaming risk prediction method

Dr Dana Ofiteru, Newcastle University

Fluorescent Microbiofilter Assay for Rapid Real-time Monitoring of Organic Micropollutants Biodegradation

Dr Caroline Gauchotte-Lindsay, University of Glasgow



Enhancing PFASs Attenuation in Coastal brownfield Soils (EPACS): enhancing natural system attenuation capacity for a key emerging contaminant

Prof Andy Cundy, University of Southampton

Bio-engineering of biochar for enhanced remediation of contaminated land

Prof Tony Gutierrez, Heriot Watt University

Fibre Highways: translocation of the microbiome for pollutant bioremediation

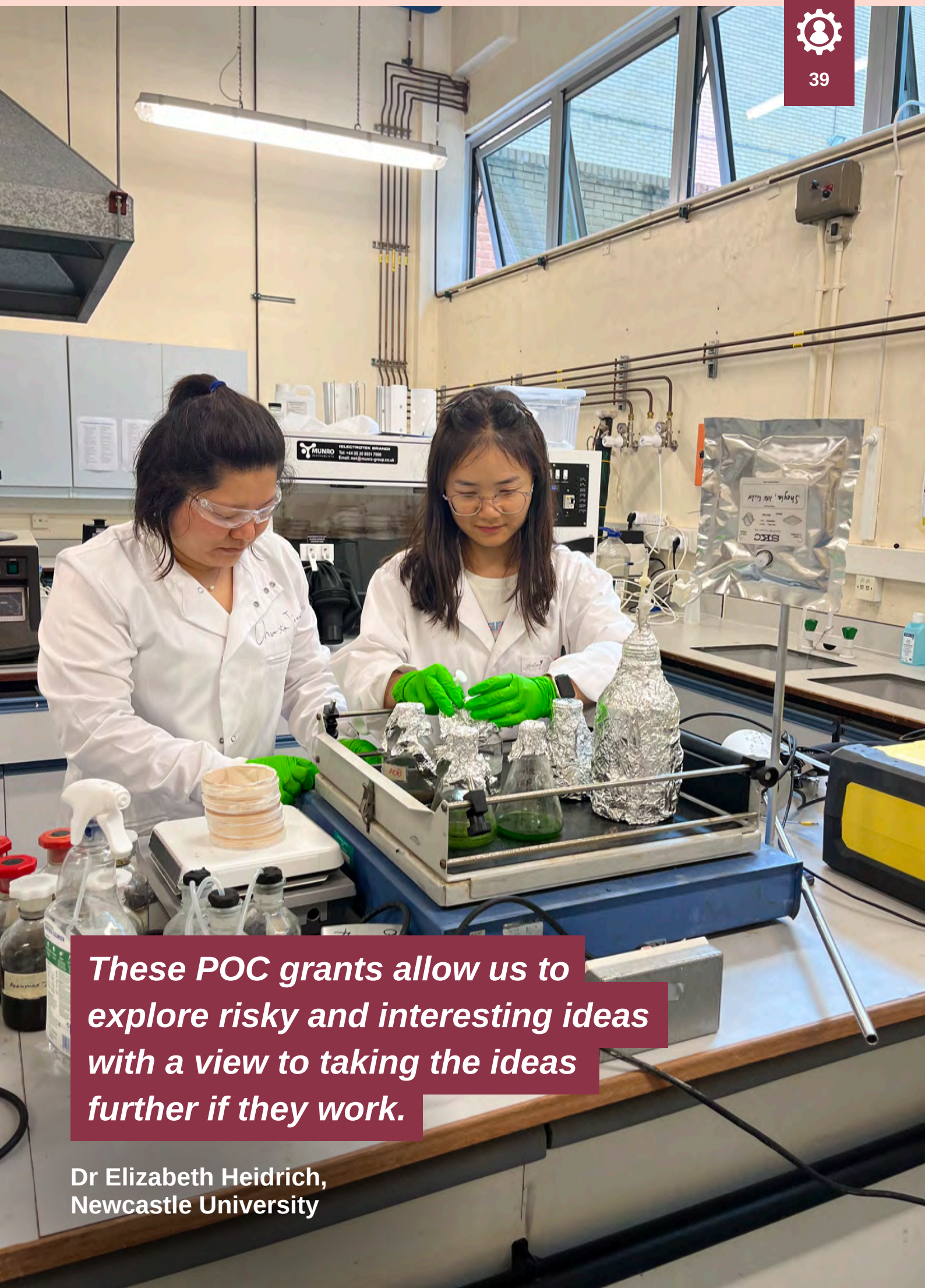
Dr Angela Sherry, Northumbria University

Development of a monooxygenase gene-based assay to characterise 1,4-dioxane bioremediation potential

Dr Simon Gregory, British Geological Survey

This new method provides a way of characterising the diversity of SDIMO genes present in samples from contaminated sites.

Dr Simon Gregory,
British Geological Survey



These POC grants allow us to explore risky and interesting ideas with a view to taking the ideas further if they work.

Dr Elizabeth Heidrich,
Newcastle University

Travel Bursaries

Travel bursaries were always available to support oral presentations at international conferences and to enable attendance at relevant UK events. Communication is an important foundational skill for all Early Career Researchers, and we have provided free access to hands-on and virtual video training such as the EBNet Video Training 2024 (webinar and workshop, plus **online materials**). We've created multiple opportunities to present within the Network (via webinars and our 6 annual ECR conferences), with further support to showcase work at various respected conferences: FEMS, ISME, IWA (various), AquaConSoil etc. See **Outcomes** for some of these activities.

Find out more
https://ebnet.ac.uk/funding/ecr-travel-bursary/

Bursaries, placements and SWAPs

I am an Environmental Biotechnologist because I want to contribute to create a clean and sustainable future. My biosensors for wastewater analysis will be helpful to optimise treatment processes: more clean water with less energy!

Anna Salvian, University of Surrey

I use the ability of microorganisms found in the environment to extract metals from minerals and for metals bioremediation. I am also interested in finding new extremophiles (microbes that love living in harsh conditions) that can have other biotechnological applications such as the production of extremozymes.

Carmen Falagan, University of Portsmouth

I am an Environmental Biotechnologist because I need to fulfil the intrinsic desire to contribute keeping our planet safe for everyone to inhabit. I strive to ensure access to clean and safe water, through my research on antimicrobial resistance in sewer pipelines and wastewater treatment plant facilities.

Stella Christou, University of Surrey

I want to make a difference in the way value is extracted from waste biomass, by maximising its utilisation leading to process circularity.

Sanjay Nagarajan, University of Bath

Reports, videos and more
https://ebnet.ac.uk/outcomes/

Events

It's hard to remember when webinars weren't a thing, but we only started them back in 2020 as a stopgap measure! EBNet has since run **over 30** of these, with single or multiple invited speakers from across the UK and around the world. Our thanks to everyone who has contributed to sharing their knowledge freely amongst the wider Environmental Biotechnology community. Wherever possible, recordings are made available online at our **YouTube channel**.

But nothing beats meeting people face-to-face. We brought our community together with an array of top research at our inaugural **Research Colloquium** in Edinburgh, 22-23 January 2020. Thereafter we have held ECR and WG events plus numerous joint activities with our sister-NIBBs. And we have been a presence making contacts at numerous water and waste industry events e.g. ADBA, REA, AquaEnviro, the European FOG summit etc.

EBNet & Algae-UK: Recent developments in the field of carbon capture, commercial development and integrated systems, 9 Oct 2019, London

E3B & EBNet: Metal biorecovery and bioremediation, 28-29 Nov 2019, Manchester

Algae-UK, BBNet & EBNet: Sargassum golden tides: a global problem, 26 May 2021, online

BBNet, HVB, EBNet & Supergen Bioenergy Hub: Realising the potential of your ideas through partnership and funding, 10-11 October 2023, Sheffield

E3B & EBNet: Bio-recovery of technology-relevant metals, 12-14 December 2023, Manchester

EBNet & Carbon Recycling Network: Microbial systems with gaseous feedstocks, 27-28 March 2024, Cheshire.

BBNet, HVB, EBNet & Supergen Bioenergy Hub: An introduction to life cycle assessment (LCA) methodology course, 26–27 November 2024, York

BBNet & EBNet: The role of anaerobic fermentation in the circular bio-economy, 23-24 January 2025, Birmingham

BBNet & EBNet: Integration of thermal and biological conversion technologies workshop, 24 February 2025, London

EBIC Environmental Biotechnology Innovation Centre

We attended the launch meeting of the **Environmental Biotechnology Innovation Centre (EBIC)** – a world-class interdisciplinary engineering biology research hub – which will continue to develop and extend EBNet's activities for the next 5 years.

Launched In March 2024, EBIC is a new partnership which involves a new centre led by Cranfield University which involve research collaborations between 10 academic institutions from across the UK and 30 associated partners. EBIC aims to enable the responsible and safe scale up cutting-edge techniques from synthetic biology, biotechnology, computation modelling and engineering science to develop innovative solutions in bioengineering and bioremediation of air, soils and air systems. Through collaborative efforts and innovative approaches, EBIC strives to address environmental challenges and foster sustainable solutions for the benefit of society.

Resources

Animations

To help illustrate Microbiology/Engineering Interactions, we have 5 new animations to enjoy on **YouTube** – as well as the original *What is Environmental Microbiology?*

Articles

EBNet has contributed many articles for various targeted audiences with dissemination primarily via *AD & Bioresources News* and also the *Water Industry Journal*. A major undertaking was the Royal Agricultural Society of England (RASE) Report – *Farm of the Future: Journey to Net Zero*.

Books

Our FREE e-book anthology **'Microbes to the Rescue!'** can be downloaded **HERE**. The Audiobook is available **HERE**.

Suitable for outreach and education activities, this anthology contains a variety of short stories that were entered into our **EBNet/Green Stories writing competition**. The stories cover a wide range of topics in Environmental Biotechnology in an entertaining and accessible way. Made available under a CC licence, we encourage you to share and use the book for non-commercial activity; remember to attribute the authors!

And a new anthology, **'Stories from the Microbial World'**, is available **here**. The anthology presents 23 short stories selected from winning stories from the Green Stories competition 'Microbes to the Rescue' sponsored by EBNet, and the 'Clean vs Green' competition, which similarly uses fiction to tackle myths and misconceptions about bacteria. The goal was to raise awareness of the environmental and health implications of over-cleaning.

Reports and Position Statements

Representing the EB community is multifaceted. Responding to various sector surveys was one way we made sure that the voice of the community was heard. In addition, we encouraged outputs from our many workshops, and supported impact in the form of reports, position statements and other communications. You can find more details online at **Resources**.

What Is Environmental Biotechnology? Although Widely Applied, a Clear Definition of the Term Is Still Needed

Heaven, S., Kusch-Brandt, S., Byfield, L., Bywater, A., Coulon, F., Curtis, T., Gutierrez, T., Higson, A. and Sadhukhan, J., 2025. Environments, 12(10), p.393.

Find out more
https://ebnet.ac.uk/resources/

Further selected publications arising from EBNet support

For more publications see also preceding pages:

POC202311
Progresses and challenges of engineering thermophilic acetogenic cell factories.

Bourgade, B. and Islam, M.A., 2024. Frontiers in Microbiology, 15, p.1476253

POC202106
Differential utilisation of dissolved organic matter compound fractions by different biofilter microbial communities.

Vignola, M., Lenselink, J., Quinn, D., Ijaz, U.Z., Pereira, R., Sloan, W.T., Connelly, S., Moore, G., Gauchotte-Lindsay, C. and Smith, C.J., 2023. AQUA—Water Infrastructure, Ecosystems and Society, 72(10), pp.1837-1851.

POC202015
Biohybrids: Textile fibres provide scaffolds and highways for microbial translocation.

Sherry, A., Dell'Agnese, B.M. and Scott, J., 2023 . Frontiers in Bioengineering and Biotechnology, 11, p.1188965.

POC202008
Challenges and opportunities for low-carbon remediation in the Niger Delta: towards sustainable environmental management.

Azuazu, I.N., Sam, K., Campo, P. and Coulon, F., 2023. Science of the Total Environment, p.165739.

Efficacy of bioamendments in reducing the influence of salinity on the bioremediation of oil-contaminated soil.

Atai, E., Jumbo, R.B., Cowley, T., Azuazu, I., Coulon, F. and Pawlett, M., 2023.. Science of the Total Environment, 892, p.164720.

Bioengineering remediation of former industrial sites contaminated with chemical mixtures.

Atai, E., Jumbo, R.B., Andrews, R., Cowley, T., Azuazu, I., Coulon, F. and Pawlett, M., 2023. Journal of Hazardous Materials Advances, 10, p.100319.

Evaluating different soil amendments as bioremediation strategy for wetland soil contaminated by crude oil.

Jumbo, R.B., Coulon, F., Cowley, T., Azuazu, I., Atai, E., Bortone, I. and Jiang, Y., 2022.. Sustainability, 14(24), p.16568.

POC202001
Assessing the role of the "estuarine filter" for emerging contaminants: pharmaceuticals, perfluoroalkyl compounds and plasticisers in sediment cores from two contrasting systems in the southern UK

Celis-Hernandez, O., Cundy, A.B., Croudace, I.W., Ward, R.D., Busquets, R. and Wilkinson, J.L., 2021. Water research, 189, p.116610.

BIV202004

Hydroxyapatite precipitation and accumulation in granules and its effects on activity and stability of partial nitrifying granules at moderate and high temperatures

Liu, Y.Q. and Cinquepalmi, S., 2021. Processes, 9(10), p.1710.

BIV202002

An exploratory study of the impact and potential of menstrual hygiene management waste in the UK

Blair, L.A.G., Bajón-Fernández, Y. and Villa, R., 2022. Cleaner Engineering and Technology, 7, p.100435.

AD WG

A critical systems thinking methodology to explore circularity of food waste in a university campus.

Córdoba-Pachón, J.R., Paucar-Caceres, A., Burrowes-Cromwell, T., Bywater, A., Shah, R., Walker, M. and Behzadian, K., 2026. A critical systems thinking methodology to explore circularity of food waste in a university campus. Journal of the Operational Research Society, 77(1), pp.370-389.

Exploring farm anaerobic digester economic viability in a time of policy change in the UK.

Bywater, A. and Kusch-Brandt, S., 2022. Processes, 10(2), p.212.

Potential for biomethanisation of CO2 from anaerobic digestion of organic wastes in the United Kingdom.

Bywater, A., Heaven, S., Zhang, Y. and Banks, C.J., 2022. Processes, 10(6), p.1202.

Biochar and PISA WGs

Stakeholder Priorities for Integrating Thermal, Thermochemical, and Biological Conversion Technologies: a Café Delphi Workshop with Industry Panel Analysis

Barr, Meredith, Mark Gronnow, and Jhuma Sadhukhan. In *Thermochemical, and Biological Conversion Technologies (March 24, 2026).*

ESWS EG

Targeted Enrichment of Nucleic Acid Bionic Arms Enhances the Hydrolysis Activity of Nanozymes for Degradation and Real-Time Monitoring of Organophosphorus Pesticides in Water.

Zhou, J., Xiong, D., Zhang, H., Xiao, J., Huang, R., Qiao, Z., Yang, Z. and Zhang, Z., 2025. Environmental Science & Technology.

N2O WG

Activated carbon amendment of sand in the base of a permeable pavement reduces total nitrogen and nitrate leaching.

Zan, R., Stirling, R., Blackburn, A., Walsh, C. and Werner, D., 2024. Science of the Total Environment, 931, p.172831.

PFAS WG

Constructed wetlands as nature-based solutions in managing per-and poly-fluoroalkyl substances (PFAS): Evidence, mechanisms, and modelling.

Savvidou, P., Dotro, G., Campo, P., Coulon, F. and Lyu, T., 2024. Science of the Total Environment, 934, p.173237.

Theme 1

Sub-Arctic bacterioplankton in-situ response to crude oil and identification of the oil-degrading community by DNA-SIP and cultivation.

Gutierrez, T., Angelova, A., Summers, S., Waldram, G., Ijazd, U. and Gallego, A., Available at SSRN 5810052.

Investigating the influence of sulphur amendment and temperature on microbial activity in bioremediation of diesel-contaminated soil.

Delanau, C., Aspray, T., Pawlett, M. and Coulon, F., 2024. Heliyon, 10(9).

Theme 2

Engineering biology applications for environmental solutions: potential and challenges.

Lea-Smith, D.J., Hassard, F., Coulon, F., Partridge, N., Horsfall, L., Parker, K.D., Smith, R.D., McCarthy, R.R., McKew, B., Gutierrez, T. and Kumar, V., 2025. Nature Communications, 16(1), p.3538.

Intensified microalgae production and development of microbial communities on suspended carriers and municipal wastewater.

Serrano-Blanco, S., Zan, R., Harvey, A.P. and Velasquez-Orta, S.B., 2024. Journal of Environmental Management, 370, p.122717.

Temperature effects of MD on municipal wastewater treatment in an integrated forward osmosis and membrane distillation process.

Almoalimi, K., Liu, Y.Q., Booth, A. and Heo, S., 2022. Processes, 10(2), p.355.

Theme 3

Biological wastes and the circular economy: Not yet where we could be.

Kusch-Brandt, S. and Heaven, S., 2025. Waste Management & Research, 43(3), pp.293-296.

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.

The EBNet Team

The Executive Board is responsible for delivery of the Network aims, while management team, comprising representatives from CL:AIRE, CIWM, Fiberight Ltd, Biogen Ltd, WSP, Severn Trent Water, Thames Water, NNFCC and others, guide priorities, shape strategy, and assess applications for funds. An International Advisory Group provides further expertise, advice and a pool of expert referees.

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