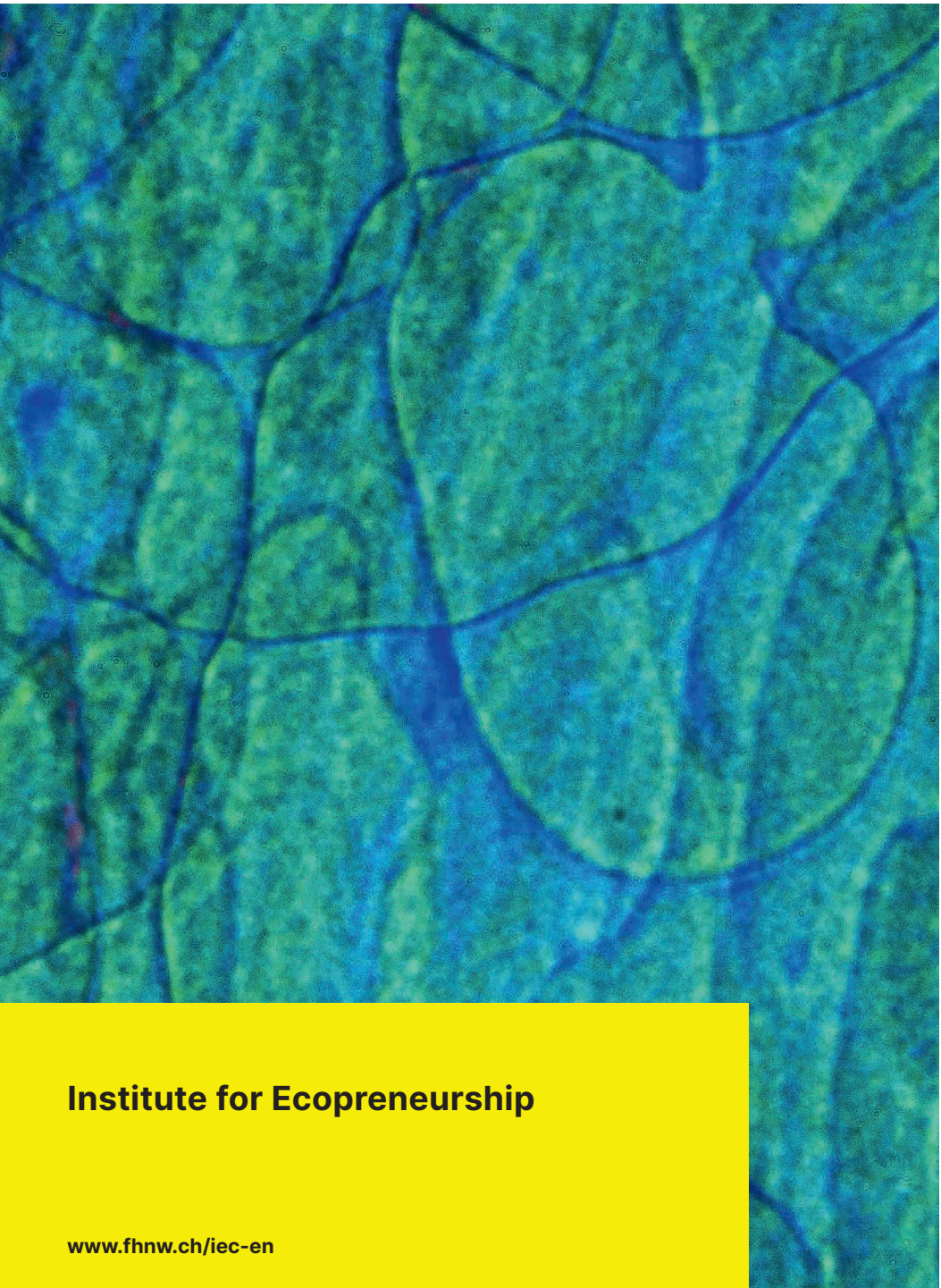
University of Applied Sciences and Arts Northwestern Switzerland
School of Life Sciences



Institute for Ecopreneurship

www.fhnw.ch/iec-en

Institute for Ecopreneurship

Understanding the environmental effects of human activities and minimising their impact

The Institute for Ecopreneurship conducts research in applied environmental science, environmental technology and circularity. We analyse current ecological challenges and develop measures to preserve and improve the quality of the environment. We contribute to the transition towards a circular economy by improving existing processes and developing new ones.

Our work is interdisciplinary, combining biology, chemistry and process engineering, which we apply at different scales.

Our applied research includes high-tech solutions to reduce emissions and recover valuable raw materials. We also design concepts and optimise processes for resource-efficient production, and evaluate the effect of substances and processes on the environment using ecotoxicology and life cycle analyses.

We are a reliable, innovative R&D partner with highly specialised expertise, close contacts with industry and authorities, and wide-ranging international networks. Our teaching benefits directly from these strengths.

Research fields

Resource scarcity, environmental pollution, antibiotic resistance, loss of biodiversity and climate change are growing challenges for humankind. To address them, we focus on environmental protection and improvement, and on closing material cycles toward a circular economy. Our research fields reflect the breadth of these topics and offer an interdisciplinary interface within the School of Life Sciences and to other schools at the FHNW.

Environmental and water technologies

Standards for how we treat drinking water, ground water and wastewater are becoming ever stricter. Processes using oxidation, adsorption, membrane systems, or combinations of these can largely remove pollutants and impurities. We develop holistic strategies and planning instruments for sustainable water use and reuse to help balance the demands of water consumption and protection.

Water, sanitation and hygiene (WASH)

WASH services in many low- and middle-income countries need enhancement. To achieve this, we integrate laboratory research, field testing and social sciences in close partnership with implementing organisations and local universities. One example of our work is the development and deployment of an innovative membrane-based handwashing station for water recycling in Mali, Burkina Faso and Nigeria.

Applied circular economy

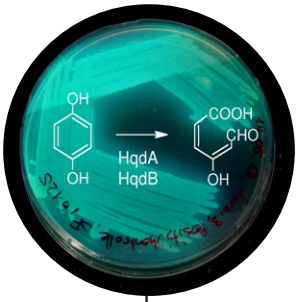
(Bio)hydrometallurgical processes use acidic, basic or complex-forming aqueous solutions to recover raw materials from secondary sources. We apply these processes to recover valuable materials from industrial waste, while ensuring minimal impact on the environment.

Sustainable chemistry

Research questions surrounding sustainable chemistry are diverse and affect a multitude of industry sectors. Our work includes applying advanced oxidation processes (AOPs) to water treatment, the elimination of PFAS (so-called forever chemicals) using adsorption technologies, and the microbial degradation of harmful organic compounds.

Sustainable resource management

Sustainable resource management seeks solutions for the intelligent sourcing and use of resources such as water, energy and raw materials, to promote and advance a circular economy.



Environmental biochemistry and biotechnology

Microorganisms and enzymes play a central role in resource exploitation and pollutant degradation. To take advantage of their potential in environmental biotechnology, we isolate microorganisms and enzymes and put them to work on bioremediation or biosynthesis.

Ecotoxicology

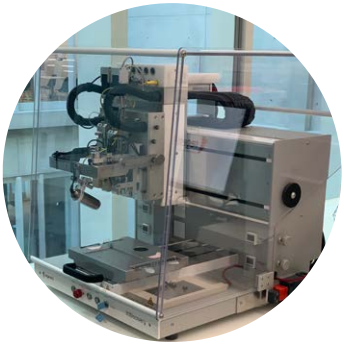
We study the effects of environmentally hazardous substances or environmental samples on plants and animals, using test systems like in vitro cell cultures or target organisms such as water fleas, zebrafish or bees. For example, we detect the molecular effects of pesticides on the brains of honeybees by gene expression analysis.

Infrastructure

We offer our collaborators a wide range of modern infrastructure for laboratory and pilot scale experiments, along with state-of-the-art analytic capabilities.

Experimental infrastructure

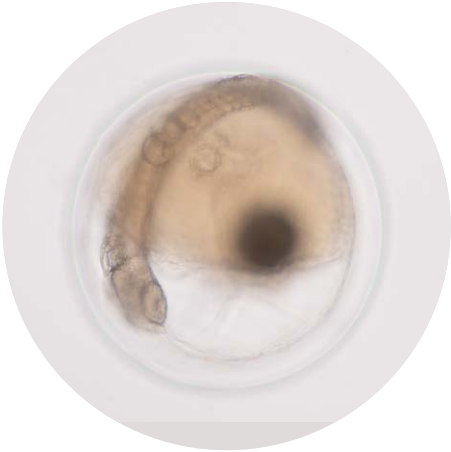
- Membrane test stands and test cells for micro-, ultra- and nanofiltration and reverse osmosis
- Process Technology Centre (PTC) with various wastewater treatment plants, filtration systems, aerobic and anaerobic membrane bioreactors, neutralisation systems, and an ozone plant
- Thermal separation process plant with rectification columns, evaporators, chemical synthesis reactor up to 100 L
- In vivo ecotoxicological biotests: exposure analyses with algae, daphnia and fish; flow-through system for fish exposure; fish embryotoxicity, acute and chronic toxicity of invertebrates in online biomonitoring systems
- In vitro ecotoxicological bioassays: bioassays, cell culture assays and gene expression analysis



Analytical infrastructure

- Molecular biology detection methods: quantitative PCR, next-generation sequencing platforms, electrophoresis
- Biochemical methods: protein chromatography, Western blot
- High-resolution chromatography and spectrometry for organic and inorganic analysis: LC, LC-OCD, QQQ and IonTrap LC-MS^n, UPLC-QTOF, GC-MS, LC-QQQ-ICP-MS, ICP-OES, NMR
- Radioisotope analysis: ^{14}C and ^{3}H, liquid scintillation, autoradiography, HPLC with liquid scintillation detector, sample oxidiser
- Water chemical analysis and environmental analysis: sum parameters such as BOD5, COD, TP, TN, TOC, and methane yield
- Microbiology lab: S2 work, flow cytometry, anaerobic glove box, multi-parallel bioreactors
- Physical and chemical solid or surface characterisation: µXRF, XRF, TOC, TGA, ESEM-EDX

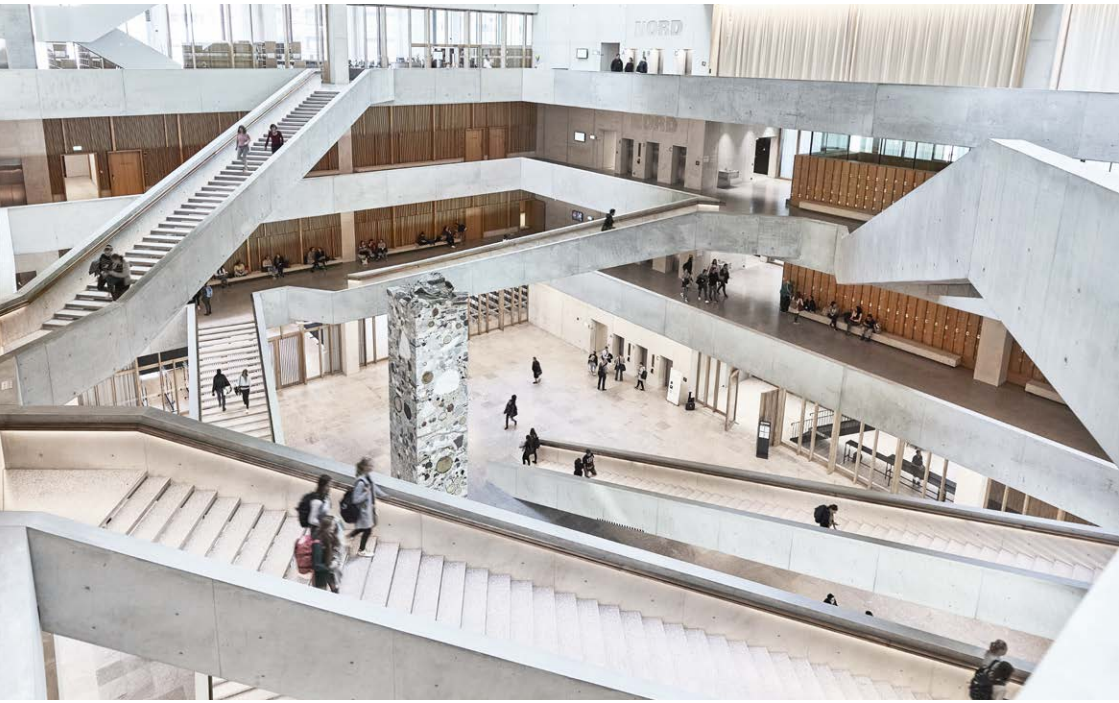
Applied research
- Process piloting
- Process evaluation
- Ecotoxicological in vivo and in vitro effect studies
- Microbiome analysis
- Metabolism studies and degradation tests
- Metal speciation
- Enzyme characterisation
- Risk assessment
- Sustainability assessment
- Life cycle assessment and cost-effect analysis



Services
- Environmental consulting for industry
- Training
- Analytical services

Continuing education
Master of Advanced Studies (MAS) in Environmental Sustainability and Innovation:
- CAS Sustainable Transformation, Ethics and Society
- CAS Planetary Health und Sustainable Healthcare
- CAS Sustainable Production and Processes
- CAS Sustainable Management
- CAS Environmental Law and Enforcement

FHNW School of Life Sciences



At the FHNW Campus in the heart of Europe's largest life sciences region, the School of Life Sciences performs cutting-edge research for a better future. State-of-the-art infrastructure and equipment, including a new Process Technology Centre, enable our researchers and industry partners to work together to develop new technologies and products from concept to market.

The campus has an ideal location close to public transport and with a view over Basel. In addition to the School of Life Sciences, the FHNW Campus Muttenz houses the Schools of Architecture, Construction and Geomatics, Education, Social Work, and Engineering and Environment, where around 4500 people study and work.

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For further information about our research fields:
www.fhnw.ch/iec-en

The FHNW incorporates ten schools:

- FHNW School of Applied Psychology
- FHNW School of Architecture, Construction and Geomatics
- FHNW Academy of Art and Design
- FHNW School of Computer Science
- **FHNW School of Life Sciences**
- FHNW Academy of Music
- FHNW School of Education
- FHNW School of Social Work
- FHNW School of Engineering and Environment
- FHNW School of Business

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