OPPORTUNITIES FOR COLLABORATION

EiCLaR would like to collaborate with site owners and operators (Private or Public), developers, solution providers, regulators.

DESK STUDY APPRAISALS

Sites for desk-based remedial option appraisal comparing EiCLaR technologies with current remediation options in terms of technical suitability, risk management performance and sustainability.

TEST MATERIALS

Materials from problem sites, such as groundwaters or solids, for bench scale testing with EiCLaR technologies.

FIELD SITES

EiCLaR has a series of field sites for proof-of-concept studies, which may be extended.

PIPELINE SITES

Sites for upscaling and further development towards commercialisation and practical market entry.

For further information or to express interest in collaborating, please contact:

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PARTNERS

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r3 Environmental Technology Ltd, UK

TZW: DVGW-Technologiezentrum Wasser, Germany

VEGAS: Research Facility for Subsurface Remediation, University of Stuttgart, Germany

Photon Water Technology s. r. o., Czech Republic

Luleå University of Technology, Sweden

Technical University of Liberec, Czech Republic

SPAQUE, Belgium

CL:AIRE, UK

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BoSS Consult GmbH, Germany

SERPOL SA, France

EKOGRID Oy, Finland

Institute of Soil Science, Chinese Academy of Sciences, P. R. China

Shanghai Jiao Tong University, P. R. China

Zhejiang University, P. R. China

China University of Geosciences, P. R. China

Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, P. R. China

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EiCLaR

Enhanced and Innovative *in situ* Biotechnologies for Contaminated Land Remediation

www.EiCLaR.org

ABOUT EiCLaR

Enhanced and Innovative *In Situ* Biotechnologies for Contaminated Land Remediation (EiCLaR) is a project funded by the EU and China. It was launched on 1st January 2021, is composed of 13 EU and 5 Chinese partners and will run for 4 years.

The project is being coordinated by Professor Timothy M. Vogel at Ecole Centrale de Lyon and Professor Xin Song at the Institute of Soil Science, Chinese Academy of Sciences.

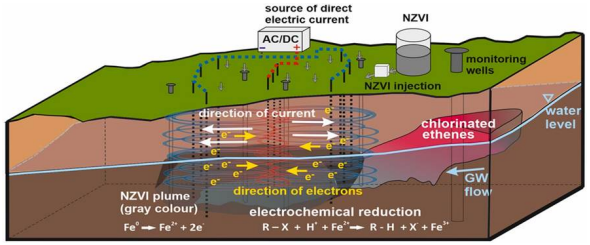
EiCLaR will develop scientific and technical innovations for *in situ* bioremediation technologies that will be directly developed into industrial processes for the rapid, efficient, cost-effective treatment of a range of environmental pollutants (chlorinated solvents, heavy metals, hydrocarbons).

These technologies will expand their range of applications to industrial sites that contain complex, high concentration pollutant mixtures:

- electro-nanobioremediation
- monitored bioaugmentation
- bioelectrochemical remediation
- enhanced phytoremediation

ELECTRO-NANOBIOREMEDIATION

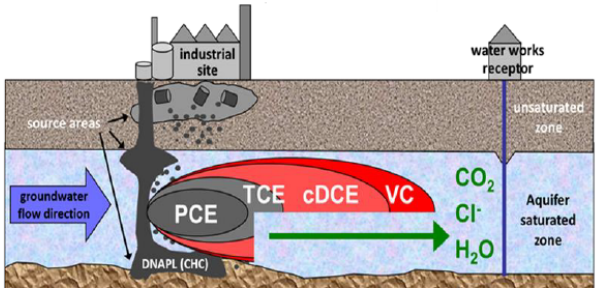
Nanoremediation is the use of nanomaterials, often iron nanoparticles, for contaminated site remediation. Nanoscale zero-valent iron (nZVI) particles possess several limitations, such as short-term reactivity and also rapid aggregation, that negatively affects their lifetime, reactivity and mobility. To overcome this, different surface modifications and methods of application of nZVI particles may be used to increase their contact with contaminants. A recent innovation by EiCLaR partners has been the combination of nano-scale and/or micro scale ZVI with applied electrokinetic (EK) treatment for extended lifetimes and microbial degradation for synergistic effects.



https://www.sciencedirect.com/science/article/abs/pii/S2213343721011015

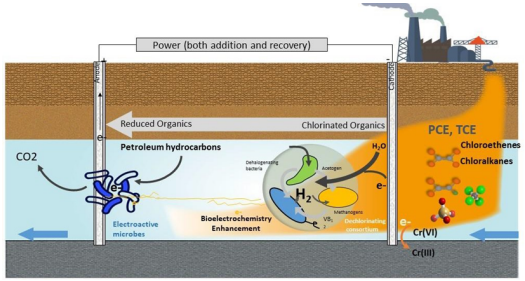
MONITORED BIOAUGMENTATION

Aerobic metabolic degradation represents a new and promising concept for removing contaminants from the subsurface environment for improving groundwater quality. Aerobic chloroethene biodegradation can occur under natural conditions or after addition of oxygen both *in situ* or in *ex situ* engineered approaches (e.g. in bioreactors or biological activated carbon). EiCLaR's technology deploys genomics-based validation of bioaugmentation.



BIOELECTROCHEMICAL REMEDIATION

Microbial bioelectrochemical systems are electrochemical devices and/or applications in which an anode and a cathode favour redox-reactions that are catalysed by microorganisms. The biocatalytic principle of a bioelectrochemical system contributes to enhance thermodynamically favourable or drive thermodynamically unfavourable reactions and can thus be an alternative electron acceptor for improving hydrocarbon removal, an electron donor for reductive dechlorination and metal reduction. In the EiCLaR project, the optimisation and validation of bioelectrochemical remediation for aromatic hydrocarbon mixtures, hexavalent chromium and chlorinated solvents in soil and groundwater will be conducted to develop the key operating parameters for field applications.



ENHANCED PHYTOREMEDIATION

EiCLaR is promoting a successful phytoremediation approach by exploiting the synergistic interactions between plants, microorganisms and/or mycorrhizae to completely degrade or immobilise contaminants *in situ*. EiCLaR's phytoremediation technology is enhanced by the delivery of bioremediation via arbuscular mycorrhizal fungi (AMF); and the use of electric fields for degradation/ immobilisation of contaminants, while facilitating nutrient distribution and mitigating root inhibition by contaminants.