EiCLaR bulletin

CL:AIRE's EiCLaR bulletins describe *in situ* bioremediation technology developments and tools created within the EiCLaR project. This bulletin provides an overview of the EiCLaR project.

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Enhanced and Innovative *In Situ* Biotechnologies for Contaminated Land Remediation - a project overview

1. INTRODUCTION

Enhanced and Innovative *In Situ* Biotechnologies for Contaminated Land Remediation (EiCLaR) was a project funded by the EU and China. It ran from January 2021 until the end of 2024 and was composed of the 13 EU and 5 Chinese partners listed in Table 1.

The project was coordinated by Professor Timothy M. Vogel at the French National Centre for Scientific Research and Professor Xin Song at the Institute of Soil Science, Chinese Academy of Sciences. EiCLaR has developed scientific and technical innovations for the following four *in situ* bioremediation technologies for the efficient and cost-effective treatment of a range of environmental pollutants (solvents, metals, hydrocarbons) (Figure 1):

- electro-nanobioremediation (ENB)
- monitored bioaugmentation (MBR)
- bioelectrochemical remediation (BER)
- enhanced phytoremediation (EPR)

The broad goal of EiCLaR was to enhance performance levels through fusion of different *in situ* bioremediation technologies with non-biological processes and to expand the range of applications to industrial sites that contain complex, high concentration pollutant mixtures.

A decision support tool (DST) was also developed in the framework of EiCLaR to help remediation companies, site owners and administrative actors choose the most suitable remediation technologies for their sites. The DST is available to use at <u>https:// contaminatedland.info</u>.

The aim of this bulletin is to provide an overview of the EiCLaR project and its main results. It provides links to other EiCLaR outputs where a greater depth of detail can be found for a range of stakeholders.

Table 1: Project partners.

French National Centre for Scientific Research, France	
r3 Environmental Technology Ltd, UK	
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	
Dutch Sino Business Promotions, The Netherlands	
BoSS Consult GmbH, Germany	
SERPOL, France	
EKOGRID Oy, Finland	
Institute of Soil Science, Chinese Academy of Sciences, P. R. Chir	na
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	

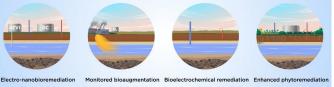


Figure 1. Schematics of the four EiCLaR technologies.



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For more information on the EiCLaR Project, please visit: www.eiclar.org

If you would like information about other CL:AIRE publications please contact us at the Help Desk at www.claire.co.uk

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2. PROJECT RESULTS

For more information about the EiCLaR project visit <u>eiclar.eu</u> where you can find the following additional resources:

Introductory video (EiCLaR in a nutshell) – a short video explaining the project (Figure 2). View at <u>eiclar.eu/category/videos/</u>

EiCLaR in a nutshell



Figure 2. EiCLaR introductory YouTube video.

Animated explainer video – an animation aimed at a general audience to provide a broad understanding of the four EiCLaR technologies (Figure 3). View at <u>eiclar.eu/category/videos/</u>



Figure 3. Screenshot from the EiCLaR animation.

Podcasts – interviews with some of the main people working on the EiCLaR project to find out a bit more about their backgrounds, how they got to their current positions and their role and activities within the project (Figure 4). Listen at <u>eiclar.eu/category/videos/</u>



Figure 4. Interviewees from EiCLaR podcasts. (Clockwise from top left) - Andreas Tiehm, Timothy Vogel, Azariel Ruiz-Valencia, Petr Kvapil, Kim Johansson, Simon Kleinknecht and Xin Song.

Technical bulletins – a series of documents describing the four EiCLaR technologies and DST in more detail (Figure 5). Download from <u>eiclar.eu/library/</u>



Figure 5. Five technical bulletins of the four EiCLaR technologies plus the DST.

Education pack – a short, illustrated interactive pdf to help engagement with schools, specifically students in post-16 education and aims to improve and promote a broad understanding of the project and its relevance (Figure 6). Download from <u>eiclar.eu/library/</u>

With industrial activity and pollution of the environment being widepread, EICLA is is developing four bioremediation technologies which use the physical, chemical and electrical processes of biological systems (such as plants, fung) and microbea) to break down contaminants and remove pollution from the environment.	Click links below to go to different pages:
	> Where do the pollutants in soil and groundwater come from?
	> What is remediation?
	> What is bioremediation?
	> What does in situ mean?
Learn more about these novel technologies that aim terminus the site of executivity of executivity and more cost effective and efficient.	> What is the EiCLaR project?
	> Types of bioromediation
	> Electro-nanobioremediation
	> Monitored bioaugmentation
	> Bioelectrochemical remediation
	> Enhanced phytoremediation
	> More information
	> Acknowledgments

Figure 6. Content of the EiCLaR education pack.

White papers – a technical briefing note for each of the EiCLaR technologies, targeted to different practitioner audiences: for site owners / managers (including real estate developers), for regulators, for service providers and for environmental service procurement personnel. Download from <u>eiclar.eu/library/</u>

List of journal papers published in peer-reviewed scientific journals – these outputs capture the most technical aspects of the research and are fundamental to demonstrate the quality of research being undertaken. View list at <u>eiclar.eu/library/</u>

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