



D1.3. Action plan

Deliverable Report

WP1 – Development of scientific strategy for PFAS analysis and remediation for UBFC

Due date: M12

Lead Beneficiary: CSIC

Dissemination level: Public

Version: 1.0



Project: 101059534 — PFAS^{twin}
HORIZON-WIDERA-2021-ACCESS-02



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Project details

Project acronym	Project title
PFAStwin	Twinning to address the PFAS challenge in Serbia

Grant Agreement No.	Funding scheme
101059534	HORIZON Coordination and Support Actions HORIZON-WIDERA-2021-ACCESS-0

Consortium

University of Belgrade – Faculty of Chemistry (UBFC), Republic of Serbia, coordinator

Agencia Estatal Consejo Superior de Investigaciones Científicas, M.P. (CSIC), Spain, partner

Bureau de Recherches Géologiques et Minières (BRGM), France, partner

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Work package details

Work package	Work package title
WP1	Development of the scientific strategy for PFAS analysis and remediation for UBFC
Work Package Leader	Lead Beneficiary
Dr. Begoña Jiménez	CSIC

Deliverable details

Deliverable	Deliverable title
D1.3	Action plan
Deliverable description	
The Action Plan will be available at the project website	
Due date	Submission date
31/08/2023	30/08/2023
Lead author	Contributors
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Dr. Begoña Jiménez	
Nature	Dissemination level
Report	PU- Public

Summary

The development of the Scientific Strategy for PFAS Analysis and Bioremediation at UBFC has been successfully completed through Work Package 1. Under this strategy, a thorough ten-year plan has been formulated. The main goal of this plan is to establish UBFC as a leading hub of expertise in PFAS research, fostering creative projects and cooperative efforts to tackle PFAS-related challenges. The objective of this deliverable is to create an action plan outlining the essential measures required to achieve the goals set in the ten-year plan.

Developing the action plan

Throughout the process of developing this action plan, several online meetings were conducted using the ZOOM and TEAMS platforms. To enhance collaboration and streamline the document's creation, dedicated folders were established on the shared TEAMS platform. In our concluding meeting, the initial draft of the action plan was unanimously endorsed by all participants. Subsequently, an approved version of the document was circulated to all members of the PFAS^{Stwin} team for their valuable input and final revisions.

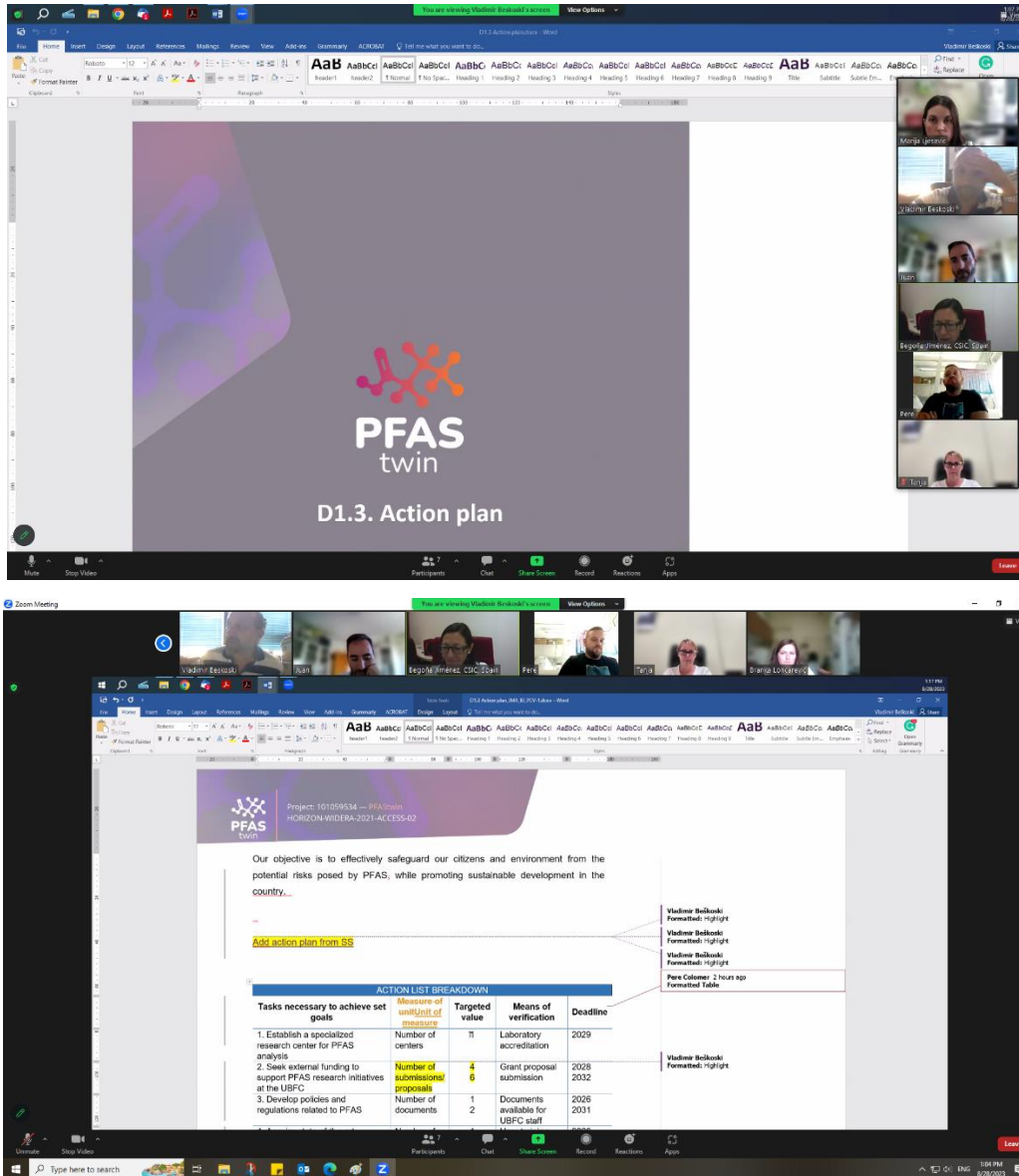


Figure 1. Members of the PFAS^{twin} during online meeting related to the report on action plan writing.

Considering that the action plan was formulated in 2023, alongside the information presented in Annex 1, Part B, page 4 of the Grant Agreement, which specifies that its validity period should be from 2022 to 2032, all team members who contributed to the development of the action plan unanimously agreed that it should be implemented effectively from 2023 to 2032.

The final version of the 'Action plan for PFAS Analysis and Bioremediation at UBFC (2023-2032)' is added as the Annex 1 of this document, but also printed as a hard copy and distributed alongside the Scientific Strategy.

END OF DOCUMENT



Annex 1: The ACTION PLAN for PFAS analysis and bioremediation at UBFC (2023-2032)





The ACTION PLAN for PFAS analysis and bioremediation at UBFC (2023-2032)



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Introduction

Per- and polyfluoroalkyl substances (PFAS) are chemical compounds that contain carbon and different fluorine atoms bonded together. These strong carbon-fluorine bonds give PFAS unique chemical properties that are valuable for creating products with oil-, stain-, and water-repellent qualities, as well as non-stick properties. However, it is important to note that these same carbon-fluorine bonds also make PFAS highly resistant to breaking down. Among the thousands of PFAS chemicals, PFOA and PFOS have been extensively studied. Multiple studies conducted over the past decade have shown a link between exposure to PFOA, PFOS, and other PFAS, and various health risks. These risks include immune suppression, elevated cholesterol levels, disruption of thyroid hormone function, lower birth weights in infants, and an increased risk of certain types of cancer.

Therefore, it is crucial to prioritize and conduct active research on these compounds, as well as to develop innovative strategies to address this challenging environmental problem. As a country undergoing economic development and transition, Serbia faces the challenge of managing and addressing the PFAS contamination in its environment. This challenge requires a comprehensive and science-based strategy that can effectively reduce the exposure and risks of PFAS to human health and the environment.

The UBFC possesses a strong foundation in analytical chemistry, environmental science, and related fields, backed by highly qualified researchers and access to advanced analytical facilities. Also, our robust network of collaborations with industry, government agencies, and international institutions offers opportunities for funding and technology exchange. Our commitment to sustainability and public health motivates us to address the challenges associated with PFAS contamination. As a result, we have developed an all-encompassing scientific strategy that will drive PFAS analysis and bioremediation research for the next ten years (2023-2032).

To accomplish this efficiently, we have identified the most significant threats and weaknesses. Our biggest challenges are the limited experience in PFAS research, constrained funding, and a shortage of well-characterized PFAS-contaminated sites and skilled personnel. On the bright side, increasing public awareness and concern about PFAS pollution opens doors for research and partnerships. The potential to pioneer innovative PFAS analysis and treatment solutions and educate the next generation of experts stands as valuable opportunities. Nevertheless, we must take into account heightened competition, evolving regulations, declining public interest, and unforeseen technical hurdles. Balancing these factors will be critical for UBFC's success in the ever-expanding field of PFAS research.

To ensure the successful implementation of the Scientific Strategy, a Ten-Year Plan (2023-2032) for PFAS at UBFC was devised. The plan aims to position our organization as a leading center of excellence in PFAS research by promoting innovation and fostering collaborative efforts to combat PFAS-related issues. This plan provides a structured approach to enhancing our capabilities, expanding scientific knowledge, and contributing to effective solutions for PFAS contamination. It involves a wide range of capacity-building initiatives aimed at equipping our faculty, researchers, and students with advanced skills in PFAS analysis and bioremediation techniques. These initiatives include targeted training programs, workshops, and exchanges. We will actively collaborate with regulatory authorities by conducting evidence-driven research. Our goal is to provide valuable insights that can shape policies and regulations related to PFAS contamination and its mitigation. Additionally, we are committed to launching community outreach and educational campaigns to raise awareness among stakeholders about the potential risks associated with PFAS contamination. Furthermore, we will promote responsible usage and disposal practices.

This document presents an action plan for the implementation of the Scientific Strategy aimed at addressing the PFAS challenge in Serbia. Our objective

is to effectively safeguard our citizens and environment from the potential risks posed by PFAS while promoting sustainable development in the country.

The Ten-Year Plan

A year-by-year order of activities for the realization of the Ten-Year Plan for PFAS at UBFC, spanning the period of 2023-2032, should be the following:

Year 1 (2023):

Formulate collaboration agreements with recognized partner universities, research institutions, and industry stakeholders.

Establish a dedicated research center/laboratory for PFAS.

Implement three projects regarding PFAS (VISION, PFAStwin and PhytoPFAS):

- Estimate the current state in the field of PFAS analysis and bioremediation of emerging contaminants in Serbia (PFAStwin).
- Train three UBFC researchers at CSIC (Spain) on Sample treatment, Analytical procedures and QA/QC for determining PFAS in different samples and writing three best practice manuals which will be implemented at UBFC (PFAStwin).
- Train two persons from UBFC at BRGM (France) on modelling and up-scaling techniques for the environmental treatment of emerging pollutants (laboratory, pilot and on-site) and for methods to assess the toxicity of pollutants on microbial communities. After training, two best practice manuals which will be implemented at UBFC (PFAStwin).
- Organize popular lectures related to the PFAS problems and solutions due to spreading knowledge to wider society (PFAStwin)
- Disseminate obtained results during project implementation at three international conferences (PFAStwin).
- Conduct experiments on phytoremediation of agricultural soil and water bodies (PhytoPFAS).
- Transfer knowledge from external collaborator Antonio Massi (phytoremediation expert from the University of Padova, Italy) via visiting UBFC (PhytoPFAS).

Year 2 (2024):

Allocate additional funding for infrastructure development, including state-of-the-art analytical instruments and laboratory facilities.

Implement two projects regarding PFAS (PFAStwin and PhytoPFAS):

- Train 20 UBFC researchers at summer school at CSIC for identification and quantification of legacy and emerging POPs in environmental samples (PFAStwin).
- Organize summer school at UBFC, focusing on GCxGC-MS for environmental forensics and MicroOximax respirometer for remediation monitoring for 40 participants (PFAStwin).
- Train 20 UBFC researchers at summer school at BRGM for bioremediation of polluted sites (PFAStwin).
- Analysis of PFAS in soil, sediment and water samples by collaboration with CSIC which will include one visit to UBFC (PFAStwin).
- Evaluate PFAS biotransformation using pretreatment and bioremediation by collaboration with BRGM which will include one visit to UBFC (PFAStwin).
- Conduct nine small research projects on scientific topics related to PFAS (PFAStwin).
- Organize popular lectures related to the PFAS problems and solutions due to spreading knowledge to wider society (PFAStwin).
- Disseminate obtained results during project implementation at three international conferences (PFAStwin).
- Conduct and finish the experiments of phytoremediation of agricultural soil and water bodies and for the fate of PFAS in plants. Develop the technical solution based on obtained results (PhytoPFAS).
- Disseminate obtained results during project implementation at six national conferences (PhytoPFAS).

Year 3 (2025):

Implement one project regarding PFAS (PFAStwin):

- Organize a one-day workshop at UBFC for the representatives of industry and stakeholders. The workshop topics will be the presentation of the PFAStwin project, panel discussions about PFAS challenges and bridging the scientific findings, industry implementation and improvement of regulation policies (PFAStwin).
- Organize popular lectures related to the PFAS problems and solutions due to spreading knowledge to wider society (PFAStwin).

- Disseminate obtained results during project implementation at three international conferences and publish three joint research papers (PFAStwin).

Enhance infrastructure for PFAS research based on identified needs and emerging technologies.

Initiate capacity-building programs for faculty, researchers, and students on PFAS analysis and bioremediation techniques.

Foster international collaborations for knowledge exchange and joint research projects. Apply for the second stage of the PhytoPFAS project to the Science Fund of the Republic of Serbia. Write new project proposals: RIA Horizon Europe, PFAS COST projects, etc.

Seek external research funding from government agencies, private foundations, and industry sponsors.

Year 4 (2026):

Conduct in-depth studies on PFAS fate, transport, and sources to inform remediation strategies.

Establish a database for PFAS research findings and data sharing.

Engage with policymakers and regulatory agencies to provide scientific input on PFAS-related policies and regulations.

Year 5 (2027):

Investigate and develop innovative bioremediation techniques tailored for PFAS-contaminated sites.

Publish research findings in reputable scientific journals and present at conferences.

Initiate public awareness campaigns on PFAS risks and prevention measures.

Organize the first PFAS symposium to share research findings and foster collaboration.

Year 6 (2028):

Strengthen collaborations with industry partners to explore PFAS reduction and substitution strategies.

Conduct interdisciplinary research projects on the health effects of PFAS exposure.

Evaluate the effectiveness of implemented remediation techniques through pilot-scale studies.

Year 7 (2029):

Secure long-term research funding for sustained PFAS research activities.

Expand the monitoring programs to assess temporal and spatial variations in PFAS contamination.

Engage in regional and international collaborations for knowledge exchange and joint initiatives.

Year 8 (2030):

Integrate PFAS research into academic curricula and develop specialized courses.

Participate in international conferences and workshops to showcase UBFC's research expertise.

Develop partnerships with community organizations to address local PFAS concerns.

Year 9 (2031):

Influence policy and regulation development through collaborative efforts with government agencies and industry stakeholders.

Expand public engagement activities to promote responsible PFAS use and disposal practices.

Strengthen relationships with funding agencies and industry sponsors for continued financial support.

Year 10 (2032):

Conduct a comprehensive assessment of the achieved goals and outcomes of the Ten-Year Plan.

Consolidate partnerships and collaborations for sustained PFAS research beyond the plan's duration.

Publish a comprehensive report summarizing the UBFC's contributions to PFAS research, remediation, and policy advocacy.

To ensure the successful realization of all activities outlined in the ten year plan, an action list (see below) is created to breakdown the plan into smaller tasks and propose the Key Performance Indicators (KPIs). The order and specific activities may vary based on the UBFC's existing capabilities, priorities, and available resources. Regular evaluation and adaptability should be maintained throughout the ten-year period to ensure the successful realization of the plan.

ACTION LIST BREAKDOWN				
Tasks necessary to achieve set goals	Unit of measure	Targeted value	Means of verification	Deadline
Estimate the current state in the field of PFAS analysis and bioremediation of emerging contaminants in Serbia	Number of reports	1	Report on the current state analysis available online	2023
Training of UBFC researchers on PFAS related topics	Number of trainings held	5	Report on the trainings	2023
Organize popular lectures related to the PFAS problems and solutions	Number of lectures	1/ 1/ 1	Report on the popular lectures	2023/ 2024/ 2025
Participation in international conferences in the PFAs related field	Number of conference contributions	3/ 3/ 3	Conference abstract books	2023/ 2024/ 2025
Expert visit on the topics of PFAS analysis, bioremediation and phytoremediation	Number of visits	1/ 2	Report on the visits	2023/ 2024
Analysis of PFAS in soil, sediment and water samples	Number of reports on the experiments	1	Report on the experiments conducted	2024
Experiments on the PFAS biotransformation using abiotic and biotic techniques	Number of reports on the experiments	1	Report on the experiments conducted	2024
Experiments on phytoremediation of agricultural soil and water bodies	Number of reports on the experiments	2	Report on the experiments conducted	2024
Organization of summer school at UBFC	Number of participants	40	Report on the summer school	2024
Participation of UBFC researchers at the international summer schools	Number of participants	20	Report on the summer school	2024

ACTION LIST BREAKDOWN

Tasks necessary to achieve set goals	Unit of measure	Targeted value	Means of verification	Deadline
Conduct small research projects on scientific topics related to PFAS	Number of research projects	9	Final reports for projects	2024
Workshop at UBFC for the representatives of industry and stakeholders	Number of participants	60	Report on the workshop	2025
Enhance infrastructure for PFAS research based on identified needs and emerging technologies	Number of instruments acquired	1	User training certificate	2026
Conduct in-depth studies on PFAS fate, transport, and sources to inform remediation strategies	Number of reports on the experiments	1	Report on the experiments conducted	2026
Establish a database for PFAS research findings and data sharing	Number of repository folders	2	Data available at the UBFC repository	2026
Engage with policymakers and regulatory agencies to provide scientific input on PFAS-related policies and regulations	Number of meetings	2	Report on the meetings	2026
Publication of PFAS research related results in reputable scientific journals	Number of publications	3 5 7	Publications available online or at the repository	2025 2029 2032
Strengthen collaborations with industry partners to explore PFAS reduction and substitution strategies	Number of meetings	4	Report on the meetings	2028
Conduct interdisciplinary research projects on the health effects of PFAS exposure.	Number of reports on the experiments	1	Report on the experiments conducted	2028
Evaluate the effectiveness of implemented remediation techniques through pilot-scale studies	Number of reports on the experiments	1	Report on the experiments conducted	2028

ACTION LIST BREAKDOWN

Tasks necessary to achieve set goals	Unit of measure	Targeted value	Means of verification	Deadline
Expand the monitoring programs to assess temporal and spatial variations in PFAS contamination	Number of reports on the experiments	1	Report on the experiments conducted	2029
Establish a specialized research center for PFAS analysis	Number of centers	1	Laboratory accreditation	2029
Integrate PFAS research into academic curricula and develop specialized courses	Number of courses	1	Course syllabus	2030
Develop partnerships with community organizations to address local PFAS concerns	Number of collaborations	1	Report on the joint activities	2030
Develop policies and regulations related to PFAS	Number of documents	1	Documents available for UBFC staff	2031
Expand public engagement activities to promote responsible PFAS use and disposal practices	Number of public engagement events	1 per year	Reports on the events	2031
Seek external funding to support PFAS research initiatives at the UBFC	Number of project proposal submissions	6	Grant proposal submission	2032
Assess the achieved goals and outcomes of the Ten-Year Plan	Number of reports	1	Report	2032