

Project Objectives

The main objective of ANSWER project is to develop well-trained and creative Early-Stage Researchers (ESRs) through innovative PhD projects to unravel the highly complex factors driving antibiotics and antibiotic-resistant bacteria and antibiotic resistance genes (A&ARB&ARG) propagation in the framework of urban wastewater reuse. ANSWER will seek innovations to drive knowledge and understanding of the reuse practice, with the aim to reduce environmental and possible public health risks and identify opportunities for establishing safe reuse systems.

Scientific Research Objectives:

- to provide a solid approach for effect analysis concerning wastewater reuse in a European regulatory and monitoring context
- to develop novel multidisciplinary approaches/techniques to enhance the diagnostic, mitigation and prevention capacity of A&ARB&ARG propagation, with cost-efficiency and wide applicability
- to integrate all of the empirical data into a web-based database which will allow for:
 - automated prioritisation of chemical/biological risk factors
 - use of the data in models for large-scale projections
 - interpretation by ANSWER internal and external stakeholders for future policy development
 - the development of science-based emission limits values (ELVs) for antibiotics and their transformation products (TPs) and ARB&ARG in treated wastewater.

Project Impact

ANSWER aims at answering critical questions related to wastewater reuse under current challenges, and in particular to provide consolidated insight on the potential effects of the reuse practice with regard to A&ARB&ARG, data on crop uptake, establish criteria/specifications on technologies and assessment methods, and suggest new effluent quality criteria to overcome current barriers and enhance further the reuse practice. The pioneer leadership of Europe in the field of contaminants of emerging concern in the environment, will be sustained through ANSWER, whose benefits will be of **scientific, technological, economical** and of course **societal** character and significance, as wastewater reuse needs to be based on scientific evidence that will enable overcoming existing obstacles and barriers. Undoubtedly, the European society has many to gain from ANSWER including contributions towards **clean environment** and **health protection**. ANSWER intends to result in a **long-lasting network** for future cooperation between the involved institutions, creating a **training platform** that will continue in the future, having a strong impact on the scientific community. ANSWER intends to create a highly supra-disciplinary and inter-sectoral research training environment in the state of the art of wastewater science and engineering disciplines. This training will consequently have a major impact on the **careers** of the ESRs improving their competitive prospects in the field of **academia, industry, policy making**, etc. Also, the **geographical/sectoral mobility** will increase the competitiveness of ANSWER ESRs and the **confidence** to start an **independent career**. Finally, ANSWER intends to teach the 15 ESRs how to **drive science beyond the state of the art** and to be able to **face the current and future challenges** by converting knowledge and ideas into products and services for **economic and social benefit**.

Project Consortium

Beneficiaries

Nireas-International Water Research Center, University of Cyprus (Nireas-IWRC, UCY) **Coordinator**
Assoc. Prof. Despo Fatta-Kassinos

Environmental Institute s.r.o (EI)
Dr. Jaroslav Slobodnik

KWR Watercycle Research Institute (KWR)
Dr. Luc Hornstra

The Agriculture Research Organisation of Israel - The Volcani Center (ARO)
Dr. Eddie Cytryn

Agencia Estatal Consejo Superior de Investigaciones Cientificas (CSIC)
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Adventech - Advanced Environmental Technologies, Lda (Adventech)
Mr. Sergio C. Silva

Universidade Catolica Portuguesa (UCP)
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Technische Universität Dresden (TUD)
Prof. Thomas Berendonk

Universita Degli Studi di Salerno (UNISA)
Assoc. Prof. Luigi Rizzo

Technische Universität Wien (TU-Wien)
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Partners

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Abwasserverband Braunschweig (AVBS)
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BioDetection Systems bv (BDS)
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HighChem (HighChem)
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The Hebrew University of Jerusalem (HUJI)
Prof. Edouard Jurkevich

Istituto Superiore di Sanità (ISS)
Dr. Emanuela Testai

Karlsruhe Institute of Technology (KIT)
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VA TECH WABAG GmbH (WABAG)
Dr. Josef Lahnsteiner

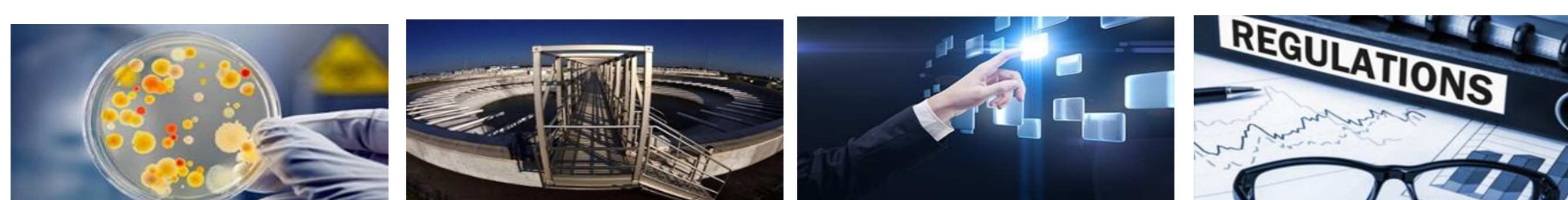
The network consists of **10 beneficiaries** and **8 partners**, from 9 countries: Austria, Cyprus, Germany, Israel, Italy, Portugal, Slovakia, Spain, and the Netherlands.



Work Packages

ANSWER is organized into 8 Work Packages (WP):

- WP1 - Spread and transmission of A&ARB&ARG under wastewater reuse scenarios**
- WP2 - Evaluation of A&ARB&ARG effects and hazard identification**
- WP3 - Innovative technological solutions for the removal of A&ARB&ARG**
- WP4 - A&ARB&ARG fate prediction through modelling approaches**
- WP5 - Data management, prioritisation and policy guidelines development**
- WP6 - Training**
- WP7 - Management**
- WP8 - Communication and Dissemination**



Training Events

	Main Training Events (TE), Workshops and Conferences	Lead Institutions*/ Country
1	Summer School on 'Antibiotics and mobile resistance elements in wastewater reuse applications: risks and innovative solutions'	CSIC, Spain
2	TE-A: Statistics and models for environmental data.	Joint event by TUD and KIT, Germany
3	TE-B: Sample preparation and effect-based monitoring in water quality assessment.	BDS, Netherlands
4	TE-C: Microcontaminants in the aquatic water cycle - wastewater reuse - the Cypriot/Israeli experience.	Joint event by UCY, ARO and HUJI, Israel
5	TE-D: Wastewater microbiota and the effects of treatment processes.	Joint event by Adventech and UCP, Portugal
6	TE-E: Wastewater treatment by advanced technologies and risk assessment framework; First ANSWER Workshop 'Risk prognosis of environmental and public health aspects of A&ARB&ARG'.	Joint event by UNISA and ISS, Italy
7	TE-F: Practical exercise on computer tools for identification and structure elucidation of antibiotics, their metabolites and transformation products.	Joint event by EI and HighChem, Slovak Republic
8	TE-G: Microbiology in wastewater treatment; Design criteria for wastewater treatment plants; Horizontal resistance gene transfer in soil.	Joint event by TU-Wien, AGES and WABAG, Austria
9	TE-H: Environmental/human health risk assessment of antibiotics; Second ANSWER Workshop 'Modelling and risk assessment tools towards sustainable wastewater reuse'.	KWR, Netherlands
10	ANSWER Final Conference - Science Slam for young scientists.	UCY, Cyprus

*Acronyms of Lead Institutions: Adventech: Adventech - Advanced Environmental Technologies LDA; AGES: Austrian Agency for Health and Food Safety; ARO: The Agriculture Research Organization of Israel - The Volcani Centre; BDS: BioDetection Systems bv; CSIC: Agencia Estatal Consejo Superior de Investigaciones Cientificas; EI: Environmental Institute; HUJI: The Hebrew University of Jerusalem; ISS: Istituto Superiore di Sanita; KIT: Karlsruhe Institute of Technology; KWR: KWR Water B.V.; TUD: Technische Universität Dresden; TU-Wien: Technische Universität Wien; UCP: Universidade Catolica Portuguesa; UCY: University of Cyprus; UNISA: Universita Degli Studi Di Salerno; WABAG: VA TECH WABAG GmbH.