



MOTREM

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Bertram Kuch (UST),
Jukka Pellinen (UH),
Paola Calza (UNITO),
Frank Rogalla (AQUALIA),
Pedro Cano (BRUKER)



Water JPI
Pilot Call Kick-off meeting
11th of March 2015, Brussels

MOTREM Consortium

URJC – Universidad Rey Juan Carlos (Spain),
Coordinator. P.I.: *Dr. Javier Marugán*



UST – Universität Stuttgart (Germany).
P.I.: *Dr. Bertram Kuch*



UH – University of Helsinki (Finland).
P.I.: *Dr. Jukka Pellinen*



UNITO – Università di Torino (Italy).
P.I.: *Dr. Paola Calza*



FCC Aqualia S.A. (Spain).
P.I.: *Frank Rogalla*



Bruker Española, S.A. (Spain).
P.I.: *Pedro Cano*



Not eligible: GEPEA – Mines de Nantes (France). P.I.: *Valérie Héquet*

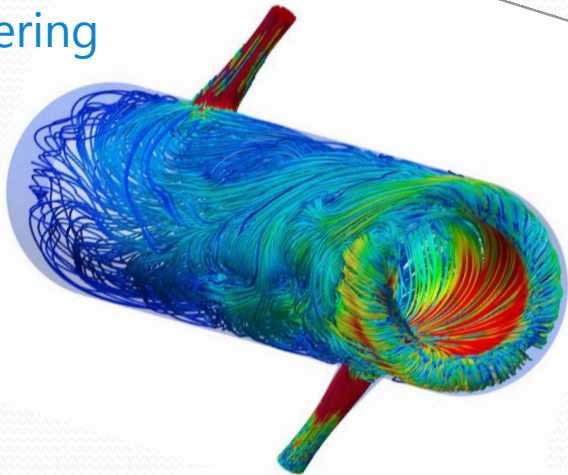


URJC – Universidad Rey Juan Carlos



Advanced
Biotreatment

AOPs & Reactor
Engineering



Water
Disinfection

CONVENTIONAL WASTEWATER TREATMENT

- Activated Sludge
- Trickling Filter, Rotating disk trickling filters, oxidation ditch

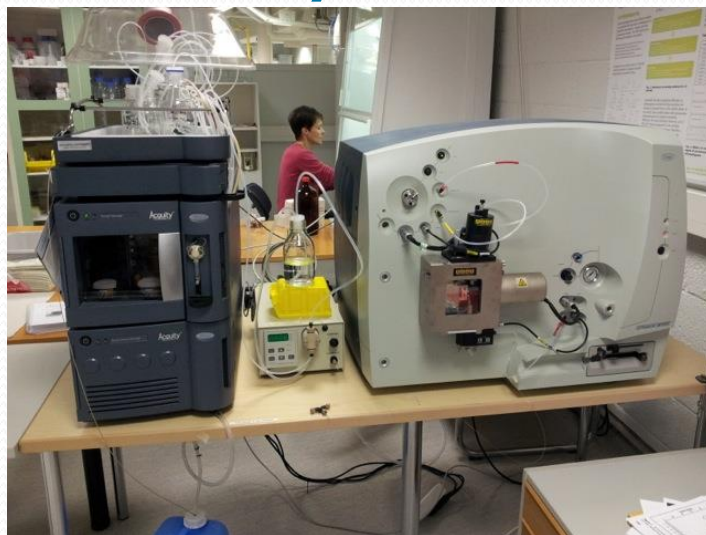
ADVANCED WASTEWATER TREATMENT TECHNOLOGIES

- Powdered Activated Carbon
- Granular Activated Carbon
- Ozonation (+ GAC, RSF)
- UV (+H₂O₂, Chlorine etc.)
- Membrane technologies
- Slow Sand Filtration

ANALYTICAL TECHNIQUES



UH – University of Helsinki

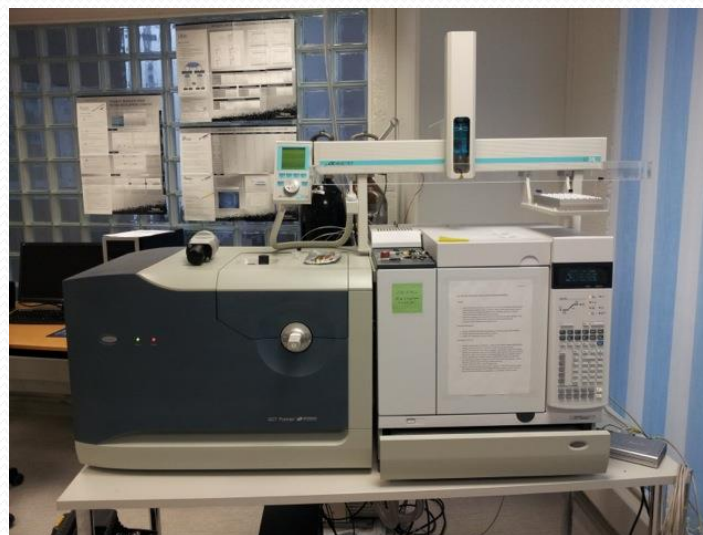


UPLC-TOF-MS



GC-MS

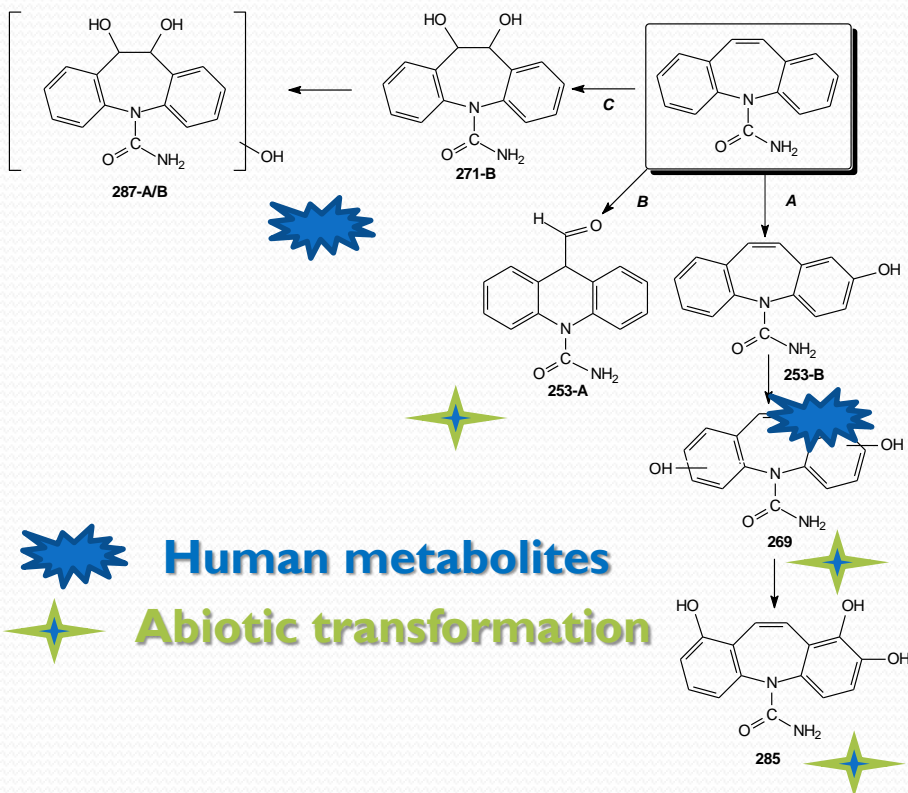
AlmaLab



GC-TOF-MS



UNITO – Università di Torino



Understanding and elucidation of the photochemical reactions that take place in surface and atmospheric water

Monitoring of emerging contaminants residues in the environment, their degradation and identification of their transformation products

- ✓ **HPLC** equipped with UV-Vis and fluorescence detectors, MS detector (LTQ- Orbitrap, QqQ and QTrap analyzers)
- ✓ **ICP-AES**
- ✓ **GC-QTOF-MS**
- ✓ **TOC** analyzer
- ✓ Ion chromatograph
- ✓ Test Microtox®- Bioluminescence measures of *Vibrio Fischeri* bacteria

FCC Aqualia S.A.

3rd Company in water management in the World

**PUBLIC WATER SERVICES
MANAGEMENT**

**DESIGN AND BUILDING OF WATER
TREATMENT PLANTS**

**SOLUTIONS FOR WATER USE IN
INDUSTRY**

**HYDRAULIC INFRASTRUCTURE
CONCESSIONS**

**MAINTENANCE AND EXPLOTATION
SERVICE FOR IRRIGATION
INFRASTRUCTURES**



Integral Water Management

Public Water Services,

Water Quality Control,

Recreational Water facilities,

Operation and maintenance of irrigation
infrastructures,

Hydraulic infrastructures concessions,



Design and construction
of hydraulic infrastructures.



Bruker



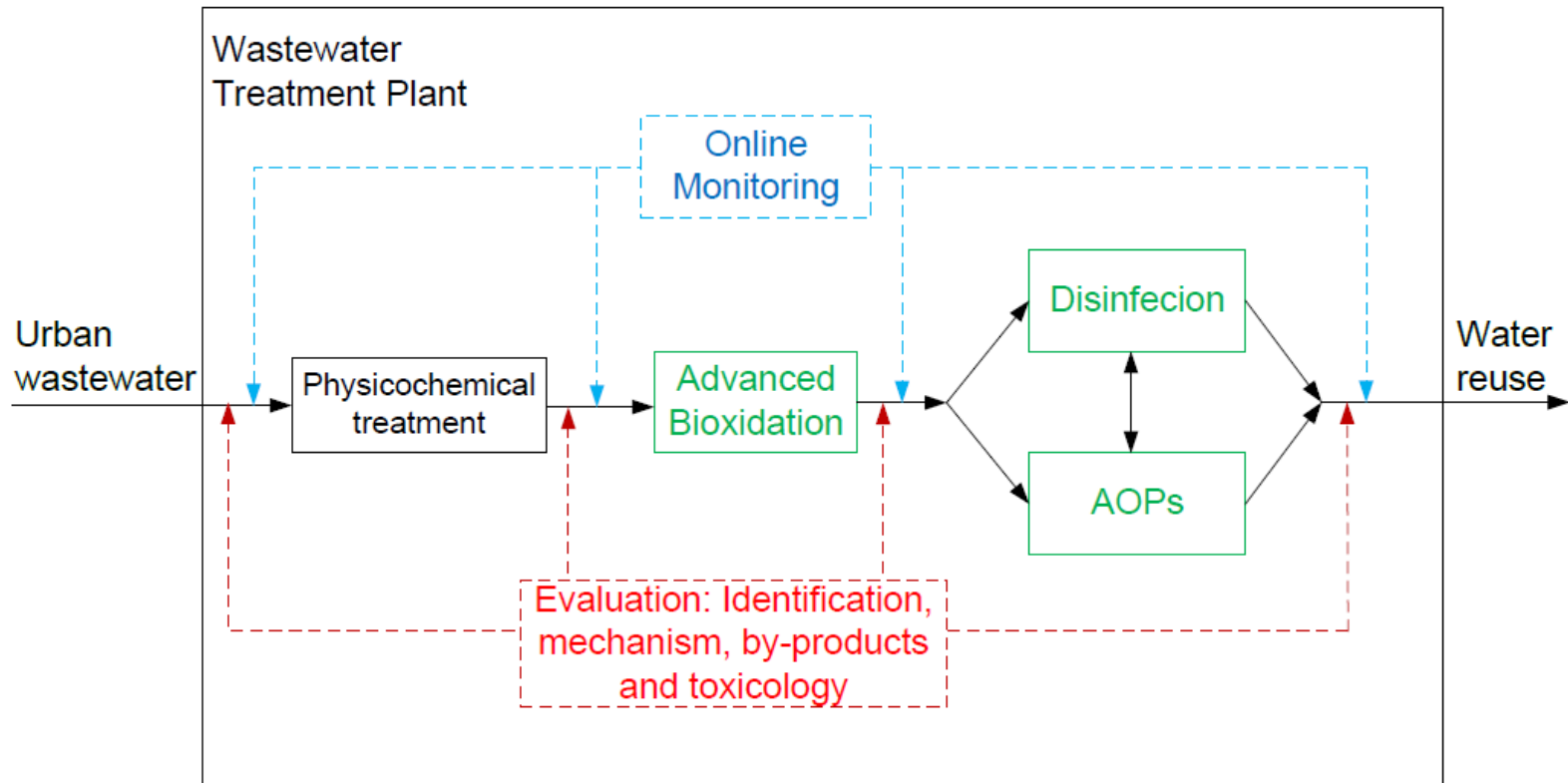
Applications Development
Laboratory
Chemical & Applied Markets

**Provided with most of the last MS
technologies from Bruker.**

GC/MS/MS Scion™ Triple Quad (2 units)
LC/MS/MS Amazon™ SL Ion Trap (1 unit)
LC/MS/MS Q TOF Impact™ II (1 unit)
LC/MS/MS EVOQ™ Triple Quad (2 units)



Integrated Processes for **MO**nitoring and **TR**eatment of **EM**erging Contaminants for Water Reuse – Conceptual Diagram



MOTREM General Objectives

The general ideas behind MOTREM project are:

- a) Develop new processes or modifications of the current biological and disinfection technologies in WWTPs by advanced oxidation and biooxidation processes to achieve the removal of ECs before water reuse or the discharge of the effluents to the environment.
- b) Develop new technologies for the monitoring of the wastewater treatment plant operation regarding the removal of ECs, including analytical procedures and ecotoxicology assessment.
- c) Bring together the technologies developed in steps a) and b) to be tested in an urban wastewater treatment plant.

MOTREM Specific Research Objectives

- 1.- To develop biooxidation processes with higher efficiency in the degradation of ECs, evaluating their feasibility in continuous non-sterile operation conditions.
- 2.- To increase the catalytic efficiency of TiO_2 materials by novel preparation and immobilization methods, evaluating their performance, lifetime and stability under long-term operation using solar light.
- 3.- To develop photo-Fenton processes operating at near-neutral pH values for the simultaneous inactivation of microorganisms and removal of ECs, engineering the process for a successful scaling-up.
- 4.- To identify the ECs more refractory to the water treatment processes to be used as indicators of the wastewater plant operation efficiency, developing new sampling and analytical methodologies for their monitoring, making possible the link with the control strategies.
- 5.- To establish the mechanism of degradation of the ECs, including the identification of the transformation products and the assessment of their ecotoxicological and estrogenic impact.

MOTREM Work-Packages

WORK PACKAGES

Project execution is structured in 5 work packages:

- WP1 Development of New **Treatment** Technologies (*URJC*)
- WP2 Development of New **Monitoring** Technologies (*UST*)
- WP3 Emerging **Contaminants** Evaluation (*UH*)
- WP4 **Dissemination** and Exploitation of Project Outcome
(*AQUALIA*)
- WP5 Project **Coordination** and Management (*URJC*)

MOTREM Technical Work-Packages

WP 1 - Treatment

Task 1.1. Efficient Biodegradation of ECs with ABOP.

Task 1.2. Novel nanoscaled photocatalysts for ECs removal & disinfection

Task 1.3. Disinfection & removal of ECs by photo-Fenton at neutral pH

WP 2 - Monitoring

Task 2.1. New strategies for WWTP monitoring

Task 2.2. Monitoring strategies with ECs tracking

Task 2.3. Integration of monitoring & treatment

WP 3 - Contaminants

Task 3.1. Identification of the suitable target contaminants.

Task 3.2. Degradation mechanisms & transformation products

Task 3.3. Ecotoxicological and estrogenic impact of ECs and TPs

MOTREM Dissemination & Coordination

WP 4 - Dissemination

Task 4.1. Public and industrial engagement

Task 4.2. Technical documentation & training workshop

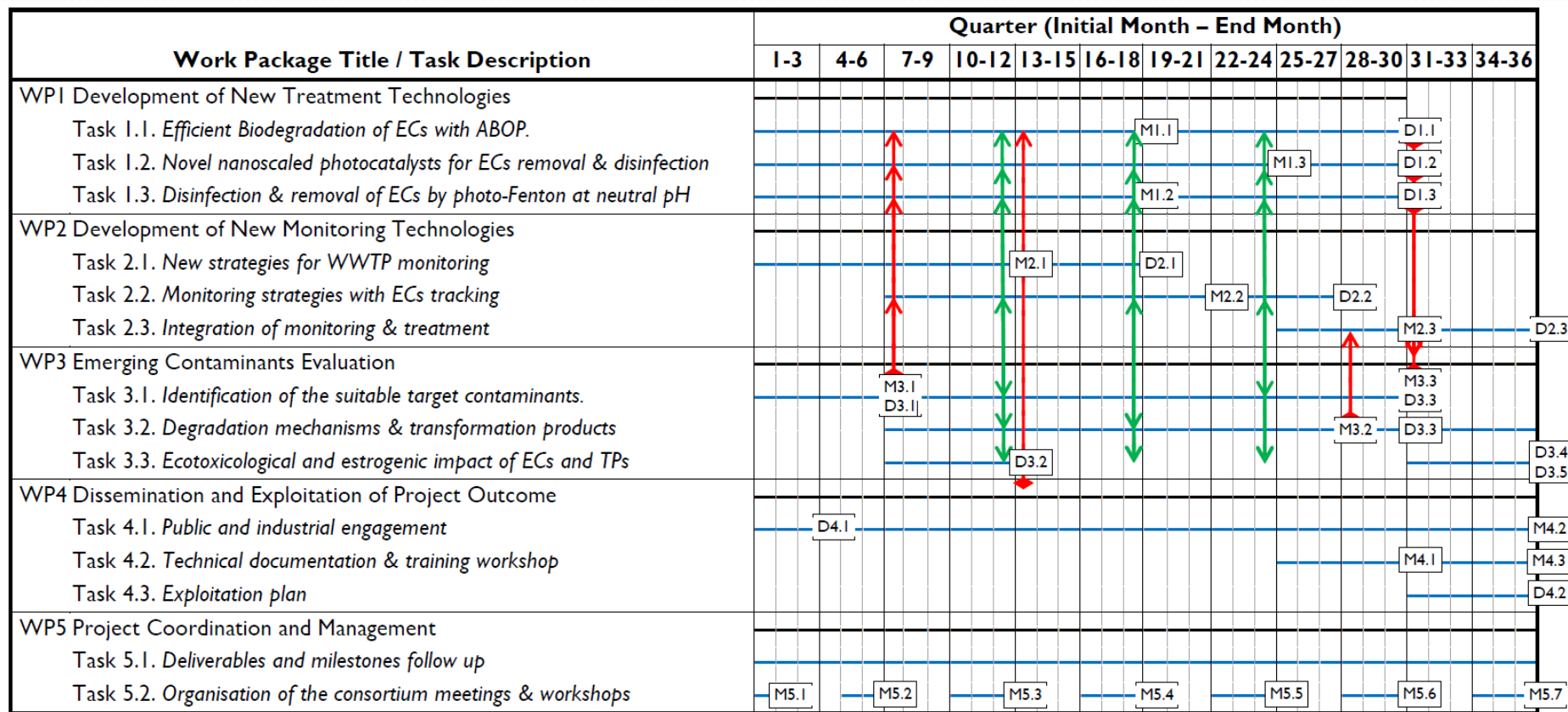
Task 4.3. Exploitation plan





WP 5 - Coordination

Task 5.1. Deliverables and milestones follow up

Task 5.2. Organisation of the consortium meetings & workshops

MOTREM Gantt Chart



Key:  Interaction / Feedback  Information transfer  Dn.n Deliverable  Mn.n Milestone

Multidisciplinary and Collaborative Project

- Multidisciplinary expertise including biotreatment processes and ABOP, catalytic materials nanoengineering, photoreactor and process design, ECs removal in disinfection processes, high level analytical methodologies for identification and quantification of ECs, evaluation of ecotoxicology and estrogenicity, and managing services related to the water cycle, especially wastewater treatment and reuse.
- Partial overlapping between expertise of the groups allow mobility of researchers and synergistic collaboration beyond the project life.
- Combination of Fundamental Science + Technological Solutions.

Scientific Relevance of MOTREM project

The expected scientific output can be summarized in four main topics:

- a) Optimised biotreatment processes with enhanced efficiency in the removal of ECs based on the incorporation of specific microorganisms.
- b) Optimised disinfection technologies and AOPs able to deal simultaneously with the inactivation of pathogenic microorganisms and ECs before water reuse or the discharge of the effluents to the environment.
- c) Optimised technologies for the monitoring of the WWTP operation regarding the removal of ECs, including analytical procedures and measurements of integrative parameters.
- d) Identification of the most representative ECs for the evaluation and monitoring of the efficiency of the water treatment processes, including its transformation products and the assessment of their ecotoxicology.

Societal Relevance of MOTREM project

Technological objectives of MOTREM project are focused on the development of market-oriented solutions for the water industry, especially related to robust, and cost-effective overall technological solutions for water treatment and reuse. Specifically, the project covers some of the current identified needs according to the Water JPI SRIA:

- i) Development of innovative advanced processes for water treatment and assessment;
- ii) Assessing the robustness of biological water treatment processes and boosting progress in the conversion from conventional water treatment plants to biological water treatment plants;
- iii) Development of strategies for treatment process intensification (by optimisation of monitoring strategies and dosages).

MOTREM drives knowledge development in innovative wastewater treatment processes, which are considered to have high strategic impact in the field. These developments, based on application to real wastewater problems, will have a potential for many applications in the market, promoting job creation, sustainable economic growth and a cleaner environment.



Stakeholders Involvement

- WVP4 specifically conceived for activities regarding the engagement of stakeholders. Important stakeholders (target market, regulatory authorities, environmental agencies, etc.) will be identified to transfer the knowledge developed by the project.
- The spread and distribution of knowledge will be performed by a number of mechanisms: conferences, trade shows, workshops, newsletters, newspaper reports, scientific publications and a website.
- Industrial partners will make presentations in more relevant events that are hosting speakers from companies developing environmental technologies.
- Partners will aim at publishing technical papers in specific industry magazines.
- Technical documentation will be produced with guidelines for the application of the new technologies and methodologies directly targeted to the end-user community.
- A training workshop will be organized at the end of the project to inform potential end-users about the developed water monitoring, treatment and analytical technologies.

Exploitation of the Results

- The participation in the MOTREM consortium of industrial partners as end-users of the developed technologies both in the operation of wastewater treatment plants and in the commercialisation of analytical equipment for the identification and quantification of ECs guarantee the applicability of the results by stakeholders.
- One of the task in WVP4 will be devoted to the implementation of an exploitation plan designed to guide the industrial partners to maximise economic gain, revealing the near-, medium-, and long-term economic benefits of the newly developed technology.
- Transferability of research results is supported by previous expertise of the MOTREM partners in their respective fields. Case studies from different European areas and involving different types of water will be tested for transferability to other sectors and areas of Europe and the world.

Dissemination of the Results

Dissemination of the project results has been included in the work planning with specific activities in WP4:

- Participation at seminars, exhibitions and workshops will be planned and performed to present non-confidential project results.
- The scientific, not preferably patent-relevant results will be published in high-quality scientific journals and conferences as well as internet-based media.
- End-users groups will be informed both through the publications of the academics and the commercial actions of the industrialists.
- Dissemination activities will also be launched in languages other than English, to reach a wide audience in target countries. The addressed audience includes all stakeholders, potential users, policymakers, and the relevant scientific and technical community.
- Dedicated website <http://www.motrem.eu>

MOTREM Website: www.motrem.eu

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MOTREM Project

Integrated Processes for Monitoring and Treatment of Emerging Contaminants for Water Reuse (MOTREM)

The MOTREM project is a Water JPI project that focuses on the development of integrated processes for monitoring and treatment of emerging contaminants (ECs), improving the efficiency of the removal of these pollutants in urban wastewater treatment plants (WWTPs), especially for water reuse.

The project aims to provide new technologies for water treatment and/or improving the existing ones through the development of integrated processes for monitoring and treatment of ECs in the current waterline of municipal wastewater treatment plants, especially focusing on the aspect of water reuse. For this goal, the project combines cross- and multi-disciplinary expertise on water treatment processes design and engineering, analytical chemistry and ecotoxicology applied to ECs that guarantee the generation not only on new scientific knowledge but also of innovative commercial solutions to the market.



Water challenges for a changing world

NEWS & EVENTS

- ⇒ MOTREM kick-off meeting 11th February 2015
- ⇒ MOTREM kick-off meeting 31st January 2015
- ⇒ Welcome to MOTREM website 20th January 2015

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PARTNERS

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UST – Universität Stuttgart (Germany). Principal Investigator: *Dr. Bertram Kuch*

UH – University of Helsinki (Finland). Principal Investigator: *Dr. Jukka Pellinen*

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Brüker Española, S.A. (Spain). Principal Investigator: *Pedro Cano*

The assembled team is well equipped to address all aspects of the project. In constructing the team, scientific excellence was a key criterion but we were also aware of the need to engage with end users at the earliest stage and to be able to accurately assess the future market potential. It was therefore important to ensure we included partners with strong links to the relevant industries and experience of translating innovative technologies into practical applications, but also some companies leading the water and the analytical instrumentation fields such as AQUALIA and BRUKER. The consortium brings together internationally leading researchers with strong track records in the key competencies needed to deliver the work programme set out above.

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MOTREM Kick-Off Meeting, Madrid 10th Feb

Action Plan MI-M9





MOTREM

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