



LIFE13 ENV/ES/001353

After-LIFE Communication Plan

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ACRONYMS AND ABBREVIATIONS INDEX

AnMBR:	Anaerobic Membrane Bioreactor
COD:	Chemical Oxygen Demand
GHG:	Greenhouse Gas
LIFE+ programme:	European financial instrument for the Environment
SRT:	Sludge Retention Time
WWTP:	Wastewater Treatment Plant
AnMBR	Anaerobic membrane bioreactor technology
MBR	Membrane bioreactor

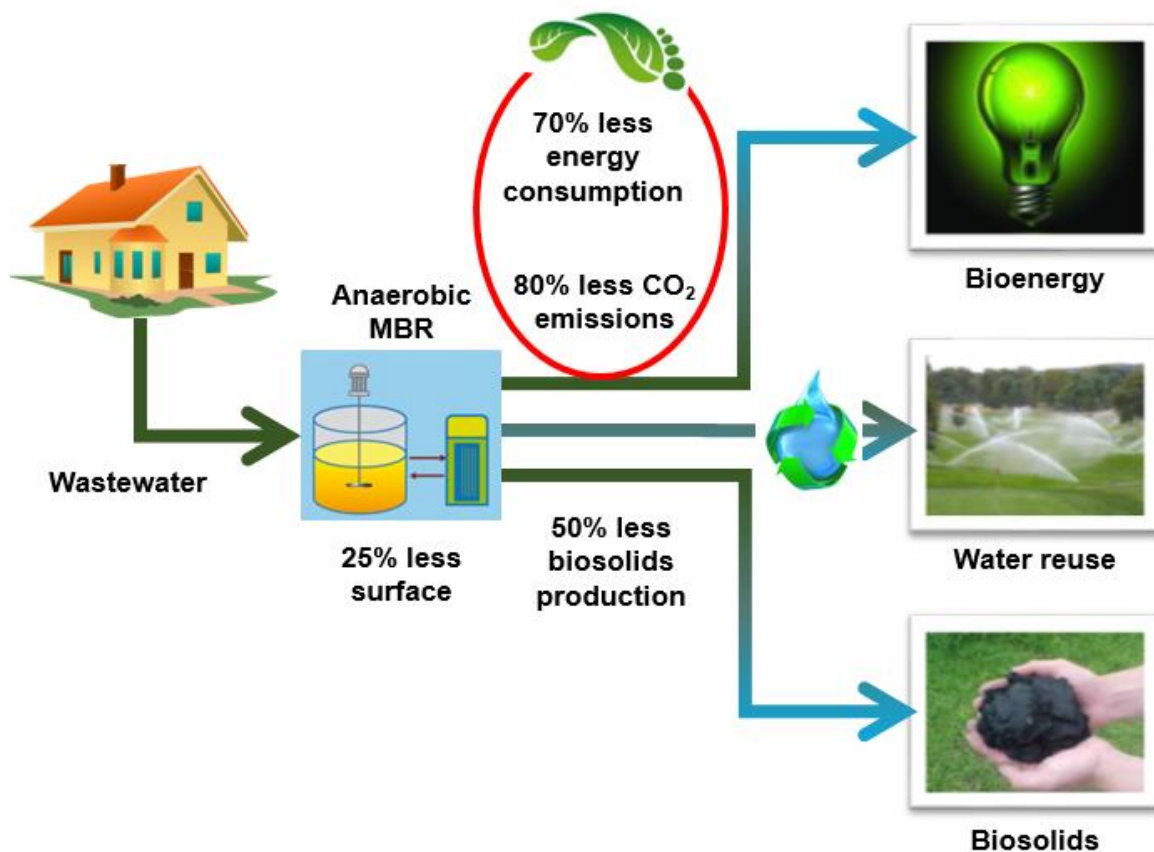
1. INTRODUCTION

Submerged Anaerobic Membrane Bioreactor (AnMBR) technology combines anaerobic digestion for organic matter removal and membrane filtration process for separating anaerobic sludge from the effluent. Membrane filtration process allows obtaining a high-quality effluent and increasing the sludge retention time (SRT) without increasing the reactor volume. Thus, sludge retention time and hydraulic retention time are decoupled. Therefore, AnMBR technology can be used for organic matter removal from low-loaded wastewaters at ambient temperatures. The results obtained at pilot scale have proved the main advantages of this technology, which are:

- i) The conversion of the organic matter present in the influent wastewater into biogas that can be used to generate heat energy, biofuel and/or electric power
- ii) Low sludge production because of the low yield of anaerobic microorganisms
- iii) Low energy consumption since no aeration is required

The purpose of LIFE MEMORY (Membrane for ENERGY and WATER RECOVERY) project is to demonstrate at an industrial prototype scale the technical and economic feasibility of AnMBR technology, as an alternative to traditional aerobic treatments for urban wastewater. To this aim, three main objectives have been set:

- i) Reducing wastewater treatment plants (WWTPs) energy consumption by 70%
- ii) Reducing by 80% the net greenhouse gases (GHG) emissions per unit of COD removed from the influent wastewater, avoiding the oxidation of organic matter
- iii) Increasing the effluent quality for reuse and minimization of residuals by 50%



These objectives can be achieved by following a set of specific activities to perform unbiased estimations of the impact of LIFE MEMORY in the validation and demonstration of AnMBR technology application in WWTPs for energy and water recovery. The activities carried out to achieve the objectives proposed were: to evaluate the effluent quality, to improve the energy balance of wastewater treatment, to evaluate different operational conditions in order to find the optimal performance, to maximize methane recovery from the effluent, to obtain critical parameters for optimum design and operation at full scale, and to establish guidelines for monitoring and controlling the process.

2. PARTNERS

FCC AQUALIA

Category: **Coordinating Beneficiary**

FCC Aqualia, S.A. is the water management parent company of FCC, one of the largest European services groups. FCC Aqualia serves more than 23 million people. FCC Aqualia's activity comprises 3 major areas among which it creates synergies in knowledge, methodology, research and development, working with local partners and administrations. FCC Aqualia responds to the needs of all parties, private and public, at all stages of the water cycle, providing water for human, industrial, and agricultural uses. Its main activity is the management of municipal water services. For R&D, FCC Aqualia has its own Innovation and Technology Department, in charge of over 16 industrially oriented demo projects, and has international activities focusing on Portugal, Italy and the Czech Republic as well as Latin America. Design-Build-Operate Contracts for major water and wastewater infrastructure are currently being executed in Romania, FYR Countries, North Africa (Algeria, Egypt, and Tunisia), Colombia, Chile, Mexico and Panama. Moreover, Aqualia has a long experience developing innovative solutions for wastewater treatment, as its main is the management of municipal water services.

KOCH MEMBRANE SYSTEMS

Category: **Associated Beneficiary**

As a world-class manufacturer of innovative membrane filtration solutions, KMS is your global resource for advanced membrane technology, custom-engineered systems and exceptional customer support. With more than 20,000 system installations worldwide, his solutions serve many needs and industries – helping customers minimize their costs and footprint while maximizing productivity. His vision is to be the global leader in the application of membrane solutions that address the filtration needs of his customers

UNIVERSITAT DE VALÈNCIA

Category: **Associated Beneficiary**

The research team of Universitat de València has studied during the last two decades the following wastewater treatment processes: biological nutrient removal, primary sludge fermentation, anaerobic sludge digestion and phosphorus recovery. During the last years, the research has been focused on the study of submerged anaerobic membrane bioreactor technology (AnMBR) and the feasibility

assessment to treat urban wastewater at ambient temperature. This research line also includes effluent post-treatment technologies and maximization of resources recovery (organic matter, nutrients and water reclamation): biological nutrient removal using methane as carbon and energy source, and nutrient recovery by microalgae cultivation (as renewable energy resource).

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

Category: **Associated Beneficiary**

The research team of Universitat Politècnica de València has been working for two decades on the integrated physical, chemical and biological processes that take place in wastewater treatment plants (WWTP), i.e. the biological removal of nutrients, primary sludge fermentation, anaerobic sludge digestion, recovery of phosphorus in the form of struvite and membrane bioreactor (MBR) applications for treating urban wastewater. The main aims of this research group are the transfer of research results to Industry and the technical assistance on the design, operation and optimization of WWTPs.

3. OBJECTIVE

The main objective of the After LIFE+ Communication Plan is the definition and implementation of an action plan to pursue the dissemination and communication of the project's results after its conclusion, which will be of benefit to many industries and municipalities by providing them an innovative solution for reducing the environmental impact, and trigger authorities to reduce pollutant's emissions and enhance water and energy recovery.

These actions will also deeply pave the way to the broad adoption of this more environmental-friendly technology.

The main activities that will be performed will include:

- Participation to dissemination events: fairs, exhibitions, conferences;
- Maintenance of the website until 5 years after the end of the project;
- Networking activities with end-users and authorities

4. STRATEGY FOR RESULTS COMMUNICATION AND DISSEMINATION

4.1 TARGET AUDIENCE

Each project partner has contributed to the dissemination of results specifically in its field of action. There is a wide diversity of potential beneficiaries, the main target groups being the stakeholders of the LIFE MEMORY project:

- Wastewater treatment companies
- Membrane technology companies
- Users who need to fulfil discharge regulations and treat their own wastewaters: such as food and beverage industries, paper mills, chemical plants, etc...

In addition, outside the private sector there are other types of target groups in this technology:

- Public authorities responsible for wastewater treatment
- Municipal, national and European authorities: an essential factor for the success of this technology is legislation. Adaptation of European legislation is necessary to allow the use of the AnMBR effluent as a high value-added irrigation water source without the need to remove nutrients.

Furthermore, there are several entities and associations interested:

- Communities of irrigators and farmers: In line with what was proposed in the Innovation Deal¹ “Sustainable wastewater treatment combining anaerobic membrane technology and

¹ Innovation Deal is an instrument that can be used at the initiative of innovators and is designed to bring together innovators, national/regional/local authorities in Member States and European Commission services in a voluntary, cooperative, open and transparent exercise with the aim to study in-depth whether any perceived regulatory barriers really exist in EU legislation or Member States implementing measures that hinder innovative commercial or industrial development in the Circular Economy. The Innovation Deal cannot derogate from existing EU legislation but may make use of the possible flexibility already allowed in such legislation. (European Commission, https://ec.europa.eu/research/innovation-deals/pdf/jdi_anmbr_042017.pdf).

water reuse”, the possibility of reusing water without eliminating nutrients opens up a path within agriculture, since the availability of a resource such as water, which with the passage of time is an increasingly scarce resource and with the nutrient content necessary for irrigation, means a reduction in the costs related to the addition of nutrients for the crop and reducing the risk of crop loss due to drought.

- Scientific community: Within the scientific community different groups of interest in the technology such as universities, technology centers, etc can be found. The information obtained from the project can be used for the development of improvements in the technology.
- Neighbourhood associations

4.2 DISSEMINATION AND COMMUNICATION ACTIVITIES DURING THE PROJECT

The dissemination activities within the framework of the Life Memory Project aim to promote the application of AnMBR technology. During the four and a half years of project execution, a large number of communication activities and dissemination of results have been developed. The main dissemination methods of the project have been articles in the press, articles in specialized publications (scientific journals, technical journals and magazines, etc.), radio, Internet, participation to conferences, fairs and exhibitions related to the project field and site visits by citizen groups and schools. Dissemination activities have taken place at National, European and International level and are summarised below.

Website:

The website of the Life Memory project: <http://www.life-memory.eu/en/home> has been used as an essential tool for the dissemination of the project on the Internet. In it you can find all the information related to the project, partners, results, reference material, as well as the dissemination of the project in different events and public documents of the project.

Below is a map of the influence of the visits and the activity of the website:

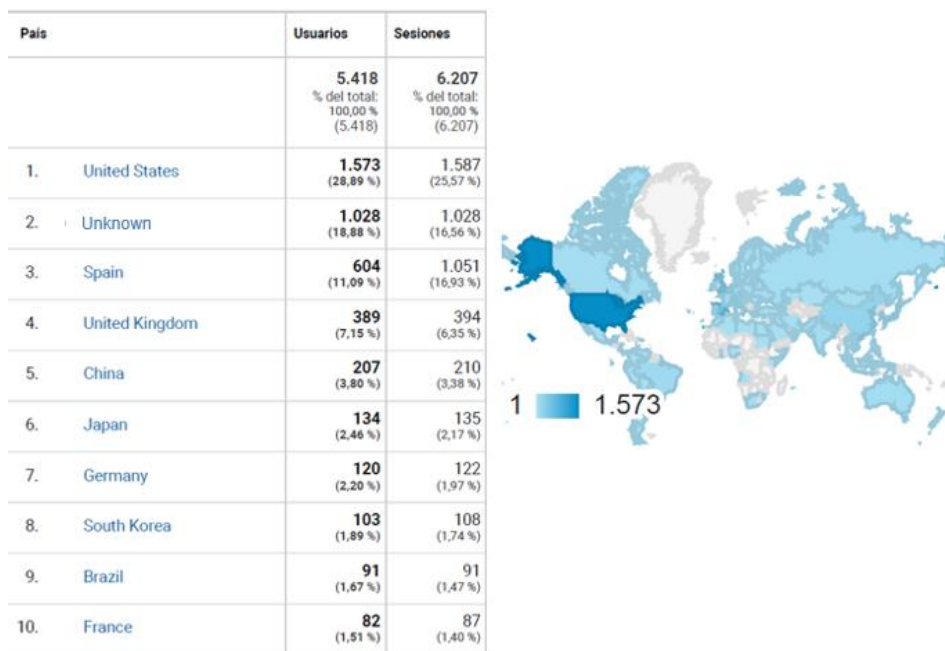


Figure 1: Visits by location

Descriptive leaflets

500 leaflets have been printed in Spanish and English with information on the project and have been distributed during participation in different events: conferences, fairs and congresses. These leaflets are also available in digital format and can be downloaded from the project website. In addition, information boards have been created and placed in the plant.

Visits to the plant

Since the implementation of the AnMBR in the treatment plant of Alcázar de San Juan has received a large number of visits mainly by students from different institutions in the area (16 visits with a total of 390 visitors) but has also received visits by all consortium participants and researchers from other institutions to conduct experiments with the plant.

Participation in events

Since the beginning the project partners have had a great participation in different events presenting the evolution and the results, below is a compilation of these activities:

- Technical Conference of Membrane Technology, organized by **AEDyR** in Madrid (17-18 September, 2014)

- **2nd EIP Water Conference** 2014. Connecting Innovation Demand and supply (4-5 November, 2014, Barcelona, Spain)
- “Water and Energy Exchange (**WEX**)” (23-25 February, 2015, Istanbul)
- **V Conference of Membrane Bioreactors** (28 May, 2015, Barcelona, Spain)
- Workshop in the **Residuals and Biosolids 2015** (7-10 June, 2015, Washington DC)
- **14th World Congress on Anaerobic Digestion** (15-18 November, 2015, Viña del Mar, Chile).
- **3rd EIP Water Conference 2016** (10 February, 2016, Leeuwarden, The Netherlands)
- X Conference “Water and Energy Exchange (**WEX**)” (29 February – 2 March, 2016, Lisbon, Portugal)
- **5th IWA/WEF Wastewater Treatment Modelling Seminar 2016**, (2-6 April, 2016, France)
- **LIFE AQUASEF Networking** Workshop (18 May 2016, Madrid, Spain)
- 13th IWA Leading Edge Conference on Water and Wastewater Technologies **LET2016**, (13 - 16 June, 2016, Jerez de la Frontera, Spain)
- **XII Spanish Roundtable on Water Treatment (META)**. (20 - 22 June, 2016 Madrid, Spain)
- 3rd IWA Specialized International Conference Ecotechnologies for Wastewater Treatment - **EcoSTP 2016** (27 - 30 June, 2016, Cambridge, The U.K.)
- **iAgua Magazine** #12 presentation. Discussion about current models of wastewater reuse (27 September, 2016, Madrid, Spain)
- Technical conference of **New technologies applied to the Wastewater Treatment Sector**, organized by EPSAR (3 November, 2016, Valencia, Spain).
- Jornadas Técnicas FACSA: Economía circular en el saneamiento y depuración de aguas. (15-16 November, 2016, Castellón, Spain)
- **IWATER** (17 November 2017, Barcelona, Spain).
- 1st Innovative Solutions for Water Management Forum (**SIGA**) (28 February - 3 March, 2017, Madrid, Spain).
- Jornada AEAS: Pasado, presente y futuro de la aguas residuales. (22 March, 2017, Madrid, Spain)
- 14th IWA Leading Edge Technologies (**LET2017**)(29 May - 2 June, 2017, Florianopolis, Brazil)
- 12th IWA Specialized Conference on Instrumentation, Control and Automation (**ICA2017**) (11 - 14 June, 2017, Quebec, Canada)
- **VI Conference of Membrane Bioreactors** (14 June, 2017, Barcelona, Spain)
- Workshop “**Membranes for water treatment and reuse**” (15 June, 2017, Girona, Spain)
- LIFE Platform Meeting on Climate Action in Urban Areas. (21-22 June, 2017; Barcelona, Spain)

- Water Technology and Environmental Control Exhibition & Conference (**WATEC 2017**)(21 June, 2017, Palermo, Italy)
- Aplicaciones Tecnológicas para la gestión, tratamiento y valorización de fangos y lodos. (6 July, 2017, Madrid, Spain)
- **8th IWA Membrane Technology Conference & Exhibition for Water and Wastewater Treatment and Reuse** (8 September, 2017, Singapore)
- European Innovation Partnership (**EIP**) Water Conference 2017 (27-28 September, 2017, Oporto, Portugal)
- EU Workshop: Boosting Research & Innovation in the Water Sector (29 September, 2017, Oporto, Portugal)
- 15th IWA World Conference on Anaerobic Digestion – **AD-15** (20 October, 2017, Beijing, China)
- Encontro Nacional de Entidades Gestoras de Água e Saneamento (**ENEG 2017**)(21-24 November, 2017, Évora, Portugal)
- LODOS 2017 - VII Jornada sobre gestión y tratamiento de lodos de EDAR (22 November, 2017, Barcelona, Spain)
- **WWT Water Industry Energy Conference 2018** (12 June, 2018, Birmingham, The U.K.)
- **Water & The Circular Economy Conference** (14 June, 2018, Liverpool, The U.K.)
- XIII Spanish Roundtable on Water Treatment (**META**) (18 – 20 June, 2018, León, Spain).
- IWA Specialized International Conferences on Ecotechnologies for Wastewater Treatment (**ecoSTP**) (25-26-27 June, 2018, London, Canada)
- **Singapore International Water Week** (8-10 July, 2018, Singapore)
- **Euromembrane 2018** (9 - 13 July, 2018, Valencia, Spain)
- **IWA World Water Congress & Exhibition** (16-21 September, 2018, Tokyo, Japan)
- 1st Workshop of the **11th International Conference on Urban Drainage Modeling** (23 September, 2018, Palermo, Italy)
- **XII Technical conference of AEDyR**, where was presented the Life Memory Project (23-25 October, 2018, Toledo, Spain).
- Green and Circular economy – **ECOMONDO**. Future challenges in nutrient research, development, innovation and implementation. (6 – 9 November, 2018, Rimini, Italy).
- **EurEau Annual Congress Limassol** (8 November, 2018, Cyprus)

It is possible to observe the diversity of events related to different areas of the Project, such as conferences, fairs, congresses, workshops and networking activities with other projects. It is also important to point out that scientific works related to the LIFE MEMORY project have been selected as oral presentations in very advanced and competitive scientific events (such as IWA Biannual, LET and

AD conferences) demonstrating the high quality of the work performed within the development of the AnMBR technology.

Articles and publications in the media

The dissemination of the LIFE MEMORY project in the media has been very intense: newspapers, television, radio, especially digital press and a large number of participations in specialized magazines.

Type of media	Type of participation	Number of participation
Technical press	Articles	27
	News	12
Regional press	Articles	1
	News	8
	Interviews	4
TOTAL		51

4.3 DISSEMINATION AND COMMUNICATION ACTIVITIES AFTER THE LIFE PROJECT

Website:

The project's web page has so far been a fundamental tool for the dissemination of the project given the high rate of registered visits from different parts of the world. This website will remain available for the next 5 years after the end of the project.

It will be regularly updated with information on dissemination activities carried out after the end of the project. In addition, project information will continue to be available on the project website in downloadable format. The Layman report with the results of the project will be available in Spanish and English to increase the potential number of readers interested in the project.

Descriptive leaflets

Leaflets with the fundamental information of the project, such as the final results, will continue to be distributed in the different events that the project partners participate in with the purpose of looking for new people interested in using the AnMBR technology in new projects, either research or implementation on a real scale.

Participation in events

The Life Memory Project has had a great presence in a variety of regional, national and international events. Once the project is finished it will continue with this great participation given the good results obtained, which will be presented in different fairs, congresses, conferences, etc... In these events, dissemination material will also be distributed (brochures, posters, rollup, etc.).

As for upcoming events, there will be an oral presentation at the 16th World Congress on Anaerobic Digestion, in Delft (The Netherlands). Nevertheless, the Memory project will continue in different events in an indirect but very present way given that after the great success of the AnMBR, there are numerous projects that include this technology as an important part of their process.

Articles and publications in the media

Until the end of the Project, numerous articles were published in specialized technical journals and also in regional and national press, as well as radio and television interviews.

After the end of the project, all the partners will continue with these dissemination activities of the project, each of them will be responsible for disseminating the project in the media they have available.

Articles continue to be generated after the operation of the plant, having 3 articles and 1 book chapter in edition for publication.

Replication to other WWTPs and to other sectors

One of the main objectives of the dissemination of the project is to replicate this technology both in wastewater treatment plants and in other types of industries.

Different projects have been launched based on the AnMBR technology, such as the LIFE METHAMORPHOSIS project (LIFE14 CCM / ES / 000865) and the H2020 RUN4LIFE project (GA 730285).

Replicating this technology in wastewater treatment plants on an industrial scale is already a fact. Recently the first urban wastewater treatment plant (WWTP) based in the AnMBR technology has been launched in Bitem, Tortosa (Tarragona).

This technology has many benefits and applications being easily replicable especially making a reconversion in places with wastewater stations based on aerobic MBR technology providing a high

reduction in energy consumption. In addition, aerobic MBRs are already established in the market, which may give the evolution of the AnMBR a greater momentum.

On the other hand, at a global level it can provide a solution in places where reuse needs are high, such as areas of water scarcity (in the Mediterranean basin, throughout the southern U.S. such as Florida or Texas, Middle East and Asia). This in addition to the places where weather conditions are favorable to increase the yield of organic matter valorization and therefore of a high biogas production that can be an important source of energy.

Another type of application is in different types of industries that must treat their water before discharging and who have a very high organic matter content and therefore can transform it into energy, such as the food and beverage industries. In addition, all types of industries that can easily integrate reused water into their production process, such as paper industries and industries that do not have enough space to install another type of conventional technology to purify their water, since with AnMBR technology the surface area required for installation is reduced by 25%.

However, in order for this technology to evolve and replicate rapidly, it is necessary to adapt European legislation to allow the effluent to be used as irrigation water with a high added value without the need to eliminate nutrients. In order to close the circular economic cycle adopted by the European Commission, an instrument called Innovation Deal¹ on Circular Economy has been created.