

ROADMAP FOR INNOVATION IN THE WATER SECTOR

REGION OF MURCIA

Policy instrument	Regional Operational Programme 2014-2020 for the Murcia Region. Measures 01-1b																
Definition	Measure 1b focuses on the development of links and synergies between enterprises, research and development centres and the higher education sector. It promotes among others eco-innovation and public private partnerships.																
1. Introduction																	
1.1 Current situation	<p>Water management has been identified as a key issue for the region (RIS3), as the Region of Murcia is suffering an important scarcity of water which is conditioning the most of their industrial activities. The region aims to reduce the consumption of water by 10 % without reducing the irrigation surface because of the agricultural activity is developed in rural areas with very few industrial possibilities.</p> <p>It is therefore particularly important to foster innovation and the innovation chain (cooperation between administration, enterprises and research) in the water sector, helping the local companies to stay competitive and to be able to cope with the scarce resources.</p> <p>All actors, research centers, enterprises and public administration, involved in the development of the water sector are known and collaborate in accordance with their lines of work to achieve a sustainable economy in the Region of Murcia, but communication/knowledge exchange is mainly to achieve success in calls for projects proposed by the regional administration and other national and international calls. The communication/knowledge exchange in each branch of triple helix is the following (0 – no communication, 5 – excellent communication):</p> <table><tr><td>Murcia – ES</td><td>Administration</td><td>Academia</td><td>Business</td></tr><tr><td>Administration</td><td>-</td><td>3</td><td>3</td></tr><tr><td>Academia</td><td>3</td><td>-</td><td>3</td></tr><tr><td>Business</td><td>3</td><td>3</td><td>-</td></tr></table> <p>An important proportion of water consumption is dedicated to the production of food. In order to meet this demand, new ways of obtaining water are currently being researched, improving water efficiency, but also good practices that are based on training are essential, and policies often support them. Currently, policies in this community boost private investment to achieve quality solutions. The Region of Murcia has a high number of SMEs and it is very difficult for them to access financing to achieve new technological development. However, the economic activity inherent in the private sector is what guarantees the maintenance of the Welfare</p>	Murcia – ES	Administration	Academia	Business	Administration	-	3	3	Academia	3	-	3	Business	3	3	-
Murcia – ES	Administration	Academia	Business														
Administration	-	3	3														
Academia	3	-	3														
Business	3	3	-														

State and the sustainability of public services. For this reason, the budget of the Autonomous Community of the Region of Murcia is aimed at expanding the items for the promotion of economic activity and job creation. The maintenance of the Welfare State must be compatible with the allocation of greater resources for investments that stimulate the private sector and promote the development of the regional economy. Spain has a participatory management of water because the hydraulic confederations (public administration) discuss how to use water and the government of the Region of Murcia considers the efficient use of its water resources as a priority. However, there are insufficient rates to recover the costs incurred in the water services and undertake new investments.

The rate impact of policies is the following:

Region	Administration	Academia	Business
Murcia - ES	5	4	3

Nowadays, the Region of Murcia is highly successful in the optimal management of its water resources. Among others, the strategic project RIS3Mur Reusagua, funded by the Ministry of Employment, Universities, Business and Environment of the Region of Murcia, within the framework of the Regional Operational Programme 2014-2020, faces the challenge of producing and using regenerated and safe water in controlled crops, as well as managing the available water resources according to their quality, availability and needs. This project is in line with the triple helix innovation model to promote the economic development of the Region of Murcia.

1.2 Problems

Many regional institutions have competencies in water and funding seems not to be focused to guarantee the placing on the market of technological solutions and their implementation in the agrifood system of the Region of Murcia, which is of high importance. A single agency should coordinate all these competences so that financing reaches the companies and regional development is guaranteed.

1.3 Definition and objective of roadmaps

The roadmaps will provide an overview of the Region of Murcia's water supply needs and will assist in the creation of a technology progress plan.

The roadmaps should make it easier the access funding. For example, water reuse and wastewater treatment plants as well as the modernization of irrigation systems should be tackled. This could for example be carried out through targeted calls or improved support for such initiatives or also revised selection criteria and specific priority areas, that address particularly water management issues.

2. Roadmaps

2.1 Critical Mass Development Model

2.1.1 Goal Definition

This roadmap aims to improve the stable **economic growth of the sector of water technologies** in the Region of Murcia through innovation and knowledge of R+D+i. The current research groups and

training and technological centres will increase their capacity by participating in a greater number of research and demonstration projects. The companies of the Region will benefit from the advances and will be able to reach an economic advantage by the efficient use of the water resources.

2.1.2 Approach

- **Which sector will be targeted/focused on?**

This road map is mainly aimed at the agri-food sector of the Region of Murcia due to the high water consumption of this sector, both at agricultural and at industrial levels. Urban wastewaters will be studied too.

- **How each region will improve the development of Critical Mass of the innovation ecosystem within their region?**

Region of Murcia will improve the development of its critical mass by reducing risks in the collaboration of all the involved stakeholders, favouring the knowledge of its success cases and their technological, financial and innovation needs through a proper communication channel. Stakeholders opinions should produce changes in political decisions and become in a political debate for the development of the Region.

- **Description of steps to improve innovation policies for enhancing the critical mass development of innovation ecosystems in the water technology sector.**

The steps to improve innovation policies in water technology are:

1. Funding lines aimed at training, research and technological centres based on indicators that guarantee quality results.
2. Generation of technical reports aimed at public administrations including environmental and socio-economic impact assessment.
3. Dissemination reports for final consumers and general public in order modify their consumption habits and inform them about the water problem in Region of Murcia. This social impact should generate new needs and legislations.

- **Description of steps to establish an integrated network in each participating region where research and innovation efforts are commonly shared between knowledge institutions, local stakeholders and policy makers.**

The main step to achieve an integrated network is the creation of a Single Regional Agency that coordinates efforts to:

1. Promote the participation of stakeholders in working groups. Directors and technicians must participate in the decision-making process.
2. Guarantee the participation of different groups of training, research and technology in the funding calls. Calls should have a multiactor/multiapproach focus. Example of beneficiaries: University, company and training centre, Technological centre, company and policy maker, etc.

3. Provide platforms for information exchange among stakeholders. Specialized forums

In this way, it could be created the Water Agency of the Region of Murcia dependent on the Regional Ministry of Water, Agriculture, Livestock and Fisheries and that would include researchers, companies and training personnel.

• **Description of how will funding synergies be increased and what can OP ERDF contribute to this development?**

In the Region of Murcia, the training, research and technological centres and organisms have a demonstrated good experience in Horizon 2020 programme, so it is expected to have a good participation in the next Horizon Europe that will finance R & D and will serve as the basis to achieve their basic knowledge. LIFE Program that finances the demonstration of these technologies and guarantees the dissemination of results is also well known in the Region of Murcia as well as other programs that allow the entry of knowledge from other regions/countries or enhance the business R+D+i activities to achieve proximity to the market. All these programs can achieve the entry of funds for different actions in the same project or favour the continuity of projects, guaranteeing the development of the critical mass capable of producing business plans, managing intellectual property rights and attracting investors.

On the other hand, the ERDF operational program for Sustainable Development seeks to cover the need to achieve water quality and indicates that investments must be made in environmental infrastructures that guarantee compliance with Directive 91/271 / EEC and must be a fundamental objective of the policy to promote the reuse of purified water to increase the availability of water resources. Therefore, the ERDF operational program may provide funding to achieve the implementation of innovation technologies in the treatment of wastewater and its future reuse.

In summary, many programs guarantee R+D+i and ERDF funds guarantee the implementation of innovations and new technologies in our Region.

2.2 Human Resources

2.2.1 Goal Definition

This roadmap aims to improve the stable and sustainable economic growth of the sector of water technologies in the Region of Murcia through the qualification of human capital and betting on retaining talent. All level students should have specific courses in Water Management and Development of Sustainable Technologies to maximize the efficiency of water resources in the Region of Murcia.

2.2.2 Approach

• **Description of steps to develop the human capital roadmap**

The steps are focused on the analysis and understanding of current needs to achieve a specific qualification and retention of talent to be applied in the business sector of water. Actions must be done to guarantee the labour market for the human capital.

1. Description of the job profiles demanded in the companies. Working groups with companies will be encouraged.
2. Evaluation of technological advances and areas of knowledge, from technological surveillance to equipment manufacturing.
3. Preparation of training programs, in collaboration with training centres, universities, etc., with visits and internships in companies, in such a way that technical vocations are encouraged among the youngest.
4. Encourage the participation of researchers in training projects.

- **Description of steps to improve integration of entrepreneurship into the education profiles**

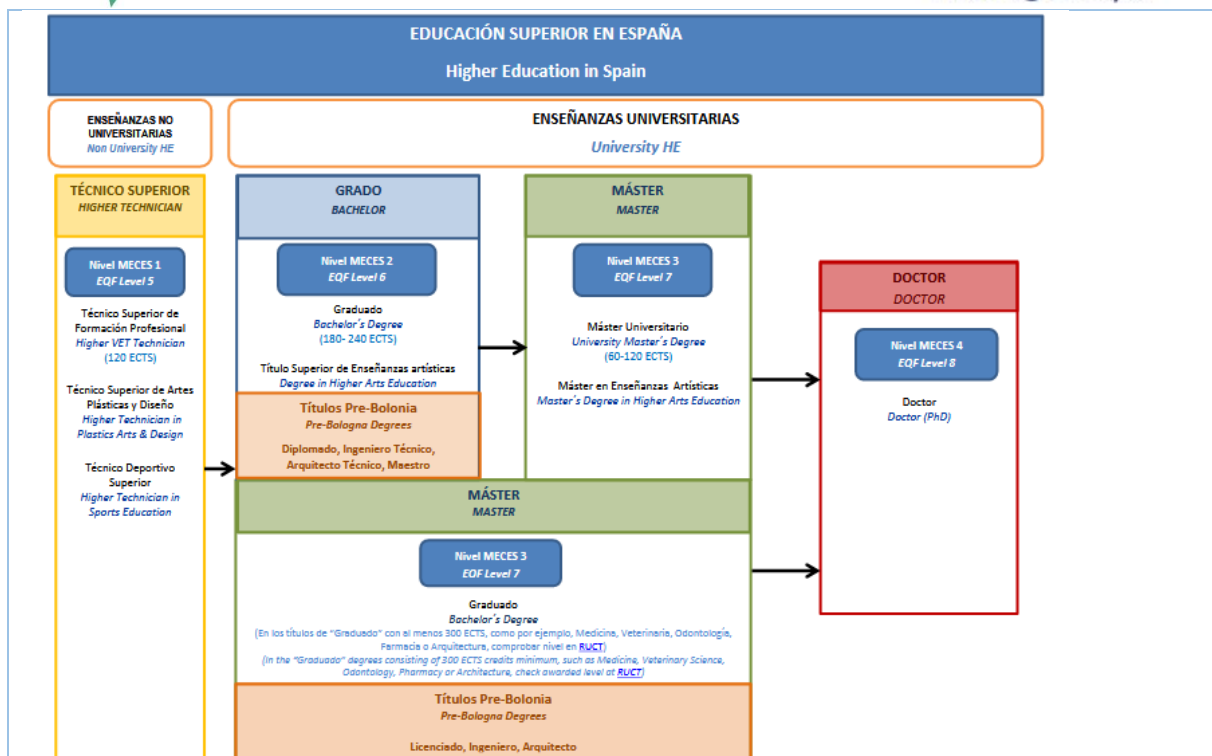
The steps will be based on guaranteeing generational change and entrepreneurship in the agro-food system for the generation of sustainable green employments through the transfer of water related knowledge throughout the critical mass and working on awareness at all levels of training.

1. Include teachers with technical and business experience in the training programs.
2. Update of the current teaching staff through continuous training in collaboration with research and technological centres.
3. Promote the increase of collaboration agreements between companies and training centres, which bring professional experience to students through pre-professional practices.
4. Bring the best available techniques to students at the intermediate and higher levels, to raise awareness of the need to modernize the water sector.

- **How far are the various EQF (European Qualifications Framework) levels represented in the education profiles of the region, connected with the innovation ecosystems?**

EQF takes into account all levels of qualification of general education, vocational training, academic education and other types of training, but does not associate degrees.

In Spain, the Spanish Qualification Framework for Higher Education (MECES) is being implemented, from level 5 to level 8, which may be connected with innovation in University level and Non-University Higher Education.



- Are there other instruments or support programmes in your region? If yes: Can these programmes be more interesting for applicants? What is the awareness about them in different branches of triple helix? What should be done to increase the awareness and encourage potential partners for application? If not: what steps should be taken to introduce such programmes in your region?

The Employment and Training Unit of the Region of Murcia (Sefcarm), through the Spanish Ministry of Employment and Social Security, encourages the development of training courses. In addition, the Erasmus + program of the European Union, which favours the training of technicians through the exchange of knowledge with other regions.

These services or programs are offered to the population in general and to students of professional training and university and receive support from the public administration for the accreditation of training demanded by the market. Some of the teachers are technicians of companies and personnel of research centres and technological centres. In addition, associated professors in the public universities of Murcia develop their professional activity in external companies.

- Which elements are concretely missing? Can these be addressed through OP ERDF?

It should be necessary more funding to expand aids to projects in strategic public-private cooperation in the Region of Murcia, as well as to create educational infrastructures in water issues (levels of Primary and Secondary Education, University Education and Vocational Training), in order to expand and improve the training offer and develop the labour potential of the Murcian population, highlighting the construction of practice laboratories in the training facilities. In addition, a higher funding would allow the hiring of personnel from the agriculture, industrial and

business sector to bring innovation to basic and specialized training and continuous education of current teachers.

This improvement can be achieved through the OP ERDF of Murcia 2014-2020, whose main objective is to promote the development of the Region of Murcia and the creation of employment. Among its main objectives is to reorient the regional productive sector, strengthen the competitiveness of SMEs and bet on entrepreneurship, in addition to strengthening the Social Welfare system in education and therefore awareness for the development of our society.

2.3 Internalisation roadmap

2.3.1 Goal Definition

To improve the stable economic growth of the sector of water technologies in the Region of Murcia through connectivity with other knowledge regions outside Spain, which facilitate Region of Murcia water innovation making use of environmental sustainability. New collaborative and exchange of personnel projects will serve both, to solve Region of Murcia water technology needs and also to put on the international market technological solutions in the water sector.

2.3.2 Approach

- **In which areas is internationalisation of the innovation ecosystems required?**

Region of Murcia is characterized by its scarcity of water resources, which make R + D + i necessary for the efficient use of water. Region of Murcia should work to promote the capture of international knowledge, but also to put on the international market our progress in relation to the modernization of irrigation, universalization of drip irrigation and wastewater treatments for its reuse.

- **Identify barriers for students or staff exchanges. Describe steps to overcome these barriers.**

English language is the main barrier for the exchange of students and / or staff from the Region of Murcia. It would be necessary to propose a series of steps that favour the learning of “practical” English language from basic education levels and encourage the presence of translators in the business sector. Nowadays English language is studied in all those levels but mainly written not allowing the students to have a fluent conversation in English.

1. Increase in the teaching hours of English language subject in primary and secondary school prioritizing the conversation. Promoting the exchange of students in secondary school.
2. Promotion of international events in the Region of Murcia.
3. Expansion of collaboration agreements at international level, with linguistic training support at destination.
4. Creation of international experts committees related to the water sector.

- **Is there a possibility for interregional collaboration regarding environmental challenges? E.g. research or demonstration projects. What should be done to intensify such actions? What are the main barriers for interregional collaboration?**

One of the strengths of the Region of Murcia is the scientific cooperation between the Region of Murcia and other neighbouring regions, as well as abroad. In this regard, the integration of the Region of Murcia in international organizations and networks for science, politics and governance of water in the Mediterranean basin is noteworthy.

Region of Murcia participates in numerous environmental projects with European funding that include an international consortium. The Region participates in many LIFE projects of the European Union, where the water sector is one of the addressed topics and it is possible to demonstrate the most innovative technologies. Therefore, there is a possibility of interregional collaboration. In any case, to increase this interregional cooperation, its critical mass should be supported by the regional and national public administrations involved in regional development, international funds and foreign cooperation, as well as by the commercial offices of the Spanish Embassies in other countries.

On the other hand, the main barriers for interregional collaboration in the Region of Murcia are the language and the size of its companies, which are mainly SMEs. The Region is in the middle of a generational change and it is necessary to ensure that new technicians, researchers and entrepreneurs have qualified training, with knowledge of several languages and that SMEs have access to funds for the financing of international actions.

- **Is it possible to formalize cooperation between innovation ecosystem, to support star-ups, students, researchers or research projects? What should be done to stimulate such cooperation?**

In the Region of Murcia, collaboration agreements and letters of support are used by companies and the scientific-technological sector to ensure cooperation in the development of the water sector.

Region of Murcia shows a lower degree of internationalization of its universities compared to the rest of Spain. Masters and Degrees in English are not offered to the students, although the exchange of students and teaching staff as well as their participation in international projects is similar to the rest of Spain.

In any case, it is necessary to increase cooperation through the internationalization of companies, training centers and research centers. To this end, the collaboration of companies with international specialists or companies should be encouraged to increase the network of contacts in areas that show synergies with the Region of Murcia. It is also necessary to find appropriate solutions for SMEs.

- **How OP ERDF can support interregional collaboration?**

Internationalization is one of the priorities of the OP ERDF of the Region of Murcia and for this reason it supports the incorporation of internationalization into the strategy of regional SMEs. Through

collaborations and development of interregional projects, the complementarity of each Region can be a competitive advantage for the technological development in the water sector.

In addition, OP ERDF can support the organization of international events dedicated to interregional collaboration and propose funding calls aimed at promoting the internationalization of companies in the Region of Murcia in competitive calls.

- **Realistic assessment of creating the conditions for raising competitiveness, growth and jobs in the regions.**

Region of Murcia has launched its Circular Economy Strategy 2019-2025 with eight lines of action within which 51 specific measures are integrated, with a total investment of 510.4 million euros, which could generate directly about 2,000 'green' jobs and keep another 21,000. This Strategy has been prepared with the participation of experts and technicians from six regional ministries, as well as economic and social agents, as well as 60 representatives of universities, technological centers and research organizations, social and environmental organizations, business associations or agricultural and trade union organizations.

This strategy seeks to produce a transformation in the production systems of companies in the Region of Murcia and a change in consumption habits to use resources more efficiently, strengthening the business and industrial sector of the Region of Murcia, create "green" jobs linked to new business opportunities.

The regional importance of water is so high that the fifth line of action is devoted to efficient use of water. This action line includes 5 actions totalling 205.3 million euros, that is, 40 % of the total budget. In this area, the Region of Murcia will develop programs to improve irrigation systems and reuse purified water (87 million euros); and other types of measures related to the improvement of sanitation or the operation of waste waters treatment plants. Finally, within this Strategy a favourable system for the accumulation of human capital specialized in the water sector in the Region of Murcia will be raised to achieve its sustainable development while obtaining competitive advantages from the use of innovative technologies.

- **How internationalisation could contribute to critical mass development in participating regions?**

Internationalization within the water sector should allow an increase of scientific and technological knowledge, being able to optimize the hydric resources of the Region of Murcia and its sustainability, as well as reaching a greater volume of business in exports due to the greater commercialization of technological products that provide sustainable solutions in other European regions.

C. Conclusions

- **Identified limitations and outlook**

It can be highlighted that the Region of Murcia has systemic shortages of water and must work on the development of innovative and sustainable technologies for an efficient use of its water resources, highlighting lines of work in reuse and awareness of the population.

There are many institutions (public and private Research Centres and Universities, Technological Centres, Training Centres, private companies, policy makers, local and regional administrations, etc.) working in water issues but a higher level of coordination should be desirable. A unique Regional Agency on Water could coordinate all the regional activities to promote innovation and sustainability in the Region.

Region of Murcia Circular Economy Strategy 2019-2025 with 40% of its budget for water issues is a good tool to improve innovation in water technologies in the near future.