

ARAGON'S WASTEWATER TREATMENT ACTION PLAN 2008–2015. HORIZON 2015

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Abstract

After developing the Special Plan of Wastewater Treatment in Aragon (SPWTA) which implicates the construction of 132 wastewater plants and the treatment of cities up to 1000 equivalent inhabitants, the Aragon Government is evaluating the challenge of Horizon 2015: to reach the target of zero equivalent inhabitants and purify 100% of the waste waters in Aragon.

With this paper we wish to expose the pillars on which the Department of Environment is basing its project to develop the Plan for Sanitation and Wastewater Treatment in Aragon (PSWTA) which will be implemented with its ultimate completion.

Introduction

In 2004, the situation in wastewater treatment in Aragon, and the need to fulfil the Water Framework Directive and other Spanish and European regulations have raised the need to address this challenge in an orderly and coordinated way.

The Government of the Autonomic Community of Aragon, through the Department of Environment, undertook the development of the Plan for Sanitation and Wastewater Treatment in Aragon (PSWTA). In a first phase, the Aragon Water Institute and SODEMASA were instructed to direct and to control the Special Plan of Wastewater Treatment in Aragon (SPWTA). The PSWTA develops the treatment of wastewater in 171 towns with a population over 1.000 equivalent inhabitants with the construction of 132 wastewater treatment plants (WWTP) to achieve the removing of the 90% of the pollutant load of the Aragon's urban waters.

While the SPWTA is at its last phase of implementation, Department of Environment of Aragon and the Ministry of Environment, Rural and Marine Affairs signed in 2008 a collaboration agreement for development of works in the water cycle. As part of this agreement fits the Integral Plan of Wastewater Treatment in the Aragonese Pyrenees (PWTAP), which aims to expand the sewage

treatment to all centers of population below the 1,000 equivalent inhabitants, beginning the works in an area of high environmental value as the Pyrenees.

Methods

The main objective of the PWTAP, the integral treatment of all the inhabited areas of the Aragonese Pyrenees, has been strongly conditioned by unique features: a mountainous area with strong and sharp orography; great natural value of the affected environment; many inhabited centers with little regular population and strong seasonal variation; complex climate conditions; demanding deadline constraints and the need for a solid study of the economic feasibility of the project. In order to carry out the objectives on time and manner, a strong effort was made in terms of planning, design and administrative processes, in truly exemplary deadlines.

The works, started in late 2007, have been developed with a meticulous planning of contents and deadlines. This has allowed that today the Constructive Projects of the area of the Pyrenees are in an advanced stage of drafting.

Thus, from the beginning it was necessary to carry out many technical studies. Although they are common in the design of a WWTP, they have implied a remarkable complexity in coordination due to their large number. There have been carried out many studies of location of the facilities, analysis, evaluation, selection and design of optimal treatment technologies and the technical characteristics necessary, studies and analytical of water flows and geotechnical, archaeological and paleontological studies of the work areas. It has been especially important the work on the study of environmental effects of all treatment plants, so that more than 60 environmental impact studies that were prepared and processed by the Administration.

Results and discussion

As a result, 279 preliminary projects have been drawn up, and the tender, awarding and the commencement of the constructive projects, which means the participation of numerous technicians from both the Administration and SODEMASA technical team, as well as over 40 engineering and construction companies involved in the work.

With regard to technological and treatment aspects, the high complexity of the boundary conditions and the required uniformity of criteria and treatment solutions has involved the design, of modular and standardized technical solutions from the beginning.

Thus, the 292 inhabited places to treat in the Pyrenees (see Fig. 1) were classified by size and needs of treatment by establishing different steps. After a technical analysis, population steps were defined allowing the design of typified WWTP for each segment of population, simplifying and solving technical discrepancies

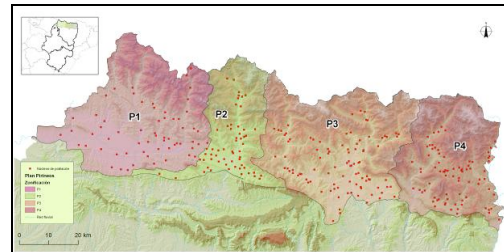


Figure 1. The PIDPA: 292 inhabited places to treat

The steps are defined after an analysis of needs and cost optimization in three groups. The first group includes all population places with up to 100 equivalent inhabitants (e.i) with the assignment of three different types of waste water treatment plants. The second group includes population centers from 101 e.i. to 1000 e.i. and 5 types of WWTP; and the third group includes larger population centers, in which each plant is designed individually. The typology selected and designed in each preliminary project takes into consideration these criteria.

The WWTP of the first group are designed with technologies based on a basic pretreatment and a three-chamber septic or Imhoff tanks such were improved with a biological filter that ensures a proper treatment of certain population centers with a low waste water production. The second group of WWTP (101–1000 e.i.) featured a mechanical pretreatment and a secondary biological treatment based in activated sludge processes. This technology is widely extended and has proven functionality. In the third group, the largest WWTP are designed individually.

As regard the economic and financial aspects, the PWTAP is designed as public-private partnership model through a public works concession including drafting of the Construction Projects, the execution of works and the operation for 20 years. The return of the investment is based on the cubic meters of wastewater actually treated by the concession holder. In order to define this, economic and technical studies of feasibility have been carried out, and those, together with the preliminary projects, ensure the proper development of the PWTAP. The total amounts in construction are over 326 million of Euros (see Table 1).

Table 1. The cost of the Plans

	Construction Inversion (Million of €)	Total Cost* (Million of €)
SPWTA	297	1062
PWTAP (Pyrenees)	129	358

*Includes construction, operation and financing

During 2009 and 2010, and once PWTAP was released, the logic progress requires the definition of purification needs in other locations on the rest of Aragon not listed yet. Essentially, consolidated population centers with a population of less than 1.000 equivalent inhabitants. Thus, demographic studies have been completed, as well as statistical and field studies of existing population centers, which have enabled them to select in a previous phase 851 population places to treat and to define their sewerage systems and treatment solutions in a future phase.

Conclusions

With the already acquired experience, it is possible to state that the model chosen of public - private partnership has demonstrated his feasibility. Of 132 WWTP in the SPWTA, 92 are in operation phase and the rest in process of construction. This way, the model has been adapted to the peculiarities of the Pyrenees to achieve the execution of almost 300 WWTP, reaching the treatment of the total wastewater of the area. Nowadays it is planned to study his extension to the rest of the Aragonese territory below 1000 e.i.

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