

WATER DEMAND MANAGEMENT IN ZARAGOZA

ACTIONS IMPLEMENTED IN ZARAGOZA FORMING PART OF SWITCH PROJECT

The main goal of water demand management in Zaragoza has been to reduce the consumption of drinking water in the city and improve its quality. Several actions that we will describe briefly now have been implemented within the working lines of Switch Project.

1. Sectorisation of the distribution network

Zaragoza has only one water treatment plant for the whole city and there are only known the results of the 325,000 existing water meters from the counters of the supply tanks. Therefore, it was difficult to value the origin and causes of non-measured water flows. Sectorisation was launched at the Actur, a district with 75,000 inhabitants from the 650,000 living in the whole city. Right now, there are 16 controlled sectors from the 95 in which the supply network has been divided. Further on, you will find more detailed information on sectorisation.

2. Characterisation of water demand in households.

A survey has been made on the attitudes, information, equipments and behaviour in households in relation to water use. This work will allow to increase the effectiveness of new campaigns to reduce domestic consumption.

3. Adoption of a new municipal by law for an efficient use of water.

In January 2011, the Municipality of Zaragoza has adopted the “Municipal By Law for Eco-Efficiency and Quality of Comprehensive water Management”. This by law, drawn up with the support of all the municipal departments involved, includes in a single text all the regulations of the City of Zaragoza for the management of the whole water cycle, including aspects such as quality of water, efficient use, circulation of sustainable habits as well as the right of citizens to be informed.

In a more concrete way, the new law includes some key aspects to continue to improve urban water management such as:

- Reduce water consumption in gardens by cutting down lawn areas, use of arid climate plants and improvement of watering systems,
- Reduce/stop the use of drinking water for certain uses,
- More efficient use of water in public and private buildings,
- Tracking of consumption of big consumers,
- Reuse of water from swimming-pools, etc.

This by law promotes also the removal of break tanks of buildings, since we consider them to be the biggest source of non-controlled consumption in the supply network.

4. Spreading of the Switch Project

During the development of the project, the city of Zaragoza has held the International Expo 2008 on Water and Sustainable Development and the Permanent Secretariat of the United Nations for 2005-2015. Taking advantage of these platforms, the Agency of Environment and Sustainability of the City of Zaragoza, as partner of the project, has boosted the participation of prominent members to spread its goals for improving urban water management towards more sustainable models.

It can be highlighted the participation of members from the management team of Switch Project in the thematic week “Water and City”, coordinated by the Agency of Environment and Sustainability of the Municipality of Zaragoza, and forming part of the exhibition on Water and Sustainable Development.



4. Projects implemented based on water management in Zaragoza.

Zaragoza, as demo city, has been the base to implement different research projects made by scholarship holders headed by Switch Projects. More concretely:

- Guillermo Penagos MSc, supervised by Peter van der Steen (UNESCO-IHE), who developed his thesis “Systems Analysis of Zaragoza Urban Water System (Spain): A Preliminary Assessment of Environmental Sustainability” in April 2007.
- Alba Martín, MSc, supervised by Chris Jefferies, professor of UWTC at Abertay University, who developed the thesis “An evaluation of two visualization tools for urban water management decision making SMURF and S-CITY VT. From a user’s point of view”, in June 2008.
- María de la Paz de San Miquel, MSc, supervised by Chris Jefferies, professor of UWTC at Abertay University, and her work “Simulation of the total urban water cycle in a neighborhood of a Spanish city and establishment of urban water sustainable indicators”, in November de 2007.
- Camilo Muñoz-Tochez, PhD, supervised by Ian Smout and Sam Kaya of Loughborough University, who is making the thesis “Incorporating energy use into the economic level of leakage Model”

6. Other actions

Linked to water management during the development of the Switch Project, there have been implemented other actions that have not been documented in reports by that fit into the goals of the project, such as:

- Water meters put in non-controlled consumption zones such as green areas
- Testing of leakage detection devices in the drinking water supply network
- In order to control with a bigger accuracy water distribution and consumption, the Department of Infrastructures is settling a computer system that will receive information every minute from the supply and sanitation network of the city
- One goal is to know the evolution of the volume of flow in relation to pluviometry. Therefore, water flow meters and pluviometers will be settled.
- Settlement of new storm tanks and adaptation of the existing ones to send data to the Department of Infrastructures on pluviometry, tank level and the possibility to pump water to the sanitation system after storms.
- During the last four years, only five times water has flown into these storm tanks. Therefore, the reuse of rain water collected by these tanks is not a top question such as is the reduction of leakages.
- In order to spread water culture, a multipurpose room has been built in the area of the water treatment and sanitation plant. This room will be devoted to education activities for groups of students and to courses and professional training.
- Forming part of the Program of Environmental Education and Sustainability of the City of Zaragoza, the Office of Environmental Education has developed many actions addressed to schools. Generic training brochures on water and other publications specifically on water treatment systems, the use and saving of water in households, and on the SWITCH Project have been used. Adequate activities to the age of the students in order to broad their knowledge on the water cycle, the importance of this resource, and its control and management have been implemented. Another sphere of action is the associations of neighbours and cultural entities, to improve their knowledge on water and secure a more efficient use.

The reports in Spanish and English on the sectorisation of the network and research on the characteristics of water consumption in households, can be found at the website. These are the key aspects.

7. Sectorisation of the network

A correct management of the water distribution system of the city is essential for reaching the general goal of reducing the volume of drinking water consumed and a more efficient use.

The plan and exploitation of the water supply systems affect directly the wise and rational use of water, and also implies –apart from the rationalisation of consumption policies for users- control policies and the reduction of leakages in storage and transport infrastructures.

The section plan of Switch Project aims at the development, application and showcasing of solutions contributing to implement projects for a sustainable and efficient use of urban water with a view to the “city of the future”.

Four measurement sectors of flow and pressure (DMAs) in the Actur area -forming part of the demonstration project for the management of water demand in the city of Zaragoza- have been planned and implemented.



Equipment for sectorisation control

Different “good practices” have been obtained from the experience learned from these first four sectors which are being used for drawing-up a survey on the systematisation of the water supply system of Zaragoza.

The system should reach, among others, the following goals:

- Guarantee the functionality of the system to provide an adequate water supply system for the city
- Optimise water saving, minimising uncounted leaks and consumption, and increasing control on the system.
- Decrease the costs derived from the implementation and exploitation of the system, improving and keeping its functionality and flexibility.

Making sections consists in creating areas adapted to the structure and functionality of the system, supplied from a unique point placed in the high network, where flows and pressure are controlled.

Thanks to sectorisation is possible:

- Fast detection of problems such as leaks and bursts.
- Control of leaks by sector. Comparison between consumption obtained at the control point of every sector and the whole consumption registered by the counters placed at the control points
- Data obtained for gauging the GIS simulation system.
- Data to be used for statistics and for an adequate interpretation of the way the system works, allowing a correct planning and a continuous improvement of its functionality.

Management of the service pressure

It has been proved the direct relation existing between pressure and leak flows. On the other hand, the quantity of water distributed by the system change every day, with demand peaks in mornings and evenings, followed by periods of low consumption at night and certain hours of the day. Therefore, tests have been made to reduce pressure when the distribution system suffers from an excessively high pressure.

8. Survey on the characteristics of domestic demand of urban water

The work “El uso del agua en los hogares de la ciudad de Zaragoza” written by Ramón Barberán Ortí and Manuel J. Salvador Figueras and published by the Agency of Environment and Sustainability, researches on the attitudes, information, equipments and behaviour in relation to the use of water in households.

This research, developed by the University of Zaragoza in collaboration with the City Council, aimed at improving knowledge on the factors affecting water consumption in households, and contributed to improve management policies on water demand for its conservation and spreading of its efficient use.

The research targeted on the residents in Actur-Rey Fernando district, and has been developed after selecting a representative sample of households.

405 households formed the sample, divided in three groups:

- A control group asked to fill out the general questionnaire
- A second group, “information and public awareness sample”, who was explained good domestic practices in the use of water, and were asked to fill out the second questionnaire in order to value their previous knowledge and attitude on the topic.

A third group, “saving devices sample”, to check the number and characteristics of water use equipments of households. After that, saving devices were installed or replaced.

The levels of average water consumption before and after the intervention data were calculated in every household of the sample. The results obtained show that the most important water consumption took place in households which were informed on good practices, about 13.22 l/day of water. There was also a reduction of water consumption in households with new saving devices in taps, around 9.45 l/day.

The research study presents the percentage of daily consumption of water and how may litres/day can be attributed to every use, as appear in these tables.

| Water uses | Percentage of consumption |
|------------------|---------------------------|
| Closet | 39.64-40.69 |
| Toilet and bidet | 20.69-21.24 |
| Shower and bath | 10.37-10.74 |
| Sink | 19.84-20.36 |
| Washing machine | 5.54-7.42 |
| Dishwasher | 1.53-2.04 |
| total | 100 |

The average level of water consumption by household is around 307 litres/day, and a consumption per capita of 101 litres/day. These quantities are not homogeneous and there is a lower consumption per capita as the number of members of the family increases.