LIFE06/ENV/IT/255

A.S.A.P.

Actions for Systemic Aquifer Protection

The ASAP project is partially funded by the European Union LIFE Programme

Model Calibration report & Technical paper

ASAP - Actions for Systemic Aquifer Protection - Implementation

(Rev. 0d)

Type of document:	Technical report
Deliverable n°:	D3.5
Author(s):	Acque Ingegneria
URI:	http://www.klink.it/gate/asap/area-di-lavoro/executing/3-06_products/t3-opt-cut/t3-6-model-calibration

ACQUE SpA Servizi idrici ACQUE

ACQUE INGEGNERIA

Province of Pisa

instituto tecnológico de galicia

http:www.klink.it/gate/asap

Confidential

Distribution allowed to the ASAP Project Participants
and the European Commission

(i) Thanks

This report is the result of Project ASAP Team work.

We thank Acque Spa that has supported the work and it has given his contribution to create the final document.

Finally, we thank all the people who have offered their support in the difficult task to analyse every matter and they discussed them patiently because of the connection between their activities and ASAP Project.

A particular thank to Franca Sussarellu for her assistance during the editing work.

Ing. Oberdan Cei
(o.cei@acqueingegneria.net)
Project manager

(ii) Contents

(iii) Document ‘s aim

The aim of this brief report is to specify the activities of calibration and optimization of the ASAP model following task activities .

(iv) Warnings

1. You have always to control the more recent version in ASAP Project page at the web address you can find at the top of the first page.

1 ==> MODEL CALIBRATION REPORT & TECHNICAL PAPER

This report is one of the deliverable foreseen by ASAP Project that is centred in Bientina ‘s aquifer (Pisa, IT).

Particularly, the document is related to the *Task 3.- Engine tuning of water-net and lowering of layer collection- Activity T3.6- Calibration model.*

In fact, the aim of the task is to put tuning the water-net in order to be as efficient as possible and to obtain the maximum possible result by water losses with the smallest possible number of interventions in the water-net to achieve immediately an efficient and effective reduction of water layer collection.

AIM

The aim of this brief report is to specify the activities of calibration and optimization of the ASAP model following task activities .

EXECUTION AND RESPONSIBILITIES

Acque Ingegneria (ACQING) is responsible for the report version and for his analysis.

2 ==> UPKEEP, RENOVATION AND RECALIBRATION OF EXISTING MODELS

After knowing peculiar working and critical sides of each district in which the net has been divided, mathematical modelling and his subsequent calibration, that has been made considering the starting state, has allowed to plan some interventions and to value system ‘s responses facing possible sceneries.

In order to reduce water losses which have an impact in a short or medium period of time on the volume of the water that can be saved they are proposed some useful methods, brought in the Asap protocol. They are the modulate regulation of water pressure in the time, that will maintain unchanged the minimal value of service level in critical points and the identification/repair of losses.

On the whole these activities involve a substantial alteration either geometrical or about hydraulic behaviour of the net and the consequent and progressive removal between the original model and the real state.

In fact, reducing losses and regulating pressure, they intervene either in spatial distribution of consumptions in a sector and therefore on flows circulation, or in the quantity of water introduced, making not appropriate the pattern used in the model previously calibrated.

Considering that the calibration executed minimizing the difference between the measured data and the calculated one don ‘t give only one combination of values of variables of the system (roughness and spatial movement of request), but only one of them, because of incoming data don ‘t coincide with the number of unknown quantities, it is necessary another phase of recalibration, which will give a new combination of roughness and distribution of request that make the model valid.

Consequently, it is executed in the net a second measuring of flow and pressure in order to value working variations brought to the system by interventions, compared to the previous state.

Obviously, the analysis of single district data has to restore a generalized reduction of water consumption, particularly of minimum night flow (QMNF) and the congruousity of the service level with the aim of interventions that has been made.

Some elements that have to be inserted in the hydraulic model are the new pattern of request discretized in a time-interval of 5 minutes that doesn‘t allow us to eliminate consumptions points and, if we execute the PDA analysis in function of water losses, new coefficients Kj ($qlos(t)_j = K_j \cdot P_j(t)^{\alpha}$) of each knot, calculated on the analysis of minimum night consumption.

The calibration is executed through a process of trial and error, regularly comparing flow and pressure data, measured in specific points of the net, with those given by the model until the optimization of that.