



WATER LOSS MANAGEMENT SMART NETWORKS





ABOUT MM



MM Spa

is a leading Italian engineering firm specialized in the design and construction of public transportation infrastructure and urban redevelopment projects promoting the sustainable development of the local area.

Founded in Milan in 1955, MM is responsible for the construction of the city's entire metropolitan rail system - 108 stations and over 100 km of track - and for major traffic and hydrological engineering projects.

MM is now able to export the solid experience it has developed in this sector to other major projects throughout Italy and abroad. It has participated, for example, in the construction of the metropolitan rail systems in Naples, Rome, Brescia, Turin, Copenhagen and Thessaloniki, the light rail systems in Padua and Venice, and the Autostrada 35 (BreBeMi).

MM Spa offers services ranging from project design to technical and financial assessments, from preliminary characterization to work supervision, and from design validation to inspections, testing and quality control.

MM is now a business partner to public agencies on major public works, whose cost and complexity demand consolidated management capabilities and absolutely reliable technical and administrative support.

Since 2003 MM is also in charge of Milan's Water Supply Service, which includes abstracting, purifying and distributing groundwater, collection and treatment of municipal wastewater, and generally, planning maintenance and investments for the water supply and sewer systems.

In 2014, MM also undertook management of the real estate assets of the City of Milan, comprising over 38,000 subsidized housing units, parking garages and other facilities. To accomplish this, MM created the new organizational unit "MM Casa", which works alongside other company structures that are already managing city services.

WATER LOSS MANAGEMENT



Water loss is one of the principal problems that must be addressed for proper, sustainable management of the water supply system. Water losses negatively impact the environment (wastage of a potentially limited resource), operator finances (non-revenue water), energy use (excess energy consumption in pumping stations), traffic (excavations to repair leaks, etc.) and society (possible damage to people and property).

Losses may be divided into two categories: administrative (apparent) losses and physical (real) losses. MM's strategy for limiting losses consists in: **QUANTITATIVE LOSS ASSESSMENT** application of internationally recognized terminology and methodologies (approved by the International Water Association - IWA). **CORRECTIVE MEASURES:** targeted, specific interventions involving field inspections and assessments, electroacoustic measurements (noise correlator, noise logger, geophone, listening stick, etc.), advanced meter management, and pressure monitoring.



Smart Meter

ELEMENTS OF THE IWA WATER BALANCE

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Use Billed Un-Metered Use	Revenue Water
		Unbilled Authorized Consumption	Unbilled Metered Use Unbilled UnMetered Use	Non-Revenue Water
Water Losses	Apparent Losses	Unauthorized Use Metering Inaccuracies		
	Real Losses	Leaks on Transmission and/or Distribution Mains Storage Tank Leaks & Overflows		
		Leaks on Service Connections up to Customer Meter		

INTEGRATED APPROACH AND REMOTE METERING



APPARENT LOSSES

MM addresses apparent losses, which are largely due to undermetering by meters that are often obsolete or oversized, by:

- **Meter management:** assessment of meter age and user consumption;
- **Laboratory testing:** testing of meter samples in the in-house laboratory;
- **User consumption datalogging:** recording, transmission and analysis of consumption profiles for specific user types.

MM uses an integrated approach to problem solving based on three fundamental pillars:

- **Replacement of old or malfunctioning meters**, sizing the meter on the basis of effective user needs;
- **Compliance with D.M. 155/2013**, which regulates meter inspection and replacement;
- **Compliance with Deliberation no. 655/2015**, which regulates the frequency of customer billing.

MM responds to water loss issues with remote metering (Smart Metering), determining the best technological solution to apply on the basis of specific needs.

The potentials and benefits of Smart Metering are many and fundamental for efficient management of water resources and for providing added services to the customer:

- **Prompt or daily communication of consumption and data referring** to anomalies (excessively high consumption, losses, malfunctions, etc.);
- **More accurate billing based on effective consumption**, reducing the number of disputes;
- **District and network water balances** via continuous, synchronized loss monitoring.



MM meter testing facility



Smart Meter installation

EXPO: n°6
(GPRS/STATIC
electromagnetic
flow meters,
high caliber)

ICeWater: n° 70
GPRS / REED
transmitter)

ICeWater

Multi-Utility A2A: n° 500
(Fixed network 169 MHz /
OPTO transmitter)



PROACTIVE: n° 280
(Walk-by 169 MHz /
OPTO transmitter)



AMR pilot projects



REAL LOSSES

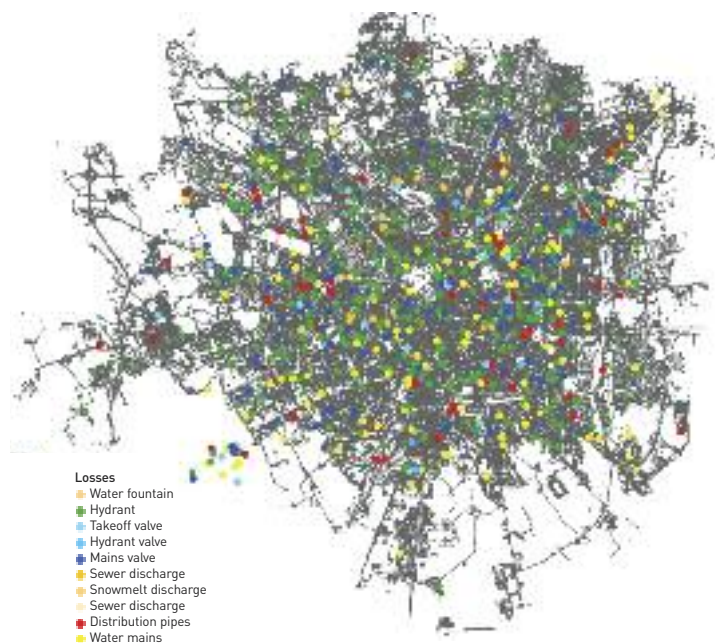
Real losses (background, reported and unreported breaks) are analyzed by breaking the network down into: transmission (extraction wells), delivery, distribution.

MM carries out the following principal activities to manage and contain physical losses:

- **Statistical analysis** and georeferencing of hidden and evident losses;
- **Assessment of pipework** most likely to be affected by leaks (Asset Management);
- **Water balances** using standard methods (Top-Down, Bottom-up, BABE);
- **Elaboration of performance indicators** (NRW, CARL, UARL, ILI, etc.);
- **Asset Management System:** leak detection and repair campaign (Maximo);
- **Pressure Management and reduction of losses** in the Abbiategrasso district (ICewater);
- **Leak Detection:** hidden leaks in distribution network (DN ≤ 400 mm) and planning of non-invasive remedial measures on the delivery network (DN > 400 mm);
- **Condition Assessment:** assessment of effective inner diameter of approximately 200 km of delivery pipework (DN > 400 mm) using innovative technologies.

For example, in 2014, using the Smartball® technology for the first time in Italy, MM was able to detect 24 breakages in DN 1200 pipes between the Assiano facility and the city center.

MILAN WATER NETWORK AND DETECTED AND REPAIRED LEAKS



Milan water network and detected and repaired leaks

SMART WATER STRATEGY



The MM strategy for optimized management involves introducing innovation to operations and customer service. Innovation is achieved by integrating new technologies and applications, innovative processes, marketing instruments and ICT to create a Smart Network.

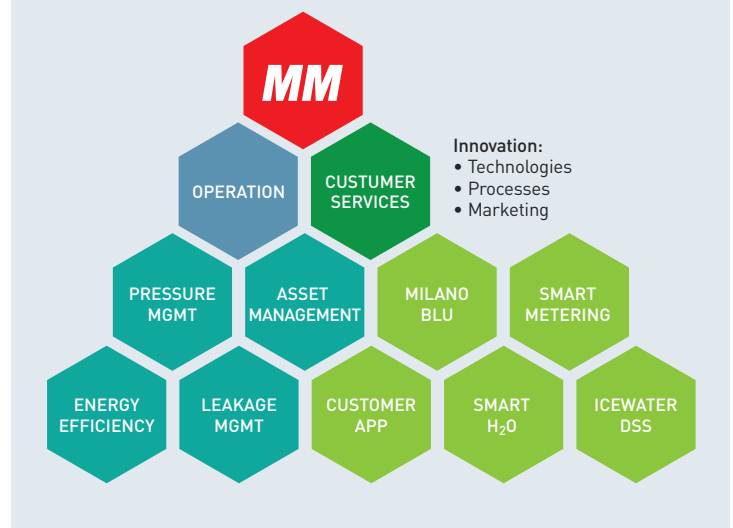
MM applies best practices in water management to:

- Optimize pressures;
- Reduce energy consumption;
- Minimize losses;
- Improve asset management cost/benefit strategies;
- customer satisfaction.

Main projects:

- Advanced pressure management based on real time monitoring of pressure at critical points;
- Optimization of pumping;
- Monitoring of energy efficiency;
- Water balance calculation;
- Assessment of nocturnal minima;
- Leak detection and location;
- GIS-based modeling and numerical analysis;
- Implementation of an advanced AMR infrastructure.

> SMART WATER STRATEGY








Pressure Meter



Flow and pressure meter



> SMART NETWORK

- 5  The highest layer is the optimization instruments for improved **Data Fusion and Analysis**.
- 4  The **Data Management and Display** layer aggregates data and information in an operator interface.
- 3  The **Collection and Communication** layer comprises ICT instruments for transmitting information.
- 2  Instruments and other hardware constitute the **Sensing and Control** layer, which contains data to be analyzed.
- 1  The first **Physical Layer** includes physical components (pipes, valves, pumps etc.)

Source: www.swan-forum.com



ICT SOLUTIONS FOR EFFICIENT WATER RESOURCES MANAGEMENT

Partners: Siemens, Toshiba, UNESCO-IHE, Consorzio Milano Ricerche, Italdata, ICCS

MM is one of the partners in ICeWater, an important ICT project financed by the 7th Framework Programme of the European Commission. ICeWater has the objective of designing, developing and field testing a Decision Support System (DSS) encompassing a broad range of functionalities in Smart Water Management.

ICeWater modules include: Water Loss Management, Water Operations Support, Water Supply System Planning, Water Asset Management and Water Demand Management.



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