

WORKING PAPER

*Milan's water and sanitation service:
from full direct provision to corporatization*

Olivier CRESPI REGHIZZI



CIRIEC N° 2013/08

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from full direct provision to corporatization****

Olivier Crespi Reghizzi^{**,**}

Working paper CIRIEC N° 2013/08

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Abstract

*This paper is focused on a case study on Milan's water and sanitation service (MI-WSS) in the 2003-2013 time frame. Since 2003, MI-WSS has been provided by **Metropolitana Milanese SpA (MM)** which is a joint stock company fully owned by Milan's municipality. MM not only operates the water service but also civil engineering services mainly in the transport sector. A historical approach is adopted as a background, to tackle the evolution from direct municipal provision to an autonomous and corporatized WSS and give more depth to the case study. Commitment to public service mission and general interests' goals is discussed adopting a historical approach too to appreciate the switch from full direct provision to corporatized provision. Limiting the analysis to MM only would be too restrictive and we propose instead to adopt a wider perimeter which includes all the stakeholders of Milan's WSS. Such an enlarged perimeter of analysis is particularly relevant to discuss regulation and governance issues. In the water sector public service mission includes many goals which should be appreciated adopting a long run and intergenerational perspective and expressed in terms of sustainability. Applying sustainability criteria to Milan's WSS raises more than one question.*

Keywords: Water supply and sewerage, Milan, corporatization, regulation, public service.

JEL: L95 - H54 - H72.

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1 Introduction to the case study

This paper is focused on a case study on Milan's water and sanitation service (WSS) which has been undertaken according to the analysis template suggested by CIRIEC. Since 2003, Milan's WSS has been provided by *Metropolitana Milanese SpA* (MM) which is a joint stock company fully owned by Milan's municipality. Since its creation in 1888 till 2003 Milan's WSS has always been directly provided by Milan's municipality through full direct provision. The case study is mainly focused on the 2003-2013 time frame in which Milan's WSS has been provided by *Metropolitana Milanese* however a historical approach (section 2 and section 4) is adopted too to tackle the evolution from direct municipal provision to an autonomous and corporatized WSS and give more depth to the case study.

Metropolitana Milanese SpA (MM) is the public enterprise on which this case study is focused (refer to Box below). It runs two different businesses: i) the water and sanitation service for Milan city area¹ (we shall refer to MM-WSS in this case study), ii) civil engineering services mainly in the transportation sector (we shall refer to MM-ENG in this case study). WSS is a regulated area of business while ENG is an area of business partially operated on the market.

The two areas of business are clearly operated distinctly since the MM-WSS area is tightly regulated (refer to § 6) while the MM-ENG one is not. The present case study is particularly focused on the WSS area of MM even if some aspects of MM as a whole will be analyzed too.

This case study adopts two perimeters of analysis: i) a company perimeter focused on MM-WSS if one restrain the analysis of the water and sanitation service to the company which performs the service and ii) a wider perimeter which includes all the stake-holder of Milan's WSS (see Figure 7).

We think that a case study within the Italian water sector is relevant to understand how the water and sanitation service has been impacted by the 1994 reform (§ 6.1) and by its meandering implementation whose last events have been the 2011 referendum and the regulatory reform which followed (§ 6.2). Sketching what was the institutional and regulatory framework previously in place is a useful background too (§ 4.3.1).

Among the Italian WSSs we think that Milan is a particularly relevant case for various reasons:

- First of all Milan's WSS has a good credit for having both the lowest water tariff in Italy and good performances: it is intriguing to check more deeply what are the real performances (section 5) not only in the short run but also from the long run point of view (§ 5.5).
- Secondly, Milan's WSS has always been municipally provided. On one hand it the paradigm of the modern urban public service created in the

¹ *Servizio idrico integrato della città di Milano.*

framework of *municipalism* (§ 2.1 and § 4.2) while on the other hand it sadly famous for not having built a waste water treatment unit until 2004 (§ 2.2). Definitely it is not a banal story to look at.

- Milan's WSS is also peculiar because it is the only Italian water service still managed at the municipal territorial scale (§ 6.3). This fact raises various governance issues (§ 7.4).
- Last but not least Milan's WSS is also very peculiar since the municipal company which is in charge of its provision, MM, developed in a very different business sector and still operates in the two areas of business.

Box 1: Metropolitana Milanese SpA

Metropolitana Milanese SpA - Soggetta a direzione e coordinamento dell'azionista unico Comune di Milano. Codice fiscale/partita IVA 01742310152
Legal address & headquarters: Via del Vecchio Politecnico, 8, 20121 Milan - Italy
- Phone +39 02 77 471
WSS area offices: Via Meda, 44, 20141 Milan - Italy – Phone +39 02 84 77 1
<http://www.metropolitanamilanese.it>

Source: <http://www.metropolitanamilanese.it>, February 26th, 2013.

Box 2: basic information on Metropolitana Milanese in 2011

MM as a whole

- turnover: 233 M euros
- number of employees: 714 people
- area of operation: Water (E36) and sewerage (E37) + civil engineering services (F42)
- owner: *Comune di Milano*

MM-WSS (Water and Sanitation part of MM only)

- turnover: 123 M euros
- number of employees: 463 people
- area of operation: water and sanitation services
- population served: 1.35 M people
- number of meters: 47 136
- water volumes billed: 231 M m³/year

Source: author's elaboration based on data from Metropolitana Milanese SpA.

2 History

From our perspective Milan's WSS history might be framed in three main phases: a) the service development and expansion phase in the late 19th century and early 20th century, b) an intermediate phase after WWII till the corporatization in 2003 and c) the last ten years of provision of the WSS by MM.

This paper is mainly focused on the last time phase (c) however we believe that giving some attention to the historical path can give more depth to this case study. Paragraph is focused on the early phase² of Milan's WSS 2.1. In addition to that, postponed investment in waste water treatment plants in Milan in the

² A full historical analysis is available in our working paper (Crespi Reghizzi forthcoming).

decades after WWII represents such a huge public policy failure that we chose to focus paragraph 2.2 on it. Last but not least paragraph 2.3 is focused on the last 20 years through when the corporatization of the service took place.

A historical approach will also be adopted when analyzing public service mission and general interest goals in section 4.

2.1 Development of a modern water and sanitation service in Milan

In the second half of the 19th century there was still no modern water supply system in Milan. Water from the *navigli* (canals) was used for all non-drinking usages while drinking water came from private shallow wells (Bigatti 1997, 29) since the city lies on an abundant aquifer³. Most of the wells were excavated down to 6-7 m depth although there were also a few bore-hole drilled down to 10-12 m depth (ATO Città di Milano 2007, 78). Water was available in large quantities and some buildings had pumps installed which made water available upstairs (Colombo 1984, 119).

Through the 1870's, ground water quality started to worsen and many scientific studies showed that its pollution was high and probably due to the quantity of waste water discharged in the ground which was significantly increasing due to the extraordinary urban growth (Colombo 1984, 119). Through the years, the scientific and decision making circle became progressively aware that the vicious circle of waste water polluting the aquifer from which drinking water was withdrawn had to be broken up. In consonance to the water quantity paradigm (Barraqué, 2003b), which was mainstream at that time in Western Europe, clean water had to be found and brought to the city from far away sources. According to this line of thought a call for water supply projects was launched in 1881 by Milan's municipality. The scope was not only to find the best way to deliver far away water to the city but also to "allow the European monetary markets to furnish capitals to build such an infrastructure".

Among the 12 projects in competition, the municipal commission ranked first a project by the *Società Italiana condotte d'acqua* (linked to the Banco di Roma) and a contract was signed. The project planned to channel spring water nearby the Brembo River and to reach Milan through a 45 km gravity aqueduct plus a 25 km pressure pipeline. A public utility declaration from the Ministry of public works was needed to allow the land expropriation and start the project. The inhabitants of the Brembo valley fiercely opposed themselves to the project. Various people and institutions took part to the debate as Colombo (1984, 120) reports. In 1885 the ministry ends up not awarding the public utility declaration for the project.

Milan's municipality terminated the contract with the *Società Italiana condotte d'acqua* and launched in 1887 a new call for projects much more

³ Milan is located in the middle of the Pianura Padana lowland with no river flowing through the city.

detailed than the first one. Mainstream thinking had changed through the time and spring water was not anymore *a priori* preferred to ground water. On the contrary the call for projects asked to any bidder to engage himself both in a long-term water supply project through the technical solution it would prefer and in a temporary water supply solution using ground water. 22 projects were in competition and evaluated by the municipal commission. In July 1888 the City's council chose to experiment a water supply pilot project which had been designed by the young engineer Felice Poggi within the municipal technical department (*ufficio tecnico comunale*). According to such a project a few deep bore holes were to be drawn, a pumping station installed and a one km pipeline was to be laid (Comune di Milano 1888).

Thanks to its location on the top of an abundant aquifer the city of Milan was able to make the sound decision of building only basic water infrastructure (wells, pumps and pipelines). Additionally, the chosen technical solution had also the great advantage of being very flexible and gradual in its implementation. Indeed a solution based on a large long distance aqueduct would have implied a large lump sum investment requiring to mobilize huge amount of money in a short period of time while expected returns on investment would come progressively as the water subscriptions would increase. Conversely in Milan the chosen technical solution implied only to invest progressively relatively small amounts of money. Investments in water infrastructure could be implemented step by step as the number of subscriptions to the water service increased (Bigatti 2000, 222).

Last but not least the choice of relying on local groundwater resources was also a way for Milan's municipality to be free from the central government's authorization which would have been compulsory in case far away water had been chosen.

As a consequence of the simple technical solution chosen, the municipality was able to directly undertake the investments and run the water service. Direct provision was also chosen for sanitation and in 1888 a specific sanitation office was created within the municipal technical department with the mission of designing a new sewer master plan for the city (Municipio di Milano 1890).

Refer also to § 4.1 where public service mission and general interest goals are analysed adopting a historical approach.

2.2 Postponed investments in waste water treatment plants

For various centuries waste water collected by the Milan's canals (*navigli*) had been channelled by the *Roggia Vettabbia* and had irrigated large farming areas downstream of Milan (the so called *marcite*⁴). Such a process had been

⁴ There is a historical document (28 September 1583) giving the technical description of 15 irrigation intakes from the *Roggia Vettabbia*. A copy of the document is available in Gentile et al. (1990, 12).

admired by various foreigners⁵. While many European cities⁶ met strong local opposition to waste water disposal through land farming, Milan was instead lucky enough to have a well-established tradition⁷ of such a practice. The 1890 sanitation project obviously planned to go ahead in the waste water disposal through land farming practice. The *Roggia Vettabbia* was supposed to collect *in fine* waste water from 2102 hectares of city areas and 750479 inhabitants. It was irrigating 2292 hectares of land. That gives a 330 inhabitants/hectare irrigated ratio which was far less than what was practised elsewhere in Europe (Municipio di Milano 1890, 66).

While using waste water for land farming without any treatment was common practice in the late 19th century, through the 20th century progressively European cities⁸ installed waste water treatment plants in order to mitigate their negative impact in terms of water pollution. The long story of Milan's waste water treatment plants started in the 1970's but due to postponed investment until 2004 the Milan's waste water was still discharged with no treatment in the River system reaching in fine the *Adriatic Sea*.

Indeed, the story of Milan waste water treatment plant started in 1972 when the Municipality chose to build two waste water treatment plants designed by the Municipal engineering department in Gratosoglio and Chiaravalle. A first tender took place in 1975 but a controversy arose since the Nosedo plant's was to be localized in a sensible area⁹ (Massarutto et al. 2006). Furthermore "the project proposal was hindered by the protest of the residents of the concerned areas (i.e. NIMBY syndromeⁱ)" (Lobina and Paccagnan 2005). Between 1989 and 1998 various tenders were launched and building contractors selected.

⁵ « Da parecchi secoli la città di Milano irriga le marcite colle acque di Vettabbia, la quale raccoglie i liquidi immondi della città. E' dunque una applicazione delle irrigazioni coll'acqua di fogna, diluite, è vero, ma in dosi considerevoli, che sorpassano i cento mila metri cubi all'anno e all'ettaro. E' inutile insistere sulle raccolte prodigiose di queste marcite, che sono l'ammirazione di tutti i visitatori. » (Mille 1885; quoted in Municipio di Milano 1890). « Ho visitato le marcite di Milano irrigate dalla Vettabbia. Non vi è in verità fra I nostri prati e le marcite che la differenza fra il piccolo e il grande. Io sono stato convinto da questa visita dell'eccellenza del sistema anche applicato su vastissime estensioni » Lettera del prof ROLLET, prof d'igiene alla Facoltà di Medicina di Lione al deputato Bourneville. quoted by (Municipio di Milano 1890, 62).

⁶ The 1890 sanitation master plan makes various comparisons with other European cities (Bruxelles, Paris, Berlin, London). Information had been collected at the 1878 International hygiene congress in Wien (Municipio di Milano 1890, 60).

⁷ « Il lavoro di secoli ha predisposto I terreni a valle della città in modo che già sono adatti a riceverne gli scoli... I proprietary dei terreni non solo accettano l'acqua ma la comprano e tanto più la pagano quanto essa è ricca di materie fertilizzanti. » (Poggi 1911, 327). Despite what Mr Poggi wrote, revenues from selling irrigation water do not appear relevant in the city's financial report.

⁸ In Paris a first waste water treatment unit was installed in 1942 in Achères.

⁹ Due to Milan hydraulic system characteristics.

However the judicial enquiries during *Tangentopoli* “de facto blocked public works for several years” (Lobina and Paccagnan 2005).

At the beginning of the 21st century Milan’s raw sewage was still discharged directly into the river system. In 2000 an emergency procedure was authorized by the environment ministry and Milan’s mayor, Gabriele Albertini was awarded the role of special commissioner. Works were awarded and their rhythm sped up. Meanwhile however, an infraction procedure (concerning the waste water directive 91/271) was started in 2000 by the European Commission against the Italian Republic. Although Europe won the procedure in 2002, no pecuniary sanction was imposed. In 2004 and 2005 the three waste water treatment plants (S. Rocco, Nosedo and Peschiera Borromeo) were brought to completion (refer to § 3.2).

Box 3: postponed investments in drinking water treatment plan

Until the early 1970’s it was thought that Milan’s underground water was clean and ready to drink. The only pollutant noticed at that time was hexavalent chromium and the wells which were not respecting the WHO limit of 50 µg/l were put out of service. In the mid 1970’s major innovations took place in the water quality analysis technology and other pollutants are noticed in Milan’s groundwater: trichloroethylene, trichloromethane and other chlorinated solvents. A study commission (including experts from the public health department of the university of Milan) was created and established a temporary limit of 250 µg/l on chlorinated solvents. Such a limit was strengthened by the EU directive (80/770) converted in Italian law by the law n°183 16th April 1987 and the decree of the President of the Republic 24th May 1988 n°236.

Although the groundwater water quality problem was known since the early 1970’s the problem was solved only in 1994 when effective investments¹⁰ (activated carbon technology and stripping) were undertaken in a rush (a decree had allowed Milan’s municipality to adopt exceptionally fast procurement rules) to respect the law-limit (30 µg/l) prior than the deadline (8th May 1994).

2.3 Corporatization

2.3.1 A classification of WSS according to their legal status

Despite the great variety of institutional models of the water and sanitation services in Europe (Barraqué, 1995), public water and sanitation entities can be classified in three major categories according to their degree of autonomy and to their legal and accounting rules status as shown in Table 1:

In the first category (Cat A) water and sanitation services are municipal departments with no legal autonomy, ruled by administrative law and public accounting rules

In the second category (Cat B) water and sanitation services are autonomous legal entities ruled by public law and public accounting

¹⁰ Prior to 1994 only minor solutions had been found (new pumping stations in a polluted part of the aquifer and deeper wells).

In the third category (Cat C) there are companies ruled by private law and private accounting rules, fully or partially owned by municipalities or other public bodies.

Table 1 – Institutional status of the WSS in Europe

	Cat. A	Cat. B	Cat. C
	Full municipal provision	Autonomous municipal provision	Corporatized provision
Germany	<i>Regiebetriebe</i>	<i>Eigenbetriebe</i>	<i>Eigengesellschaften</i> and <i>StadtWerke</i>
Spain	Existing	Existing	Joint stock company
France	<i>régie simple</i> or <i>régie à autonomie financière</i>	<i>Régie à personnalité morale et autonomie financière, EPIC, EPCI</i>	<i>Société d'Economie Mixte SEM</i> or <i>Société Publique Locale SPL</i>
Italy	<i>servizi in economia</i>	<i>azienda municipalizzata / azienda speciale</i>	<i>Società per Azioni</i>
Portugal	Existing	Existing	Holding and subsidiaries <i>Aguas de Portugal</i>
Switzerland	<i>Services municipaux</i>	Some <i>stadtwerkepfliege</i>	
Wallonia (Belgium)	<i>régie directe</i>	Interco	

Source: author's elaboration.

In Italy, the *Legge Giolitti* on the municipalisation of local public services was approved in 1903 and modified in 1925¹¹. The *Azienda Municipalizzata* legal framework was defined together with the legal procedure to be adopted by a municipality wishing to proceed to a municipalisation. “In-house” provision of the service was still authorized, particularly for those municipalities which were already directly providing the service¹² (Rotondi 1997).

Despite various attempts through the decades after WWII to introduce a reform of the 1903 Giolitti law on local public services (Arcangeli 2000, 457), it was only in 1990 that a significative reform of local public services was made (*Legge 8 giugno 1990 n°142*). According to the 1990 law local public services could be provided through the following four institutional forms: a) direct provision (Cat A), b) concession to a private partner, c) through an *azienda speciale*¹³ (a new name for the *azienda municipalizzata*) (Cat B) or d) through a private plc partially or totally owned by the municipality (Cat C).

In 1994 an ambitious reform of the water sector was launched (*Legge Galli 36/1994*). It implied an autonomization of Italian WSS as it only the three last

¹¹ *Legge 29 marzo 1903 n°103, Regio Decreto 30 dicembre 1923 and Regio Decreto 15 ottobre 1925 n°2578.*

¹² In Milan the water and sanitation services were already existing as municipal departments prior to the 1903 law. Their institutional form was not impacted then by the 1903 reform. Conversely the Azienda Energetica Municipale (AEM) was created to operate the municipal power plants.

¹³ Modifications were made to the 1986 decree DPR n°902 which fixed the organisation and accounting rules of the Aziende Municipalizzate.

institutional models of service provision were allowed while formal direct provision was excluded. In 2001¹⁴ the *azienda speciale* legal status was not allowed anymore and the joint-stock company was the only legal form allowed regardless of the ownership (public, private or mixed). This was the kick off to the full corporatization of Italian WSS.

2.3.2 Corporatization of Milan's WSS

The Milan's WSS were under *direct provision* (*gestione in economia – CAT A*) from their creation in 1888 until 2003 (refer to § 2.3).

In Milan as in the rest of Italy the Galli reform was implemented with a significant inertia. In 1997 the *Formentini* municipal administration had chosen to transform Milan's WSS from direct provision into an *azienda speciale*. Such a shift never took place and the forthcoming municipal administration (mayor Albertini) opted instead in favour of a municipally owned joint stock company (Lobina and Paccagnan 2005).

At first the idea was to create a specific joint stock company (SOGEA) which would have been owned by the municipality (99% of the shares) with a small shareholding by AEM (the municipal power company which had been partially privatised). However the 2001 decree (decreto 448/2001) made public tendering compulsory to choose WSS operators with the only exception of WSS operated by fully municipally owned joint stock companies.

In November 2002 Milan city administration decided to award a 3 to 5 year water supply and sanitation concession for the ATO Città di Milano to Metropolitana Milanese (MM) which was formerly responsible of the engineering and design services in the urban public transport sector (Box 4). WSS operations were transferred to MM in June 2003.

What were the reasons behind such a decision? According to our interviewees on one hand there was the need to balance MM-ENG with new activities and revenues, on the other hand there was the need of a management change in the municipal WSS after decades of full municipal management.

¹⁴ According to the decree n. 448/2001 (art. 35).

3 Operations

The water and sanitation (MM-WSS) operations of MM are described in paragraphs 3.1 and 3.2 while paragraph 3.3 is focused on all the other operations of MM which mainly concern civil engineering services (MM-ENG) in the transportation sector.

3.1 Water supply and sewer networks

MM runs entirely on its own the water service of the city of Milan within the regulatory area of the *ATO Città di Milano* (see also section 6). Some data are summarized in Table 2 and Appendix 6. Water is withdrawn from deep (40-100 m¹⁵ bore holes in the abundant aquifer which lies below the city. 23 pumping stations out of 27¹⁶ include a water treatment. The most common water treatment is activated carbon technology (in 21 pumping stations) and stripping. Pumped water is then delivered to the users through a 2 360 km water supply network. Milan's water supply system does not require much storage (only 229 403 m³) since the natural aquifer is a virtually infinite natural storage just below the city. There are only 47 136 meters since there is only one meter per block of flats. In 2011 201.16 M m³ were billed out of 225.539 M m³ pumped. That gives a total losses (including both technical and commercial losses) ratio of 13% (refer to § 5.2 for a benchmark).

MM runs entirely on its own the sewer network too while wastewater treatment plants are operated by external companies (§ 3.2). The sewer network has a total length of 1 457 km. It is a combined sewer and gravity based system since Milan's topography is slightly sloped from the North to the West. Therefore operations on the sewer network are very simple and consist only in daily maintenance.

Operations concerning water supply and sewer networks include: running and monitoring of the wells and pumping stations, daily maintenance of all the water supply and sewer infrastructure, water quality control, metering, billing and customer service. It also includes the asset management of the entire infrastructure: planning the investments, implementing the various administrative steps, procurement and monitoring the works. Engineering and design studies are realized by the engineering services (MM-ENG) of MM itself and their costs are re-invoiced to the WSS area (MM-WSS). Works are tendered through public bids.

¹⁵ (ATO Città di Milano 2013, 70).

¹⁶ 27 pumping stations are in operation out of 30 existing pumping stations.

Table 2 – MM-WSS infrastructure

Water infrastructure	quantity	Sanitation infrastructure	quantity
boreholes	538	Large sewers $3 < A < 20 \text{ m}^2$	101.99 km
boreholes in operation	416	Medium sewers $1 < A < 3 \text{ m}^2$	233.12 km
pumping stations in operation	27	small sewers ($A < 1 \text{ m}^2$)	1 121.89 km
pumping capacity	9 000 l/s	total sewers	1 457 km
pumping stations with water treatment units	23		
storage units	35	population equivalent capacity of the 3 wastewater treatment plants	2 300 000 inhab
total storage capacity	229 403 m ³		
pipeline	2 332 km		
meters	47 136		

Source: author's elaboration based on data from MM and Massarutto (2011).

3.2 Waste water treatment

Until 2005 the city of Milan had no wastewater treatment plants (refer to § 2.2). Three plants are in operations nowadays: Nosedo, San Rocco and Peschiera Borromeo (see Figure 1). Although MM does not operate those plants, it bills and collects a wastewater treatment fee from the users and pays the external entity in charge of the plant's operation according to the terms of each specific legal agreement.

Nosedo treatment plant (1,250,000 population equivalent capacity) is operated by a private company *MilanoDepur SpA* representing the consortium of companies¹⁷ which built that plant through a project financing scheme (DBOT). According to the DBOT agreement¹⁸ the consortium owns the assets¹⁹ until the end of 2015 and has a management contract until the end of 2019²⁰. After 2015 assets will be Milan's municipality's property. MM pays a yearly fee²¹ to *MilanoDepur SpA*. MM also pays directly energy and sewage sludge disposal which are not included in the yearly fee.

¹⁷ SIBA SpA (leading partner), Degremont Italia SpA, Pssavant Impianti SpA, Veolia WST Italia SpA, Unieco Scarl, Bonatti SpA, Itinera SpA are shareholders of the consortium. Operations are however delegated to *Vettabbia Società Consortile a responsabilità limitata*. Source: <http://www.depuratorenosedo.eu>, retrieved the 26/2/2013.

¹⁸ Signed with Milan's municipality.

¹⁹ In fact the first line of Nosedo treatment plant is already owned by Milan's municipality which financed its construction. Conversely the remaining part of Nosedo treatment plant is owned by *MilanoDepur SpA*. All the treatment plant is operated by *MilanoDepur SpA*. Informations retrieved through various interviews.

²⁰ With one year extension option until 2020.

²¹ The DBOT agreement was signed by the consortium and by Milan's municipality. However MM pays the yearly fee (*canone g* and *canone f*) to *Milano Depur SpA* on behalf of Milan's municipality.

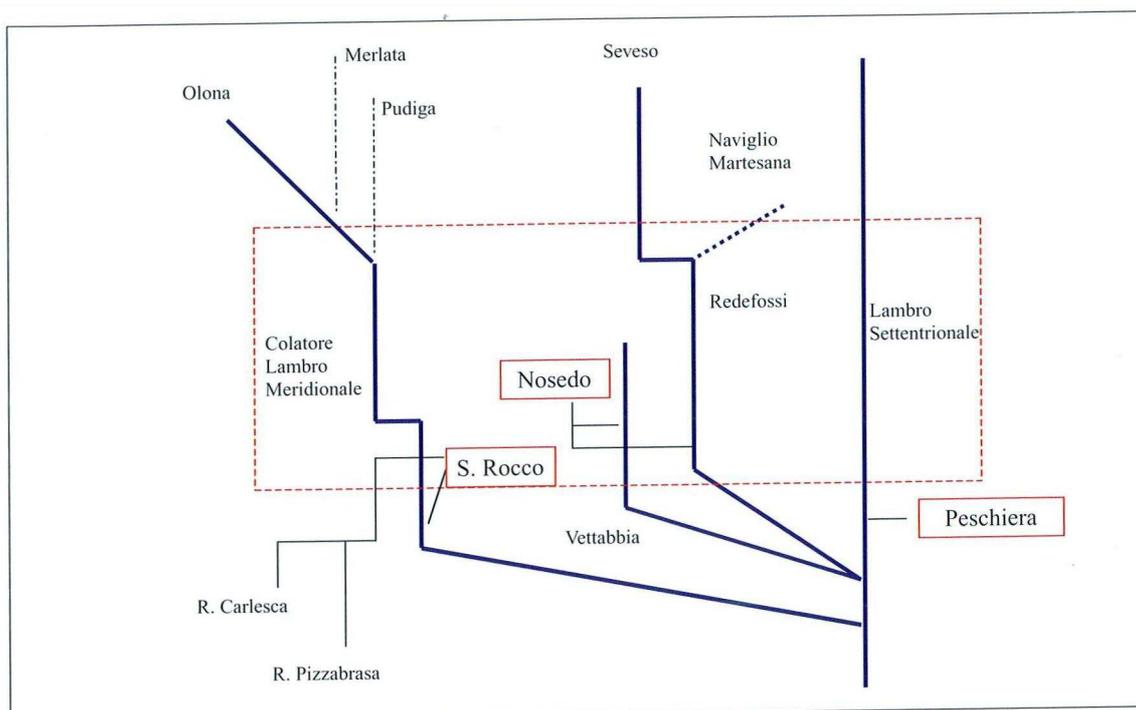
San Rocco plant (1,050,000 population equivalent) is operated by *Degremont SpA* which had been the leading partner of the consortium which built that plant. The initial construction contract included operation of the plant for five years by the contractor. Afterwards the end of the management contract has been postponed to the end of 2014. Milan's municipality owns the plant. MM pays a yearly fee to *Degremont SpA* which is inclusive of all the operating costs (including energy and sludge disposal).

The Peschiera Borromeo line²² treating Milan waste water (250,000 population equivalent) is owned by *CAP Holding SpA* and operated by *AMIA Acque SpA* (previously *CAP gestione SpA*) (Refer also to § 7.4). Milan's municipality owns some shares of both *CAP Holding SpA* and *AMIA Acque SpA*. Milan's municipality and *CAP gestione SpA* (now *AMIA Acque SpA*) have agreed that the Peschiera Borromeo line will treat Milan's waste water until 2022. MM transfers to *AMIA Acque SpA* all the "waste water treatment" revenues billed to users located in the eastern area of Milan's municipality and connected to the Peschiera treatment plant. MM makes no earnings on the waste water treatment part of the service with those users (except a billing fee not very relevant)²³. From our interviews it appears however that a part of the Peschiera treatment plant was financed by Milan's municipality. This is puzzling since it means that the ATO Città di Milano has transferred a part of its own waste water revenues to the ATO Provincia di Milano while it kept for itself the investments' costs.

²² The Peschiera Borromeo wastewater treatment plant treats mainly waste water coming from the ATO Provincia di Milano sewer system. One line of the plant is dedicated to Milan city's waste water. Obviously the plant is run as a whole and waste water from Milan city and from the Milan provincial are obviously mixed and treated altogether.

²³ "CAP Holding ha realizzato – in adempimento alla convenzione sottoscritta con il Comune di Milano – il potenziamento del depuratore di Peschiera Borromeo, in cui sono depurati i reflui dei quartieri est della città. A seguito dell'adozione del Piano d'Ambito della Città di Milano, si è riconosciuto – con atto del 28 dicembre 2010 – a CAP Holding la quota di cui al DM 1 agosto 1996 fino al 31 dicembre 2022." Quoted from the yearly financial report of CAP Holding 2011.

Figure 1 – Schematic view of Milan’s river and sewer system



Source: Massarutto et al. (2006).

Table 3 – Management of Milan’s waste water treatment plants

	Nosedo	San Rocco (ex Milano Sud)	Peschiera Borromeo (2 nd line of treatment)
Builder	Consortium lead by SIBA S.p.A.	Consortium lead by Ondeo Degremont	Consortium with Siba S.p.A. -, and Ondeo Degremont
Contractual scheme	Building and operating (incl. project financing)	Building + operating (no project financing)	Building
Investimento	. € 117 millions for the works +. € 17 millions per concession costs	€ 87 millions for the works and € 48 millions per the 5 years management and additional works	€ 17 millions for the second line and € 5 millions for the sewer
Lenders	Banca Intesa and Royal Bank of Scotland		
Other donors	Regione Lombardia and Fondazione Cariplo for the public park		
Infrastructure owner	Consortium until 2015, Comune di Milano afterwards	Comune di Milano	CAP Holding S.p.A.
Operations	MilanoDepur S.p.A.	Degrémont S.p.A.	Amiacque S.r.l. (ex CAP Gestione SpA)
Length of the management (years)	12 + 4 years	5 + 4 + 1 years	26 years
End product disposal costs	MM S.p.A.	Included in the operations fee	Amiacque S.r.l.
Energy costs	MM S.p.A	Included in the operations fee	Amiacque S.r.l.
Gas costs (sludge drying)	MM S.p.A	Included in the operations fee	-

Source: author’s translation based on Massarutto (2011).

It appears that no capital expenditure or financial costs on the past investments in the waste water infrastructure are due or currently paid by MM (as we will describe here below). All these costs were and are covered by Milan's municipality.

– Nosedo treatment plant: the first line of Nosedo treatment plant was financed by Milan's municipality. The remaining part of that plant was built in project financing through a DBOOT scheme signed with Milan's municipality. Financial costs (capital expenditures part of the yearly fee – *canone e*) are still paid to *MilanoDepur SpA* by Milan's municipality and not by MM.

– S. Rocco treatment plant was financed directly by Milan's Municipality.

MM received existing waste water treatment plants as an infrastructure capital stock “granted” with no capital costs, amortization or financial costs induced. Nevertheless nowadays MM is responsible of the investment policy on those assets (maintenance and new investments).

3.3 Engineering

In 2011 the Engineering department of MM (MM-ENG) was organized in four main divisions (see also Appendix 1): a) transport engineering & design, b) transport works, c) hydraulics infrastructure engineering & design, d) hydraulics infrastructure works.

The two latter divisions provide engineering services (technical studies, design, procurement, works supervision) mainly for the water and sanitation department of MM. However they also have some contracts with other clients (for example in the framework of the 2015 Milan International Exhibition infrastructure works).

The two first divisions cover the whole project cycle of transport infrastructure from preliminary studies to works procurement and supervision. The main activities concerns underground and periurban railways lines in the Milan area. Most of these activities are provided by MM to Milan's municipality through an in house contract awarding which does not require open tendering. Some activities are still provided by these two divisions for independent branches of MM created to operate separately contracts with other Italian public administrations (*Metro engineering srl* for example in charge of the Naples underground). However, after 2006 new contracts of MM for other Italian public administration cannot be signed²⁴. Therefore activities of the engineering

²⁴ Indeed the Bersani decree (D.L. 4-7-2006 n. 223 e legge 248/2006) established accordingly to the EU principles that services could be provided to a local public administration by companies owned by the local public administration itself through in-house provision. Conversely companies operating in-house for their owner (local public administration) cannot work for other local public administrations. To comply with the new legislation separate branches (*Metro engineering srl* and *Napoli metro engineering srl*) were created to fulfill

department of MM in Italy can be provided only to the Milan's municipality (including other municipally owned companies such as SEA who owns and runs Milan airports) and to other Italian Private sector companies (*Società Autostrade*, the motorways company, for example).

Since its activities are constrained on the Italian market, MM tries to expand its engineering activities abroad on foreign markets. Indeed, starting a few years ago, an officer is in charge of answering to international bids mainly concerning engineering services in the transport sector. Although it was not initially planned for MM to operate internationally in the water sector, this might happen since its knowhow as a relevant operator in this field is internationally appealing.

Box 4: The history of Metropolitana Milanese

Metropolitana Milanese SpA was created by the municipal administration in 1955 to design and build the first underground line. Works started in 1957 and the first was brought to completion by 1964. In 1969 the first part of the second underground line was completed. In 1990 the first part of the third underground line was completed. MM was responsible of the realization of the underground lines on behalf of Milan's municipality while these are operated by the ATM, the municipal public transport company.

Source: <http://www.metropolitanamilanese.it/pub/page/it/MM/storia>, retrieved April 23rd, 2013.

4 Public service mission and general interest goals

4.1 Public service mission goals in watsan

What do we mean by “**public service mission**” for a WSS? This is a vast concept and in this paper when talking of “public service mission” we will refer mainly to the following goals:

- a) Universal provision and equal access to the service to all citizens;
- b) An investment policy driven by a long run vision and an intergenerational concern;
- c) Water resources conservation and environmental protection.

From a historical perspective the three public service goals have not always been given equal priority. In the service expansion phase the first two goals were seen as key as we will see in § 4.2. The third criteria on the contrary has been inserted in the Italian water sector agenda only since the 1970's and in fact implemented only in the late 1990's in Milan (see § 4.3 and § 2.2).

Central and Local government has also **general interest goals**: “these include for example policies related to employment, containment of inflation, promotion of research and development, of human capital, of fixed capital accumulation, competition and industrial policies” (CIRIEC 2012). Indeed public service

previously existing contracts (particularly the Naples underground lines) with other public administrations.

entities or companies behaviour might be influenced explicitly or implicitly in order to fulfil these general interest goals.

After a historical insight on the expansion (§ 4.2) and intermediate (§ 4.3) phases of Milan's WSS in terms of public service missions and general interest goals we focus the last paragraph (§ 4.4) on the present phase after corporatization of the WSS. To what extent and how is MM-WSS implementing public service missions and general interest goals?

4.2 A strong public service commitment in the expansion phase

Through the 19th century in many European cities the concession model failed in generalizing the service to the whole city. Water and sanitation services have been progressively considered as public services in which the municipalities should engage either to provide the service or at least to regulate its provision by private companies (Barraqué et al. 2011; Millward 2000; Bigatti et al. 1997).

In Milan, as we described in § 2.1 the concession model was only planned at first but never implemented. From their birth as modern services in 1888 water and sanitation were considered as public services as the quotation below from the 1894 municipal council acts shows:

“The municipal board is convinced that the municipality should not make any profit from the sanitation service; it is an essential public service which should be provided by the municipality”.²⁵

Indeed, in Milan the WSS expansion is a truly municipal story as the local public authorities created the first modern water and sanitation service and invested massively to realize an ambitious water and sanitation system which is still in operations nowadays. Those were the years of the sanitary and hygienic discoveries of Koch and Pasteur. Expanding the WSS service was then seen as a noble mission aimed at improving the sanitary condition of the city and *in fine* saving lives. Brilliant civil servants and engineers such as Felice Poggi engaged themselves in such a mission. They were hired in the WSS municipal departments in order to design such a key infrastructure and manage the service. A high attention was given to the quality and long lasting characteristics of the built infrastructure. A number of detailed studies²⁶ made at that time are still the design reference for today Milan's sewer and water system. Moreover the built infrastructure was truly long lasting since it is still in operations nowadays. Referring to the public service goals detailed in the previous paragraph there was a strong commitment in favour of the first two while the environmental concern was far from being even considered in that time's agenda.

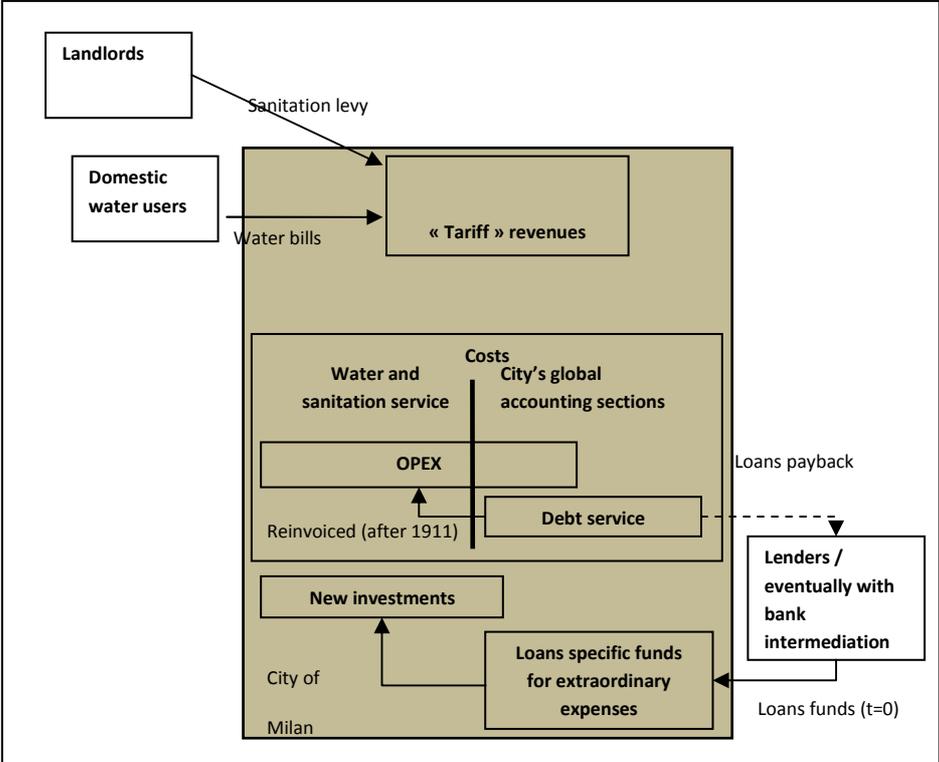
²⁵ Author's translation “La giunta è partita dal concetto che il comune dal servizio di fognatura non dovesse trarre lucro ; si tratta di un servizio pubblico essenziale e spetta al comune prestarlo” (Atti del Municipio di Milano 1893-1894 p 365, 26 febbraio 1894).

²⁶ Such as *Le Fognature di Milano* by Felice Poggi (1911).

The WSS was directly provided by the municipal departments. Although there were separate accounting sections in the municipal yearly financial report there was not a separate budget but only a single global municipal budget. Water was metered and billed and sanitation was charged too through a levy which to our purpose can be considered as a Tariff revenue too as suggested by (Massarutto 2007). There was no direct link between the Tariff revenues and the OPEX and CAPEX of the two services. Indeed tariff-revenues of the WSS were flowing in the general budget of the municipality while specific OPEX and CAPEX budgetary amounts were allocated each year to the water and sanitation service (refer also to the Figure 2 below) (Crespi Reghizzi forthcoming). Adopting the 3T's OECD methodology (OECD 2009) one could wonder which mix of the 3T's (Tax, Tariff or Transfer) was covering the OPEX and CAPEX.

From our research (Crespi Reghizzi forthcoming) there is evidence that in Milan until 1899 Tariff revenues did not manage to cover even the WSS's OPEX. After 1899 although Tariff revenues did cover WSS's OPEX they were far too little to fully cover the debt's service. Indeed CAPEX was financed at a great extent through debt and the infrastructure costs (particularly concerning sanitation) were particularly high when compared to the Tariff-revenues. By definition the costs left uncovered by Tariffs-revenues were covered by Tax-revenues through the general municipal budget (some data reported in Table 4 and Appendix 5).

Figure 2 – Institutional scheme and financial flows of Milan's WSS (1888-1924)



Source: author's elaboration.

Table 4 – Water and sanitation services global financial flows (1889-1924)

Water	(a)	(b)	(c)	(d)	(e) = 100*c/d	(f)	(g) = c-f
Years	Revenues	OPEX	Gross profit	Invested capital	Return on capital %	Debt service	Net profit
1889	2 960	-	-	756 281	-	48 360	-48 360
1894	136 460	144 180	-7 720	5 754 260	-0.13	357 825	-365 545
1899	533 073	432 740	100 333	12 927 674	0.78	780 163	-679 830
1900	655 251	376 653	288 614	13 917 581	2.07	831 981	-543 367
1905	1 460 382	452 085	1 008 297	21 449 254	4.70	1 240 118	-231 821
1917	4 539 394	1 552 272	2 987 121	60 499 928	4.94	3 294 262	-307 141
1920	8 389 454	4 435 513	3 953 941	66 482 521	5.95	3 512 238	441 703
1924	14 038 096	6 736 070	8 350 890	96 554 604	8.65	5 168 748	3 182 142

Source: author's elaboration, all data in Italian Lira.

In 1903 in Milan there was a debate on whether the water service should be provided through an *azienda municipalizzata* (see § 2.3.1 for references to the 1903 Giolitti Act). While the Azienda Energetica Municipale (AEM) was created to operate the municipal power plants, conversely the municipality chose to keep in full direct provision the WSS service and justified its choice on various reasons:

- i) the positive experience of the previous years,
- ii) the water service has tight relations both with sanitation and with public works,
- iii) the water service should answer first to “general interest needs” such as: a) to extend the water network also in streets where no water will be sold in order to provide a fire protection service or to provide water for public use (public buildings, schools social housing or public laundry or public baths),
- iv) “Selling, metering and billing water to the private users is not tricky enough to require an *azienda municipalizzata*. The water service has not such a commercial nature.”²⁷

From its birth till the 1930's Milan's WSS (as most Italian WSS) was strongly aimed at expanding and providing the water and sanitation services through a public service approach (first goal (a) in § 4.1). There was also a high concern in favour of future generations' interests as the commitment in favour of long lasting infrastructure (second goal (b) in § 4.1) shows. However if we consider intergenerational aspects from today point of view it is striking that environmental concerns (third goal (c) in § 4.1) were not considered at all at that time. The concern on intergenerational fairness was also central in the policy debate on whether to implement deficit financing or not as this quotation from the 1891 municipal council debate shows:

²⁷ Author's translation (Municipio di Milano 1907).

“To justify a loan it is not sufficient to tell that public infrastructure will benefit mostly our grandchild. Since we are confiscating future revenues, we also have to demonstrate that no other infrastructure needs will appear in the future and that we provide nowadays to all the future needs, including the unprevisible ones²⁸”.

On the contrary using WSS to pursue general interests goals (employment, price controls) was not very much in the agenda at that time as it became in the second part of the 20th century (see next paragraph).

4.3 After WWII a WSS more influenced by general interests goals

4.3.1 Water price regulation in Italy after WWII

After WWII a price regulation regime for various goods and services was implemented in Italy in order to fight against the high inflation of those years and preserve consumers' purchase power. Indeed in 1944 the *Comitato Interministeriale Prezzi* (CIP) and the *Comitato Provinciale Prezzi* (CPP) were created (*Decreto Legge 19 ottobre 1944 n°344*). The water tariff regulation was subjected to those committees. Water tariffs were set in an anti-inflation perspective with little regards to the cost of service (Arcangeli 2000, 301). As a consequence in most cities Tariff revenues were largely below the cost of the service. Furthermore only small percent tariff increase were authorized with the paradoxical effect that the cities starting with a low tariff were authorized smaller tariff increase than those starting with greater tariff.

In 1968 (Dpr 18 Maggio 1968 n°126) it was established that the prices regulation guidelines were to be set by the CIPE (*Comitato Interministeriale per la Programmazione Economica*) reducing the CIP's responsibility only to detailed implementation of the CIPE's guidelines. A total prices freeze was set at first after 1973 in order to fight against the price burst caused by the oil crisis. In 1974 such a rigid regulation was relaxed and new guidelines²⁹ for the regulation of public services were adopted by CIPE (Arcangeli 2000, 301). The 1974 regulation was based on the following conflicting principles: i) to refrain from major increases in the domestic water users' bills in order to fight against inflation, ii) to allow an indexation of the tariff on the inflation and on the water service operational and investment real costs in order to progressively reduce water services yearly imbalances and iii) to give disincentives to water consumption through an increasing block rate system (Bardelli and Muraro 2003, 349). It would have been tricky to meet both a inflation control objective

²⁸ Such a position was taken within a report which argued in favour of a fiscal reform of Milan's excise duty system « *a giustificarli [i prestiti] non basta affermare che i vantaggi delle grandi opere pubbliche ridondano in gran parte sui nipoti ; occorre dimostrare che a tempi nuovi non corrispondano nuove aspirazioni, e che noi provvediamo oggi a tutte le aspirazioni anche le non prevedibili di quell'avvenire di cui andiamo man mano confiscando i redditi.* » (Municipio di Milano 1891, 42).

²⁹ CIP 45/1974, CIP 46/1974 and Delibera 26/1975.

and a tariff close to real cost of service. In fact the administrative process of a decentralized regulation through the CPP was so slow and complex that the implementation of the 1974 guidelines did not fully take place (Arcangeli 2000, 301).

After the 1979-1980 oil crisis, the control on public services tariff was reinforced again to avoid a snowball effect on inflation. In the 1980's the macroeconomic tariff control was made a priority (particularly after 1984) and it was judged acceptable and necessary to cover public services deficits with fiscal revenues from the general budget (Arcangeli 2000, 301).

With the reforms of the 1990's (particularly the *Legge Galli* of 1994 – see § 6.1) the price control policies were softened according to the principle that WSS should be financed through Tariffs rather than through Taxes (full cost recovery principle).

4.3.2 Milan's WSS after WWII

We have seen in the previous lines that in the decades after WWII water tariffs in Italy were heavily regulated to pursue general interest goals of anti-inflation policies. Data collected by the author on Milan's WSS in those years confirm this trend (Table 5) Local Public Services were also used as a source of employment and Milan's WSS was not an exception to that trend³⁰.

In those years yearly investments amounts were approved each year by the municipal council. There was little or no connection between the gross profit of the service and the planned investments. The water and sanitation service made their investment plan which was analysed by the municipal budget department and approved by the municipal council. Former employees of the municipal administration told us that it was quite frequent for the authorised Capex amounts to be below the investment plan need since “investments in the water and sanitation infrastructure were not politically visible as those in nursery schools”. Indeed there are two well-known stories of postponed investments in drinking water treatment and waste water treatment (§ 2.2 and Box 3).

Our data on Milan's WSS financial flows after WWII show that starting in the 1970's Tariff revenues were not high enough to cover OPEX. As a consequence gross profit was negative. It was only in the 1990's that tariff revenues were high enough again to cover OPEX. Three kind of factors can explain the imbalance of the 1970-1990 years: i) the water tariff regulation policy in Italy in those years aiming at controlling inflation (Tariff revenues were capped while operational expenditures increased significantly as inflation was very high in those years), ii) the reduction in sold water volumes and iii) the impact of the 1976 *Merli* law on sanitation levies³¹.

³⁰ Source: interview with a high ranked civil servant, former manager of Milan's water department.

³¹ Indeed, since the creation of the sanitation service in 1888 a sanitation levy (higher than opex) had been charged to the users by Milan's municipality. After 1976 Milan's municipality

Table 5 – Revenues, Opex and gross profit of Milan’s WSS (1956-2000), all values in Lira

	water and sanitation		
year	revenues	opex	gross profit
1956	2 816 016 441	2 412 666 026	403 350 415
1960	4 129 720 834	2 957 839 125	1 171 881 709
1965	5 728 731 413	4 101 642 482	1 627 088 931
1970	6 904 790 660	6 871 698 861	33 091 799
1975	7 286 197 460	7 809 942 946	-523 745 486
1980	14 647 478 995	18 329 273 360	-3 681 794 365
1985	37 283 747 950	48 308 083 461	-11 024 335 511
1990	63 334 093 303	61 066 857 635	2 267 235 668
1995	60 372 081 708	58 008 451 527	2 363 630 181
2000	107 337 122 233	66 531 867 852	40 805 254 381

Source: author’s elaboration based on *Conto Consuntivo dell’anno* [various years].

It is quite clear that after WWII Milan’s WSS was much more influenced by general interests goals (anti-inflation policies, over-employment) than in the first phase we analysed (§ 4.2). Public service missions were still considered very relevant but Milan’s WSS was not always very effective in implementing that mission. A clear example of a partial failure to fulfil the public service mission is given by the (non)investment policies implemented in those years and particularly the two stories of postponed investments in drinking water treatment and waste water treatment (§ 2.2 and Box 3).

From our point of view some of the pursued general interests goals were in conflict with public service missions ones: indeed, on one hand anti-inflation policies which capped WSS tariff revenues while on the other hand municipal decision making process often gave the allocated investment budget (from Tax revenue) to other municipal sectors. The joint effect of these two processes contributed to keep Milan WSSs in underinvestment.

4.4 After corporatization

In the last paragraphs we have adopted a historical approach on public service and general interests goals implementation in Milan’s WSS. In this paragraph we leave history aside and come back to the present. To what extent and how is Milan’s WSS provided by MM committed to clear public service goals? Is it driven by general interest goals too?

could not charge anymore the water treatment part of the sanitation levy since no waste water treatment plant was in operations. It could charge a sanitation levy only in the limitation imposed by the *Merli* law.

4.4.1 *Explicit public service obligations*

Historically in the decades of full direct provision (category A – Table 1) the public service obligations were implicit and not formalized. Since 2003 a distinct entity, MM is responsible of the WSS's provision on behalf of Milan's municipality (corporatized model – category B – Table 1). Public service obligations are then formalized through various documents: i) the *Piano d'ambito* (investment plan) theoretically set by A-ATO MI, ii) the *convenzione* (contract) between MM and the A-ATO MI, iii) the *regolamento di servizio* (set of rules applying to the WSS) between AATO-MI, MM and the users and iv) the *carta della qualità dei servizi* (quality standards applying to the WSS).

The three public service mission goals listed in § 4.1 are then included and formalized in the above documents. The first goal (a - Universal provision and equal access to the service to all citizens) is the more evident and clearly included in all the above mentioned documents (especially the three last one). The second and third goals (b - An investment policy and c - Water resources conservation and environmental protection) are at least theoretically and regulated and formalized by the *Piano d'Ambito*. On the contrary general interests' goals are not mentioned in those documents.

4.4.2 *Non contractual public service operations*

Apart from the public service goals formalized and made explicit, MM provides some other services although they are beyond its contractual mission and not binding, when asked on why they were providing these services even if not bound to do so the interviewees told us that it was for a “commitment to public service mission”. Three examples of this kind of activities are described in this paragraph.

- a) **Supplying water to Corsico:** due to a former agreement between Milan's municipality and Corsico municipality, MM supplies drinking water to the Corsico inhabitants even if Corsico is not included in the ATO Città di Milano but in the ATO Provincia di Milano. Although the agreement expired in 2005 MM still provide water to Corsico users to comply with public service obligations.
- b) **Managing and monitoring the shallow aquifer:** Milan is located on the top of an abundant aquifer. In the last decades the aquifer water table level has been raising more and more due to industry's decline in Milan area. Flooding of underground infrastructure (such as underground lines but also private basements) is a source of concern since most of these infrastructures were built when the water table level was deep and decreasing due to heavy and increasing water consumption. To control the water table level and avoid flooding, water is monitored and withdrawn through a system of shallow wells (*pozzi di prima falda*). Investments and maintenance of this system are made by the municipality. Although daily operations (pumps monitoring

mainly) on this system should be the municipality's responsibility they are undertaken by MM. Energy costs are covered by MM (some pumps run 24 hours a day).

- c) **Surface water and flood control:** although they are not visible many rivers and watercourses still flow just below Milan's city. It happens from times to times that water flow exceeds the discharge capacity allowed by the underground riverbed (This is particularly true for the Lambro and Seveso rivers). In that case water spurts out and floods the streets. The phenomenon has worsened through the 20th century due to the massive urbanization and soil impermeabilization upstream which increases flood discharge above maximum discharge figures which had been used decades ago for dimensioning the underground river beds. Flood control is the municipality's responsibility rather than MM one. However after 2003 no human resources having the necessary knowledge are left within the municipality. Under a temporary agreement with the municipality (already expired) MM is in charge of taking care and monitoring rivers and watercourses. MM operates these activities for free although it is not legally bound to do so. The technical staff of the MM sanitation department dedicates a significant part of its working hours to these activities (roughly more than 50% according to an interview we have undertaken). These activities are run by MM on a public service mission base since otherwise "no one else would take care of this essential problem". The fact that no one within the municipality is taking responsibility of the issue is by itself a problem since investments in this capital intensive area are not judged priorities in the municipal budget arbitrations and constantly postponed³².

4.4.3 Corporatization and commitment to public service

A part of the Italian civil society movement in favour of public water militates for a draw back from corporatized WSSs (category C in Table 1) to a full direct municipal provision (category A in Table 1) or autonomous municipal provision (category B in Table 1) arguing that corporatized WSSs even if fully publicly owned implement already an unacceptable formal privatisation. Through our interviews we have inquired on how the public service mission commitment and implementation changed when comparing the full direct municipal provision to the MM's corporatized one. From our interviewees point of view the "public service philosophy" (meaning the commitment to public service goals) driving MM's operations has not changed significantly if compared to the one

³² Apparently the *Autorità di Bacino del fiume Po* and the *Agenzia Interregionale per il fiume Po*, created in 1998 have less power than the previous *Magistrato del Po* in incentivizing or making compulsory investments in Milan's surface water and flood management infrastructure. Source: interview.

previously driving the fully municipal WSS. Indeed MM’s commitment to provide “non contractual public service operations” even if not bound to do so (§ 4.4.2) might be considered as a proof that public service awareness is still driving MM’s operations. According to our interviewees what might have significantly improved is that public service goals have been formalized and that the flexibility (in management, in accounting, in finance) allowed by the corporatized legal status is much more efficient and effective in reaching the public service mission goals. However this is only a subjective perception on which a detailed analysis cannot be easily performed to confirm or deny it.

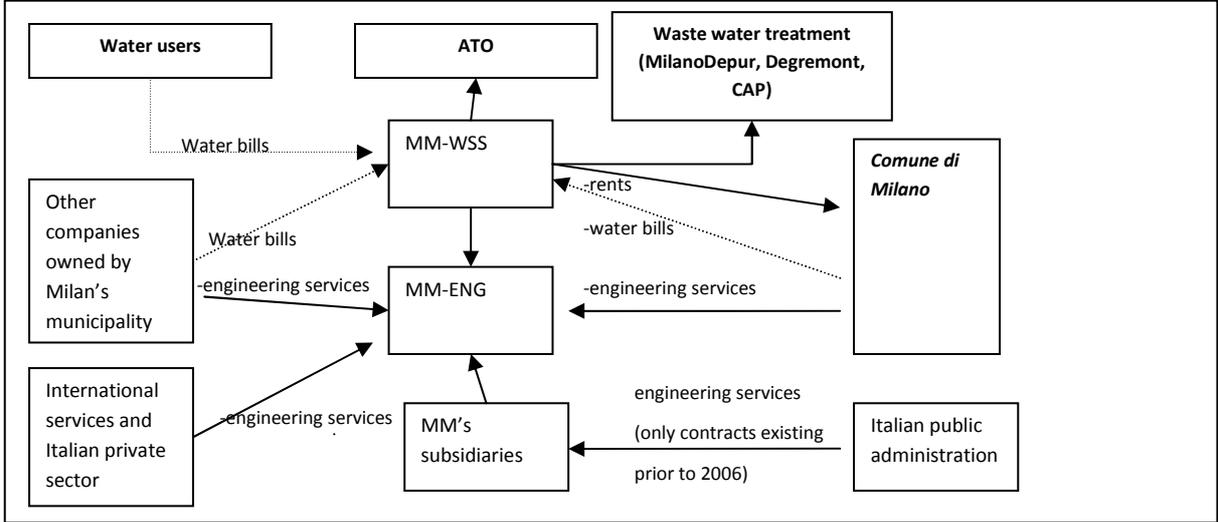
5 Performance

5.1 Financial performance and cost-effectiveness

Table 6 here below shows a reclassified Profit & Loss account for MM as a whole from 2002 till 2011. We shall remember here that the WSS provision was transferred from Milan’s municipality to MM in June 2003. That explains the large change in revenues between the years 2002, 2003 and the years afterwards. Table 7 shows instead a reclassified Profit & Loss account for the WSS part of MM only. Figures confirm that the great majority of MM’s EBIT is due to the WSS part of the company since MM-ENG’s external activities have decreased after 2006 when the possibility for MM-ENG to provide services to other Italian Public Administration has been restricted.

We shall remember here that the “full cost recovery principle” applies to Italian WSS which means that MM does not receive any revenues from Taxes or Transfers neither from the municipality nor from the Central Government. We shall see on the contrary that some money is flowing from the water and sanitation budget to the general budget of Milan’s municipality. Figure 3 here below shows the financial flows taking place between MM, Milan’s municipality and the major other actors.

Figure 3 – Financial flows of MM



Source: author’s elaboration.

Although over the last 10 years MM has constantly made a profit, no dividends have been given to the shareholder (Milan's municipality). On the contrary the profits made increase the net assets. As classically done by most municipally owned companies, MM's approach consisted in having a small EBIT for fiscal optimization purpose. This does not mean however that no financial transfers were taking place between MM and its municipal shareholder. It rather means that financial transfers were taking place using the cost side of the business rather than the profits.

Indeed, from 2003 till 2007, MM paid a yearly concession fee (*canone*) of roughly 23 M euros to Milan's municipality³³. This is a huge value (it has the same order of magnitude of all the salaries and wages costs - excluding social security costs) which was over estimated in order transfer money from the water budget to the general municipal budget without facing fiscal losses in favour of the central government.

In 2006 a decree³⁴ tried to implement more rigorously the "water pays for water" principle and made clear³⁵ that no concession fees could be paid by the water operators to the municipalities while it was confirmed that the water operator was responsible of the payback of the loans which had been subscribed by the municipality to finance water and sanitation infrastructure.

To comply to the 2006 decree from the year 2008 the concession fee was abolished and replaced by three kind of financial transfers from MM to the municipality: i) loan's payback, ii) building rent³⁶ and iii) other costs for various services. After 2010 the three items adds up for a total amount of more than half of the concession fee previously paid. Although this amount might appear more reasonable it is still an over-estimation of the real costs faced by Milan's municipality.

A negotiation between MM and Milan's municipality is taking place in those recent months and we are keen to think that the financial transfers from MM to Milan's municipality are very probably doomed to decrease in the future. A first reason in favour of such a trend is due to the budget balance of MM which is more and more tight due to the combined effect of lower revenues (due to lower

³³ (ATO Città di Milano 2007, 185; ATO Città di Milano 2010, 26).

³⁴ Decree 152/2006, article 153, <http://www.camera.it/parlam/leggi/deleghe/06152dl2.htm>, retrieved 4/24/2013.

³⁵ According to the CONVIRI the payment of concession fees from water operators to the municipalities was not legal even before 2006 since the Metodo Tariffario Normalizzato was not mentioning concessions fees among the acceptable costs. CONVIRI, Parere n°7625, Aprile 2011.

³⁶ The amount paid for "godimento beni di terzi" was of 17.6 M euros in 2008 and 13.5 M euros in 2009 (ATO Città di Milano 2010, 26). After 2010 the rent amount was of roughly 6 M euros per year. Rent contract (year 2010) between MM and Milan's municipality http://www.atocittadimilano.it/public/nicola/fck/file/Sotto%20allegati%20dell%27Allegato%20G%20della%20Deliberazione%2013_2013%20del%20CdA%20del%2003%20Aprile%202013/All.%20G%206.PDF retrieved 4/24/2013.

water consumption) and higher costs (mainly due to investments). A second reason is that the new AEEG regulation guidelines impose a closer scrutiny on all costs faced by water operators on which efficiency gains can be asked (OPEX* § 6.2). A debate³⁷ is taking place on whether the rent paid by MM to the municipality should be considered within OPEX* or within OPEX** depending on whether the assets for which a rent is paid are unique or replaceable with other assets which could be rent at lower prices on the market.

Table 6 – Reclassified Profit & Loss account of MM SpA

Thousand Euro	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Revenues	80 828	189 441	279 468	239 943	230 453	248 002	254 292	236 930	260 507	232 792
Operating Costs	75 942	168 980	263 785	227 835	217 517	231 968	237 997	219 967	240 816	201 435
EBITDA	4 886	20 461	15 683	12 108	12 936	16 034	16 295	16 963	19 691	31 357
Depreciation, amortization and write down	2 542	3 986	4 389	5 463	7 314	8 609	9 722	12 522	13 272	15 387
EBIT	2 344	16 475	11 295	6 645	5 622	7 426	5 682	4 442	6 419	11 273
Financial income and expenses	-1 168	-806	-386 983	-877 132	-1 697	-2 749	-2 998	-1 970	(2 077)	(3 388)
Result before taxes	1 765	15 563	10 980	6 078	3 910	4 750	2 684	2 760	4 199	7 282
Income taxes	1 474	6 903	5 581	3 956	3 192	3 586	2 545	2 497	3 346	3 390
Profit (Loss) of the year	291	8 660	2 122	5 399	718	1 164	139	264	852	2 766
CASH FLOW	-4 133	25 730	-19 300	-976	-5 851	-9 137	-1 378	-71	1 712	12 787
Leverage³⁸			0.42	0.70	1.41	1.91	2.90	3.60	3.30	2.80
ROI [%]			24.29	11.18	6.54	6.94	4.82	3.11	3.96	7.35
ROE [%]			6.46	15.45	2.01	3.16	0.38	0.71	2.24	6.77

Source: Author's elaboration based on data from Massarutto (2011) and from the "*Bilancio d'esercizio*" of MM, various years, all values in thousand Euros.

Table 7 – Reclassified Profit & Loss account of MM - WSS

	2004	2005	2006	2007	2008	2009	2010	2011
Revenues	104 962	116 169	117 668	110 796	110 326	113 917	113 464	123 019
Cost	86 648	101 929	107 097	103 726	99 146	101 856		
EBITDA	18 314	14 240	10 571	7 070	11	12 070	15 900	24 715
Depreciation, amortization and write down	8 928	9 032	8 439	3 794	7 767	7 636	10 686	13 908
EBIT	9 386	5 208	2 132	3 276	3 413	4 434	5 214	10 807

³⁷ AATO-MI, Sotto allegato 7 dell'Allegato G della Deliberazione 13_2013 del CdA del 03 Aprile 2013, www.atocittadimilano.it, retrieved 4/24/2013.

³⁸ Posizione Finanziaria Netta / Patrimonio Netto.

Financial income and expenses	538	237	273		1 999			
Result before taxes	8 848	4 971	1 859		1 414	4 277	4 626	8 804
Income taxes	4 566	2 747	1 369		1 397			
Profit (Loss) of the year	4 282	2 224	490		17	2086		

Source: author's elaboration based on data from three versions (2007, 2010 and 2013) of the *Piano d'Ambito ATO Città di Milano*. The 2013 version is only an internal draft version, courtesy of MM.

5.2 Technical performance

A benchmark comparison of MM versus other Italian operators has been undertaken by Massarutto (2011). Other interesting benchmark analysis of the Italian water sector have been published by the same author in 2012 (Massarutto et al. 2012). Some figures in terms of technical performances are given in Table 8 and others are reported in the Appendix 3. Most data shows that MM is well above the average technical performances of Italian water services (which are not so high though). MM delivers water which fully complies to quality standards with no interruption while 245 municipalities in Italy (and 24 in the North of Italy) do not fully respect drinking water standards. Unplanned maintenance interventions are not frequent (0.48 interventions/km of network) showing a good reliability of the drinking water network.

In terms of cost indicators (last lines of Table 8) MM figures are affected by the peculiarities of Milan's WSS (typical of a dense big city): a dense network which means that the cost per unit of network are relatively high, a large population served (cost/unit of people served is low) and large sold volumes (cost/ volume is low).

Table 8 – Benchmarking of MM – technical performance

		MM	Lombardia	Nord	Italia
Water losses	Water (millions m ³)	221	1.408	3.696	8.143
	Water billed (millions m ³)	201	1.111	2.727	5.500
	Total losses (%)	-13%	-21%	-26%	-32%
Waste water	Waste water recycle after treatment (%)	33%		0%	0%
	Users connected to a waste water treatment plant	100%	81,5%	84,9%	78,5%
	Users connected to advanced waste water treatment plants	100%	69,9%	68,8%	52,2%
Water non respecting drinking standards	N° municipalities	0		24	245
	Population (millions)	0		0,06	2,1
Network maintenance	Unplanned maintenance intervention on the network (n./km)	0,48		1,25	3,18

Total cost / km network	Euro/km	48.697			23.325
Total cost / inhabitant	Euro/inhabitant	88			135
Total cost / 1 000 m ³	Euro/1 000 m ³	543			1 475
Total cost / employee	Euro/employee	241.25			222

Source: Massarutto (2011; Massarutto et al. 2012) based on data from MM, ISTAT, Mediobanca and IRPET.

Since 2009 relations between MM and its customers are ruled by a *Carta di Servizio* through which MM has made various commitments concerning its customer service. Commitments made by MM appear to be much more ambitious than those made by many other Italian water utilities (Appendix 3).

5.3 Organization

The company is managed by a chairman and a general director. Various general administration services (administrative and financial department, legal office, communication and marketing) are under the direct responsibility of the general director (in white in the organizational chart in Appendix 1) and deliver services to the whole company. Conversely operations of the MM-WSS area of business and MM-ENG area of business are run separately.

MM employs 714 people divided in the two areas of business (see table below). MM-WSS operations require a significant number of workmen while MM-ENG operations require mainly engineers and skilled staff. Workers in the two areas of business have different contractual conditions. Indeed personnel from the MM-WSS area chose to keep the same labour contract which they had when working for Milan's municipality (public administration collective labour agreement) while MM-ENG workers are employed according to a transport sector private collective labour agreement.

Table 9 – MM's human resources in 2011

	manager (dirigenti)	middle manager	employee	workmen	Total
ENG	22	43 ³⁹	186	0	251
WSS	7	31 ⁴⁰	204	221	463
Total	29	74	390	221	714

Source: Metropolitana Milanese, bilancio dell'esercizio 2011.

The people and the organization of the two areas of business come from very different past traditions: municipal administration philosophy for the MM-WSS area and company way of thinking for the MM-ENG area even if MM has always been company owned by the municipality. Also due to these different

³⁹ quadri.

⁴⁰ posizioni organizzative.

past stories, synergies⁴¹ between the two business areas have not been easy to develop after the fusion of the two businesses in 2003. Indeed, at first the two businesses were run quite separately. Progressively the MM-ENG area started to provide design and engineering services to the MM-WSS area. MM knowledge and experiences were relevant in the design and engineering of subways. Milan water and sanitation infrastructure is mainly underground too. Nevertheless, delivering engineering services to MM-WSS required MM-ENG department to acquire additional knowledge and to adapt to new skills.

After 2006 MM could not sign anymore new engineering contracts with other Italian public administration except Milan's municipality, it could only bring to completion existing ones through distinct *ad hoc* branches (refer to § 3.3). Despite increasing efforts to obtain additional work on the international market, services provided internally to the MM-WSS department represent nowadays a significative percentage of the activities of the MM-ENG department.

In 2011 the organizational structure of MM has been reformed (refer to the organizational chart in the figure below) in order to create more integration between the two areas of business (MM-WSS and MM-ENG) particularly concerning general facilities. It appears from our interviews that an accounting reform has been undertaken together with the organizational one. MM-WSS and MM-ENG are now considered as autonomous entities from an accounting point of view in order to be able to have a transparent view of the profitability and cost-effectiveness of the two areas of business. We have been told that the services delivered from MM-ENG to MM-WSS are billed at market prices but we have not counterchecked such an information.

According to an internal estimation by MM computed in the framework of the new regulatory regime (§ 6.2), in 2011 activities re-invoiced from ENG department to the WSS one represented a total amount 2.31 M euros (equivalent to 13 people full time). General company services (chairmanship and board of directors, general direction, administrative and financial department, legal office, communication and marketing) re-invoiced to the WSS department represented 5.45 M euros in 2011 (equivalent to 49 people full time).

5.4 Asset Management Policy

Maintaining the existing infrastructure and investing in new assets is a key activity for water utilities, even in Europe where they are in a mature age (Barraqué 2009). The asset management⁴² policy of a water utility is particularly

⁴¹ Furthermore WSS offices are located in a different location from MM headquarters.

⁴² A definition is given by the US Environmental Protection Agency: "Asset management is maintaining a desired level of service for what you want your assets to provide at the lowest life-cycle cost (...). It is a framework being widely adopted as a means to pursue and achieve sustainable infrastructure.", http://water.epa.gov/infrastructure/sustain/asset_management.cfm, retrieved on May 21st.

crucial from a sustainability point of view (Marlow 2010). This paragraph is focused on the asset management policy of MM.

Concerning the water and sanitation networks, despite an ambitious investment plan, investments undertaken are harshly constrained and slowed down by the administrative authorization needed to dig up below the city's streets. Indeed, according to MM it is very tricky to obtain dig up authorizations from Milan's municipality due to the heavy traffic congestion within the city; many administrative steps are required and apparently being a municipal company does not give MM the preferential conditions in implementing a smoother dialogue with the municipal administration on these issues.

In practice, dig authorizations are so tricky to obtain that the majority of the investments in the networks are undertaken by MM either to urgently repair broken / leaking pipes (curative approach) or when a street renovation is undertaken by the municipality (windfall effect choice).

To limit the excavated areas, no-dig intervention techniques have been tested by MM and progressively implemented on most construction sites. No-dig techniques⁴³ allow to renovate a water pipe or a sewer reducing significantly the dig area below the streets and thus reducing the works' impact in terms of traffic congestion. Despite such a limited impact on congestion authorization for no-dig interventions are still tricky to obtain for MM. Furthermore the technical debate is still open on whether these no-dig renovation techniques are effective in extending significantly the time life of the networks or not. How many years of additional time life does a no-dig intervention give to an asset? This is the crucial issue from a sustainability point of view and unfortunately it will stay unanswered for a while.

Investments are not limited to the network's renewal and planned also on the water production plants. Despite the fact that new pumping stations allow significant energy savings MM has not chosen to systematically invest in modern and energy pumping stations. Indeed, as some ancient pumping stations have a long life time, they are kept in operations and upgrading is spread over the time.

Concerning water treatment units no major investments are needed at the moment since water treatment units (activated carbon technology + air stripping) have been completed not so long time ago (1992) due to an insufficient investment in the past (Box 3).

⁴³ A no-dig technique for sewer renovations has been tested and implemented in Milan since a long time. It is based on a metal concrete. It is able to give new strength to the sewer's structure and it is spread using a special robot. It is mainly used in the case of large sewers where a total renovation would require too many days. No-dig techniques on pipes have also been more recently tested by MM in the framework of a research project with another company. They use special mortars and sheaths to renovate the pipes and eliminate leakages. Nevertheless these techniques cannot solve the structural fragility of iron cast pipes. Source: our interview.

Despite their recent completion some investments are needed in the waste water treatment plans (8 Million euros investment in the San Rocco waste water treatment plan which had been under dimensioned).

5.5 Sustainability

To better tackle the many intergenerational aspects the public service mission the three goals mentioned in § 4.1 might also be expressed in terms of sustainable development. An interesting approach on the sustainability of WSS has been proposed in the framework of the Water 21 research project based on the concept of the “3 E” namely Economics, Environment and Ethics (Correia 2001; Barraqué 2003). The sustainability problem can be expressed through three questions⁴⁴ (Barraqué 2003, 205):

1. Economics — how is infrastructure capital maintained and replenished?
2. Environment — what new investments/approaches are needed to ensure environmental protection and water resources conservation?
3. Ethics — who pays for sustainability costs? If WSS costs increase due to (1) and (2) will these costs be affordable for all users?

Another evaluation framework for WSS based on the concept of sustainability has been proposed by Massarutto (2002; 2004; 2007): a WSS is sustainable as long as externalities through time and space are avoided. In other words “a WSS is sustainable if it satisfies the present generation without jeopardizing the future generation capabilities” (Massarutto et al. 2012, 25). In practice to be sustainable single generation should not damage the natural capital (water resources, natural environment, biodiversity) and maintain the infrastructure capital (networks, treatment plants...) in order not to transfer a part of the costs on the next generation.

If we adopt the sustainability criteria described above is MM-WSS sustainable? The research report edited by Massarutto has made such an analysis on various Italian WSSs among which MM (Massarutto et al. 2012).

1. Economics: in all the Italian WSS considered by Massarutto et al. (including MM) it appears that the undertaken investment allowed are still much below what would be needed to reproduce in the long run the infrastructure capital. A first reason for such an un-sustainability is found is the complexity of obtaining a digging authorization (§ 5.4). Another reason has to be found in the water and sanitation tariff level which have been set too low determining too low cash flows to make the investment plans (*Piani d'Ambito*) bankable (Massarutto et al. 2012, 84-92)

⁴⁴ The EAU & 3E research project on which our PhD thesis is partially financed is based on such a vision of WSS's sustainability, <http://eau3e.hypotheses.org/>

6 Regulation

6.1 Legal and regulatory framework after 1994

Some details on the regulatory regime applying to the Italian water sector through the 20th century have been given in § 4.3.1. Here we are going to focus on the years after 1994 when an ambitious reform of the water sector was launched in Italy (*Legge Galli – Legge n°36 1994*). A vast amount of literature⁴⁵ has already analyzed such a reform and it is not the purpose of our work to make a new analysis. However a synthetic summary of the main features of the legal regulatory framework of the Italian water sector might be useful for the reader. The principal features of the implemented reform were:

- The concept of Integrated water and sanitation services (*Servizio Idrico Integrato*) meaning that water and sanitation had to be run jointly by the same entity.
- Economies of scale: WSS were to be run at a larger geographical scale, the *Ambito Territoriale Ottimale* (ATO).
- WSS could be operated through various organisational solutions: i) direct municipal management, ii) the municipally-owned “azienda speciale”, iii) the partly municipally-owned PLC and iv) concessions to a private partner.
- Regulatory powers were awarded to local regulators to be created for such a purpose (*Autorità d’Ambito Territoriale Ottimale* - AATO). A national regulatory committee the *Comissione Nazionale di Vigilanza sulle Risorse Idriche* (CONVIRI)⁴⁶ was also created.
- AATO were responsible of the following tasks: i) designing an investment plan (*Piano d’ambito*), ii) choosing how to operate the service (in-house provision, bid for a concession...), iii) signing the contract with the operator (*Convenzione*), iv) approving the business plan and v) periodic and extraordinary regulatory revision of the ATO investment plan (*Piano d’Ambito*) and of the tariff.
- The CONVIRI was mainly responsible of preserving the users’ interest and supervising tariff regulation. It was also responsible of an observatory and database on the water services. In practice it was an institution understaffed, suffering from huge information asymmetries and having little regulatory power.
- Last but not least the water and sanitation services were to be self-financing and transfers from the central state were forbidden. A revised

⁴⁵ An updated evaluation of the reform has been recently done by Massarutto and Ermano (2013) and by Massarutto et al. (2012). Many interesting papers are included in Muraro and Valbonesi (2003).

⁴⁶ At first it was called *Comitato Nazionale di Vigilanza sulle Risorse Idriche* (COVIRI).

tariff methodology (*Metodo Tariffario Normalizzato – MTN*) based on the full cost recovery principle was approved in 1996 (decreto ministeriale 1 agosto 1996). Exceptions to the MTN were made for concessions existing prior to the Galli Law. As a result in 2011 many operators were still applying the former CIPE tariff methodology instead of the MTN one (AEEG 2012a, 25).

The implementation of the reform was left to a large extent to the local authorities (municipalities and regions) resulting in large differences its technical implementation. Indeed the ATO were to be defined at the regional level, thus a great variety of choices has been made (refer to Table 10): from a unique regional ATO (as in Puglia where the *Acquedotto Pugliese* was operating the service) to a ATO limited to a single municipality (as in Milano). In most of the other cases the ATO has been placed at the intermediate scale of the *Provincia* (county division) as the Lombardy’s map below shows:

Table 10 – Main features of Italian ATO’s

	Average	Minimum	Maximum
Number of Municipalities included	89	1 (ATO Milano Città)	377 (ATO Sardegna)
Number of people living in the area	660 000	70 000 (ATO Peligno Alto Sangro)	4 millions (ATO Puglia)
Surface served (km ²)	3 300	182 (ATO Milano Città)	24 000 (ATO Sardegna)

Source: author’s translation based on Canneva (2011), data from BlueBook Utilitatis 2009.

Figure 5 – Map of ATO's in Lombardy



Source: Canneva (2011) quoting Blue Book Lombardia 2008.

Between 1994 and 2011 the Galli reform has been implemented with great inertia and frequent legislative modifications⁴⁷. Legislative changes and debate were particularly frequent concerning the degree private sector participation.

In December 2001⁴⁸ a law “imposed *de facto* the selection of water operators exclusively through competitive tendering, with the only exception being represented by the direct award of a concession to a wholly publicly-owned company provided that within two years of the concession award an equity stake of at least 40% was sold to a private operator selected through competitive tendering”. WSS could not be operated anymore by the municipality and should be delegated to autonomous company. The latter could be municipally owned⁴⁹ (in-house provision), private or partially owned by a municipality and by a private partner. To comply to such a decree the responsibility of Milan’s water and sanitation services was given to *Metropolitana Milanese* as a temporary solution at first (Lobina and Paccagnan 2005).

The 2001 legislation was partially in contrasts with EU principles and in 2003 the law was modified and this time it allowed three institutional choices for

⁴⁷ decreto legislativo 3 aprile 2006, n. 152, decreto legge 112/2008, decreto legislativo 16 gennaio 2008 n°4, legge 26 marzo 2010, n. 42.

⁴⁸ legge. n. 448/2001, (the 2002 Budget Law) art. 35.

⁴⁹ Or regionally owned in the case of the Acquedotto Pugliese.

WSS: i) awarding a concession to a private company selected through competitive tendering; ii) a public-private joint venture whereby the private partner is selected through competitive tendering and iii) a company entirely owned by local authorities (in house provision according to the TECKAL EU jurisprudence).

In 2009 the Ronchi Decree (decree 135/09) made competitive tendering compulsory to award a concession of the WSS within an ATO. Companies entirely publicly owned could participate to the competition. Although the decree did not excluded WSS run by municipally owned companies (Massarutto 2009; Scarpa 2009b; Scarpa 2009a), it was considered by the public opinion as imposing the privatization of water services. An opposition movement arose⁵⁰ and made the legal step to make a referendum in June 2011 against the “water privatisation” on two issues: i) did the voters want to abolish the part of the 2009 Ronchi Decree which made compulsory to use competitive tendering to choose the operator for WSS? and ii) did the voters want to abolish the “remuneration of the invested capital” part within the water tariff computed by the MTN? The “Yes” won with a great majority in both cases.

6.2 The new regulatory regime after 2011

The CONVIRI turned up to be very weak and many experts and policy makers argued in favour of a more independent and powerful national regulatory authority. After the 2011 referendum⁵¹ the regulatory power on water services was transferred⁵² to the *Autorità per l’Energia elettrica ed il gas* (AEEG), the national regulatory authority for gas and energy.

The AEEG undertook in 2012 a public consultation process⁵³ in order to reform the tariff regulation of WSS. This was a sensitive mission since the new tariff regulation would have both to respect the 2011 referendum outcome (which had canceled the remuneration on the invested capital element of the tariff formula) and guarantee full cost recovery⁵⁴ including the financial costs of investments⁵⁵ in order to make investments in the water sector again “bankable”.

⁵⁰ Forum Italiano dei Movimenti per l’acqua - <http://www.acquabenecomune.org> .

⁵¹ Just prior to the referendum the decree 70/2011 had created the *Agenzia nazionale per la regolazione e la vigilanza in materia di acqua*, which was never effectively in operations.

⁵² Decreto legge 6 dicembre 2011 n°201 enforced with the Legge 6 dicembre 2011 n°214.

⁵³ (AEEG 2012a; AEEG 2012b) available on

http://www.autorita.energia.it/it/operatori/operatori_idr.htm .

⁵⁴ Also to comply to EU rules.

⁵⁵ « *Un nuovo metodo tariffario per la determinazione della tariffa del servizio idrico integrato... pena la violazione del decreto legge n. 70/11, del diritto comunitario e degli stessi principi affermati dalla Corte costituzionale (sentenza n. 26/11), la copertura integrale di tutti i costi di esercizio e di investimento, compresi i costi finanziari.* » (AEEG 2012a, 12).

Indeed, after the referendum uncertainty on the regulatory framework had made the operators to avoid investments and to restrain as much as possible their activity to daily ordinary operations.

The AEEG approach consisted in both defining a temporary tariff regulation (Metodo Tariffario Transitorio – MTT) and working on designing a brand new tariff regulatory method to apply afterwards. The MTT was approved in December 2012 in order to be applied in 2012 and 2013 (AEEG 2012c). The main features of the new tariff method are:

- Different rules apply to OPEX admitted in the tariff determination depending on their nature: i) energy costs, ii) internal OPEX* on which efficiency efforts can be asked, iii) internal OPEX** on which efficiency efforts cannot be foreseen, iv) OPEX purchased at wholesale. Items from the second and fourth categories are compared to the items inserted in the Piano d'Ambito and an intermediate value between the two items is adopted in the tariff determination.
- The MTT computes a CAPEX contribution based on the assets value (inflated to the 2012 and 2013 value) owned by the operator up to two years prior to the examined regulatory year and defining appropriate regulatory amortization durations for each category of asset.
- The MTT considers also assets not present in the operator's book which were financed in the past by the municipality. Their estimation allows to admit in the tariff the Fondo Nuovi Investimenti (FoNI), a sort of special ear marked fund awarded to the operator for new investments.
- The MTT estimates an authorized revenue through a complex formula (AEEG 2013) as the sum of CAPEX contribution, energy costs, OPEX**, OPEX* and OPEX purchased at wholesale + FoNI component. Based on such an authorized revenue the MTT computes a multiplier factor τ which applies to the previous tariff.

6.3 Regulation in ATO Città di Milano

In Lombardy the ATO were defined in 2003⁵⁶ (more than 8 years after the adoption of the Galli law). An ATO was created for each *Provincia* except for the Provincia di Milano where two distinct ATO were created: the *ATO Città di Milano* and the *ATO Provincia di Milano*. According to our interviewees, a unified ATO was not chosen mainly for political reasons in order to preserve the autonomy of the two historical operators (Milan's municipal water service operating within the city and CAP operating in the neighbouring municipalities, see also § 7.4).

⁵⁶ La loi régionale 23 du 12/12/03 modifiée par la loi régionale 18 du 08/08/06.

The *Ufficio d'ambito ATO Città di Milano* (AATO-MI)⁵⁷ was created as an *Azienda Speciale*⁵⁸ of Milan's municipality in 2006⁵⁹ and is responsible of the regulation over the *ATO Città di Milano*. According to a 2010⁶⁰ law, by 1st January 2011 the AATO have been abolished and the responsibility was left to the regions to choose how to confer the responsibilities exerted by the AATOs. Later on⁶¹ the deadline was postponed to 31/12/2012.

In 2007 the AATO approved the *Piano d'Ambito*⁶² for the 01/01/08 – 31/12/2027 time frame. Waiting for such a plan, the most urgent investments (94 millions euros in sanitation to be spread over 20 years) were inserted in a first investment plan (*Piano stralcio*) approved in 2001⁶³. In 2010 the *Piano d'Ambito* has been revised (*ATO Città di Milano 2010*) postponing a significant part of the investments to the second half of the concession period (2018-2027) as shown in Appendix 4. In 2013 MM is proposing to the *ATO Città di Milano* to adopt a new revision of the *Piano d'Ambito* (*ATO Città di Milano 2013*) which would modify once again the investment plan. Total figures of the three version of the investment plan are summarized in Figure 6 and more details are given in Appendix 4. The 2013 revision proposal of the *Piano d'Ambito* is based on a very different investment plan for the 2013-2027. Major differences with the PdA 2010 consist in:

- 153.5 M euros less investments as a whole than in the PdA 2010
- A more “reasonable” and “realistic” investment plan based on the idea that MM and Milan's urban system cannot implement more than 40 M euros of investment per year (due to the risk of congestion and to the contracting out process). As a consequence.
 - o More investments in the 2013-2016 years than in the previous version
 - o Less investments in the 2017-2027 years
 - o Many investments savings are justified on a better technological choices basis (No-dig techniques, better chosen investments in waste water treatment plant).

⁵⁷ <http://www.atocittadimilano.it>

⁵⁸ According to the law the AATO could be established either as a formalized consortium of municipalities or with a lighter formalization as an agreement between municipalities. The *Azienda Speciale* is a special kind of public law entity created by the art. 114 of the decree n°267 of the 18th 2000.

⁵⁹ *Delibera del consiglio municipale* 3 aprile 2006 n. 54.

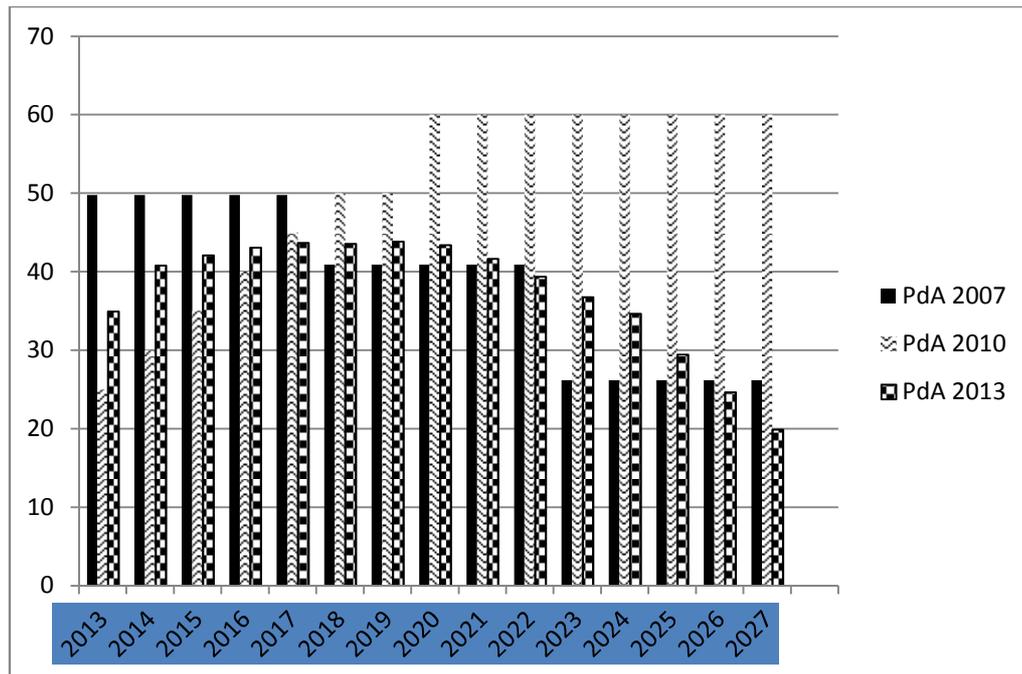
⁶⁰ legge 26 marzo 2010, n. 42.

⁶¹ Decreto legge 29 dicembre 2011, n. 216.

⁶² The piano d'ambito (*ATO Città di Milano 2007*) was approved by the ATO on the 3/08/07 after the municipal council approval on the 26/07/07.

⁶³ The *Legge 23/12/2000 n°388* (Finanziaria) had made compulsory to draft a *Piano stralcio* in order to fasten the investment's rhythm concerning the sanitation part of the water cycle.

Figure 6 – yearly investments in Milan’s WSS according to various versions of the investment plan



Source: author’s elaboration based on data from Massarutto 2011 and PdA 2013.

Massarutto and Ermano (2013) have pointed out that one of the major weaknesses of the Italian regulatory setting is the subjectivity left to the AATOs for the revision of the ATO’s investment plan and their lack of capability to correctly implement such a regulatory process. Indeed in Milan investments amounts were progressively curbed down in order not to increase the water tariff.

Some other considerations on how the regulation is being implemented in Milan’s ATO are given in § 7.2.

6.4 Borrowing constraints

Water and sanitation services are concerned not only with formal regulation of the water sector but might also be constrained by other external factors. In particular from our perspective the borrowing constraints faced by Italian WSS are a key issue in a phase where they have huge investments needs. This paragraph is focused on such an issue.

From a historical point of view despite the great variety of institutional models of the water and sanitation services in Europe (Barraqué 1995), investments in water and sanitation services have mostly been the responsibility of municipalities and other local public authorities. If we make reference to the three classical institutional models of direct municipal provision, *affermage* (leasing) and concession, only in the latter model, the concession, CAPEX investments are the responsibility of the private *cessionnaire* while on the

contrary they are “publicly” driven not only in the direct provision model but also in the *affermage* scheme⁶⁴.

In Italy (and in Milan) for decades investments in WSS were undertaken by municipalities. The WSS’s budget was not clearly distinct from the global municipal one. Debt⁶⁵ issued to finance WSS investments was considered as municipal debt to all means. Nowadays Italian WSS have been corporatized (§ 2.3) and are provided by joint stock companies. Some of these such as Metropolitana Milanese are fully municipally owned. To what extent debt issued by those public entities is accounted for as sub-sovereign debt and *in fine* as sovereign debt? Furthermore, in a normative view, should such a debt be considered as sub-sovereign debt?

In Italy an Internal Stability Pact⁶⁶ has been approved by law in 1998 (Legge 448/1998) to make the local public authorities (in particular the municipalities) to contribute to the goals of the European Stability and Growth pact (SGP) in terms of percentage of consolidated sovereign debt / GDP (Fraschini 2002, 177). Such an internal stability pact is seen as a major constraint on Italian municipalities’ autonomy and is presently criticized for constraining public investments and slow down the economic recovery.

However according to the EU legislation WSS’s debt should not be considered as sub-sovereign debt. Indeed the European legislation (Council Regulation n°2223/96 – SEC95) established that “market” public enterprises with Tariff covering at least 50% of the total costs should not be included in national public accounting⁶⁷ used for yearly reports to EU institutions in the framework of the European growth and stability pact (SGP).

Italy follows a twofold approach: although it obviously complies to EU guidelines for computing national public debt, the government also requires (decree n°1/2012) the local public companies owned by local public entities providing “in-house” services (such as WSSs) to fulfill to the internal stability pact previously applied to local public authorities only. One of the ideas behind such a decree was that local public authorities were by definition guarantors of those local public companies’ debt in case of financial imbalance (Corte dei

⁶⁴ Indeed, in *affermage* the contract states which investments are the responsibility of the public entity and which ones are the responsibility of the private operator. In France in most *affermage* contracts, and especially in the most recent ones, the great majority of investment is the responsibility of the local public entity (*autorité organisatrice*) while the private operator is only responsible of maintenance and minor investments.

⁶⁵ Debt was subscribed at concessional rates with public lending entities such as the *Cassa Depositi e Prestiti*, the *CREDIOP* or the *Cassa del Mezzogiorno*. More details on these aspects are given in another working paper (Crespi Reghizzi, forthcoming).

⁶⁶ Not all European countries chose to approve an internal stability pact in order to apply the European agreement. For example France did not create such a tool.

⁶⁷ National public accounting made by ISTAT in Italy or by INSEE in France apply such a definition and does not include debt of Water and Sanitation services within national public debt.

Conti 2012). Until now the constraint deriving from the decree n°1/2012 has not been implemented yet since no implementation ministerial decree has been published yet. It seems that a second stability pact to be applied to fully publicly owned companies could be created in addition to the existing one which applies to local authorities⁶⁸.

An argument in favour of the corporatization of Italian WSS was that corporatized WSS would be more autonomous from the municipal administration, from our perspective considering their debt as sub-sovereign raises a striking paradox. We have shown that the Tariff level of Italian WSS does not allow a high level of self-financing for investments. If their access to debt is constrained too the critical under investment in WSS infrastructure is not going to diminish. Referring to the sustainability criteria of § 5.5 it is clear that both their economic and environmental sustainability goals will not be met if their access to debt is limited. Indeed how will the infrastructure capital reproduced? How will be undertaken the huge investments to restore the good ecological status in rivers (as required by EU directives)?

7 Governance

7.1 Formal governance

This paragraph addresses the formal governance of Milan's Water and sanitation. Two aspects will be analyzed: i) MM's formal governance as a company, ii) Milan's WSS institutional mapping and regulatory governance.

MM is a joint stock company fully owned by Milan's municipality. There is a president and a board of directors (4 members) while a general director is responsible of the operations. The president, the members of the board and the general director are appointed by the municipal board. In 2013 an open call⁶⁹ for candidature has been launched by Milan's municipality in order to renew the president and the board of directors of various municipal companies among which MM.

MM's formal governance as a company is only a part of the story since a significant part of it does not take place within a straight shareholder-company relationship. The institutional mapping is more complex and observing the figure below might be useful. Indeed a regulatory relationship is taking place too. Regulation is exerted by the *Ufficio d'ambito ATO Città di Milano* (AATO-MI) on behalf of Milan's municipality. The AATO-MI employs five people: a director, an engineer, an economist and two employees. The director is a high ranked municipal civil servant. Since it is an *azienda speciale* (autonomous

⁶⁸ Press article of Gianni Trovati on *Il Sole 24 Ore* on the 30/01/2013 and 04/02/2013.

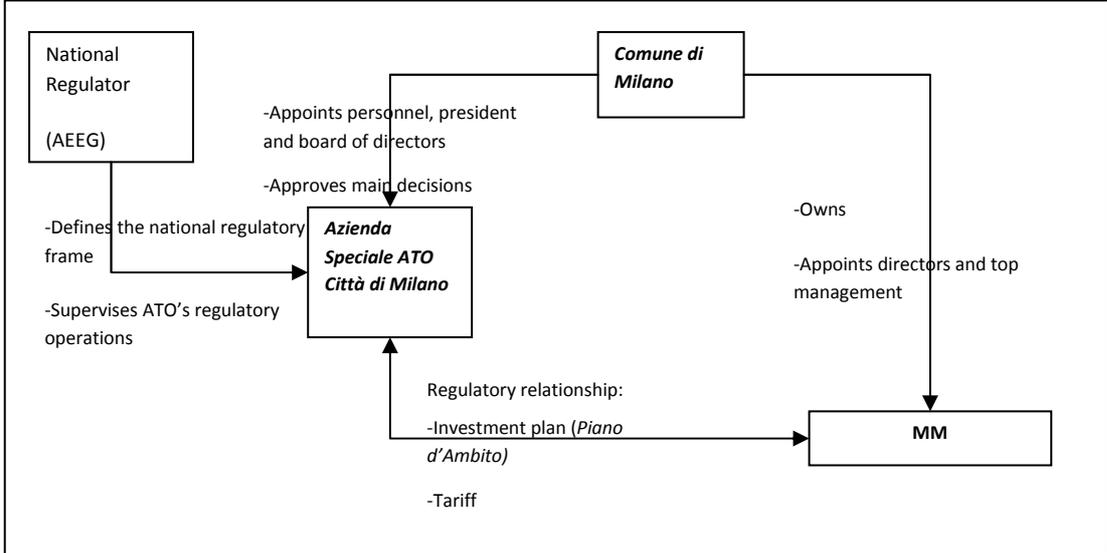
⁶⁹ Retrieved on April 2013 the 23rd from

<http://www.comune.milano.it/dseserver/webcity/garecontratti.nsf/WEBAIL/1475B3CC880A60A8C1257AFA004E10F7?opendocument>.

municipal body submitted to administrative law and public accounting rules) the AATO-MI is administrated through a board of directors composed of three people: a president and two counselors. The board of directors is nominated by the municipal council. Presently the board of directors (nominated the 24th November 2011) is composed of independent “experts”⁷⁰, who do not receive any indemnity for their mission. Even if AATO-MI is responsible of MM’s regulation, its regulatory power is not that high since major decisions of the AATO-MI have to be approved by the City’s council.

Since 2011 (and in practice since 2012) the national regulator (AEEG) has also a key role in the governance of Italian WSS since it defines the regulatory method to be applied and it monitors AATOs’ regulatory decisions.

Figure 7 – Milan’s WSS institutional mapping



Source: author’s elaboration.

7.2 Beyond the formal governance

In this paragraph we will go beyond the formal aspects of the governance previously analyzed. We will rely mainly on the various interviews we undertook. What are the real relationships between MM and the municipality like? How is the regulatory process between MM and the municipality undertaken in real terms?

One could imagine that the municipality environment (including the political majority) would try to impose its influence and power on MM on various aspects of the company life. Indeed, as all municipal services, the water and sanitation service can be partially used as an object in the political arena. Results from our interviews show a twofold relationship. On one hand the municipality has relatively infrequent interactions with MM and ignore as much as possible

⁷⁰ The president is a professor of economics while the two counselors have been working previously in the water sector and seem to have some political affinity with the left wing Milan administration and with the 2011 water referendum movement.

MM. Indeed, once appointed MM's board of directors and top management, the municipality is unaware and does not interfere on MM's daily operations. On the other hand the water price is a political issue and currently Milan's municipality (and AATO-MI) is reluctant to adopt the water price's increase which results from AEEG new tariff regulation methodology (MTT - § 6.3). Another example of political influence is the decision made in 2013 by MM to install public fountains to deliver sparkling water. From our interviews it appears that MM was encouraged by the municipality to do this although it was not keen on that.

Another key aspect to consider is that after WSS's transfer from the municipality to MM (in 2003), all the municipal human resources having knowledge and experience concerning the water sector have been transferred to MM too. Nearly no water sector expert has been left within the municipal administration. That means that the municipality (and the AATO) are in practice unable to exert by themselves any relevant control on MM. It also means that the Municipality relies on MM for all water related public policies issues as we have detailed in § 4.4.2. The pattern is similar within the local regulator, AATO-MI which is in fact not able to truly control and regulate by itself MM's activity. By definition, a classical informational asymmetry takes place between MM which has all the informations and both AATO-MI and the municipality which are "in the dark". What is really striking in Milan's case is the fact that no knowledge at all has been kept within the Municipality and the AATO-MI. In practice MM exerts both the role of regulated entity and regulator. For example the two past investments' masterplans (*Piano d'Ambito*) have been entirely drafted by MM even if such a key regulatory document should have been AATO-MI's responsibility (and indeed it has AATO-MI logo only on the front page). In all the key steps of its regulatory mission (ATO's plan revisions, tariff revisions) AATO-MI has recruited private consultants and relied on them to conduct the regulatory process. In our opinion the need for an external help is a clear proof of the AATO-MI weak regulatory capability. The good point might be its awareness of such a weakness and the decision to ask for some external help to compensate the weakness. Unfortunately, no stable partnership has been established with a single consultant but new people have been recruited every time with a continuous loss of regulatory knowledge.

More globally speaking Milan's municipality as a whole is not able to express an unambiguous goal function to which MM should comply. Indeed Milan's municipality is composed of many entities which might give contradictories signals to MM. A clear example comes from the administrative process required to undertake infrastructure works: on one hand MM has to fulfill the investments targets defined in the masterplan which has been approved by the AATO-MI and by the municipality, on the other hand MM is subject to a complex administrative process for the works implying to dig under the streets. Apparently to have a dig authorization requires such a high effort that it is the

major constraint on MM's investment's level (§ 5.4). Indeed from MM's point of view dig authorizations are so hard to obtain that funding's is not yet a constraint on the investment level.

7.3 Civil society's participation

It has been noticed by various observers that there is a growing request for more user's participation in public services including WSS. Many researchers have developed social sciences approaches to address such an issue (Barbier 2005; 2002). Bernard Barraqué wrote that "it is the third criterion in the Eurowater definition of sustainability namely ethics, including public information and participation, that is the most crucial today" (Barraqué 2003) and that "in the end, the water policy community clearly needs to turn towards unprecedented forms of governance, inclusive of the water users" (Barraqué 2011). Indeed, the "EAU & 3E" research project on the sustainability of urban water services has even added a fourth sustainability criterion to the 3 criterion described in § 5.5. The fourth criterion is "democracy" or "governance" (meaning water users participation). This paragraph analyses how civil society's involvement in Milan's WSS governance takes place.

On one hand, in Italy there is no existing specific framework for a transparent participation of the civil society and/or the users in WSS governance as for example it exists in France (*Commission consultative des services publics locaux (CCSPL)* or *Observatoire Parisien de l'eau*. MM has launched in 2012 the internet website "Milano Blu"⁷¹ in order to increase and facilitate user's participation. No other institutional initiative has been taken in Milan to increase user and civil society participation to the WSS's governance.

On the other hand in the last few years in Italy, water has been an issue mobilizing a lot the public opinion, particularly on the Public / private debate. A national committee in favour of "public water" (*Forum Italiano dei Movimenti per l'Acqua - FIMA*) was fought for public provision of WSS. The climax of such a public opinion participation was found in the results of the June 2011 referendum (§ 6.2 and § 6.3).

⁷¹ <http://www.milanoblu.com/>, retrieved on the 05/05/2013.

Box 5: Corporatized WSS or not?

A part of the FIMA movement considers that joint stock companies fully owned by municipalities do not fulfil completely the public water management paradigm and campaigns for WSS provision through less corporatized legal entities (such as the *azienda speciale*). Indeed in Naples Arin Spa has been transformed in “Acqua Bene Comune Napoli” and such a trend is noticeable in other Italian cities too⁷² (for example in Turin). In Milan a committee⁷³ (FIMA – MI) was created too and battled in the 2000 decade in favour of municipal provision of WSS. In Milan no significant action has been taken yet to induce the municipality to provide WSS through an entity less corporatized. This is also because there is an open question concerning the territorial scale of WSS provision (the municipality or the county - *Provincia* ? – see § 7.4).

After the huge mobilization of the civil society in the 2011 referendum, one could hope that more transparency and a larger participation of the users and civil society would take place in the WSS’s governance. Furthermore in Milan there is a quite tight political affinity between FIMA-MI and the left-wing Pisapia municipal board which won the 2011 elections just a few weeks before the referendum. As a consequence of the political affinity with the FIMA movement did Milan’s municipal board implement a deeper users/civil society participation in the WSS governance? Unfortunately not. Let us see what the affinity with the FIMA movement implied:

a) Firstly, the two counsellors of the AATO-MI recently appointed by the municipal board were active contributors to the FIMA movement.

b) Furthermore in October 2012 Milan’s municipal council inserted an explicit reference to water as a common good in the municipal statute⁷⁴.

c) last but not least it appears from our ground research in early 2013 that both the AATO-MI and the municipal board are very reluctant to approve water tariff increase even if the current tariff determines too low cashflows to make the investment plan bankable. It is quite disappointing that all the civil’s society involvement in the water sector expresses in the end only in the request for a water tariff as low as possible.

7.4 Territorial scale of governance

We have already pointed out (§ 6.1) that generally the ATO were placed at the county level (*Provincia*). Milan’s ATO is an exception since two distinct ATO were created within the *Provincia di Milano*: the *ATO Città di Milano* and the *ATO Provincia di Milano* (ATO-Prov)⁷⁵. Within the ATO-Prov the WSS is provided by *AMIA Acque SpA* while the assets are owned by *CAP Holding SpA*. Such a dual scheme with an owner of the assets and an operator was

⁷² http://www.altreconomia.it/site/fr_contenuto_detail.php?intId=3957, retrieved on the 05/05/2013.

⁷³ <http://acquapubblicamilano.wordpress.com/>, retrieved on the 05/05/2013.

⁷⁴ <http://acquapubblicamilano.wordpress.com/>, retrieved on the 05/05/2013.

⁷⁵ <http://www.atoprovinciadimilano.it/>, retrieved on the 06/05/2013.

implemented in the ATO-Prov in order to comply with a Lombardy regional law⁷⁶ which has been declared unconstitutional afterwards⁷⁷. *CAP Holding SpA* is owned by various municipalities. 60% of the shares of *AMIA Acque SpA* are owned by *CAP Holding SpA*. Milan's municipality owns a small share of both companies. A comparison between MM and AMIAACQUE is given in Table 11.

There is an open and recurrent debate on whether a unique ATO and operator for the whole Provincia di Milano (including the inner Milan area) would be more effective and allow significant economies of scale or not.

The history of the WSS in the city of Milan and in the outer districts is a different one: full direct provision by the municipality in Milan's city while in many of the outer municipalities WSS was provided by a public entity, the *Consorzio Acqua Potabile*. When the ATO were created at the end of the 1990's no consensus was found on creating a unique ATO and operator. The choice was made to preserve the *statu quo* and keep the two existing operators. Nowadays the question is on the agenda once more since a new institution, the *Città Metropolitana*⁷⁸ is being created and should replace the *Provincia di Milano*. The widespread idea would be that on various topics (among which WSS) the responsibilities should be transferred at the metropolitan level.

Table 11 – Comparison between AMIAACQUE and MM

		AMIAACQUE		MM
		2010	2011	2011
Employees		527	605	463 (714 in total)
Number of supplied municipalities		184	184	1
Inhabitants supplied		1.73 M	2.01	1.35
Meters supplied		267 129	332 236	47 136
Water supplied	m ³ /year	174 782 901	207 232 164	231 103 709
Water supply network	km	5 503	6 603	2 332
Sewer system	km	3 658	4 629	1 457
Number of bore holes		653	788	538 (416 in operations)
Water treatment plant		282	319	23
Waste water treatment plant		53	54	3

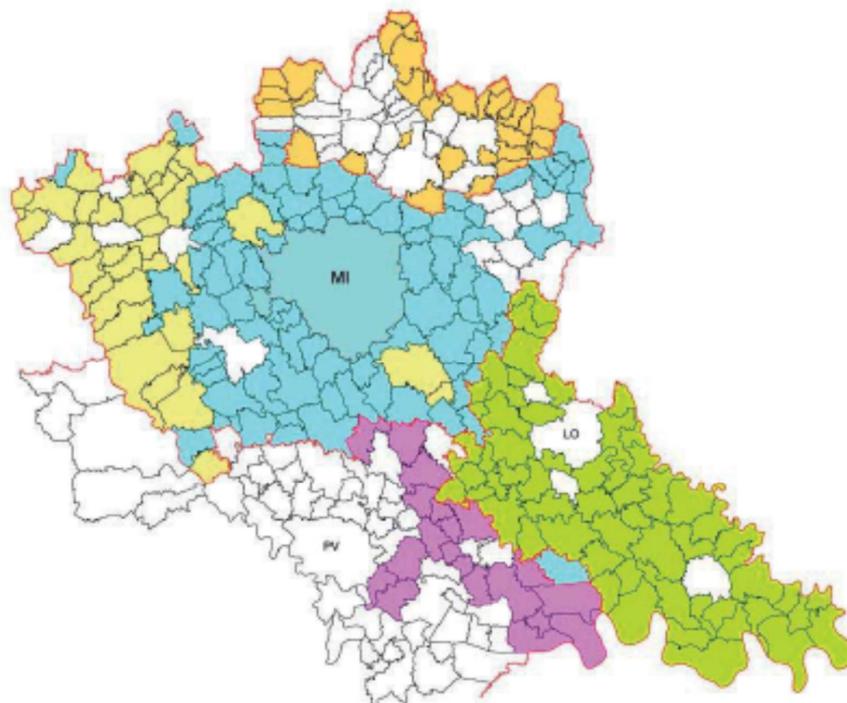
Source: author's elaboration based on data from MM and AMIACQUE.

⁷⁶ L.R. Lombardia n. 18/2006.

⁷⁷ Sentenza n°307, corte costituzionale, 20 novembre 2009.

⁷⁸ <http://www.milanocittametropolitana.org/>, retrieved on the 07/05/2013.

Figure 8 – AMIAACQUE area of activity



Source: bilancio 2011 of *CAP Holding SpA*.

From our interviewees' point of view an eventual fusion of Milan's WSS with CAP Holding implies significant financial transfers from the city to the metropolitan scale and makes it inconvenient for Metropolitana Milanese and eventually for Milan's water users. We give some elements on various factors which were mentioned during our interviews. It would be interesting to perform a critical analysis on all these issues but this is out of the present paper research scope:

- AMIAACQUE is already a fusion of various independent municipal WSS. Apparently in many cases the former local management of the WSS has not been modified that much and the AMIAACQUE has more a financial mutualisation role rather than a technical one⁷⁹. Considering the previous statement as an assumption, how significant are the reachable economies of scale from an eventual fusion of MM with AMIAACQUE? From our interviews it seems that little mutualisation of the infrastructure can be expected⁸⁰.
- Apparently MM and AMIAACQUE have a very different organisation of the operations. MM still has a technical capacity of intervention while AMIAACQUE mainly relies on external entities through subcontracts.

⁷⁹ For example as far as we know AMIAACQUE does not have a own flying squad and relies on various external private entities in each different place for delivering such a service.

⁸⁰ This assumption seems to make sense at least for water supply since it relies on ground water and it is delivered on a local basis.

- In the outer areas of the Provincia there are still significant investments to be made in sanitation and waste water treatment while these have already been brought to completion in Milan city. As a consequence a fusion of the two operators would imply a financial transfer from future Milan city's users in favour of outer areas' users. Furthermore an infraction procedure is still pending on CAPHOLDING concerning sanitation and waste water treatment. The unification of the two operators would expose Milan's city users to bear a part of the fine.
- The water tariff is already higher in the outskirts than in Milan city (refer to Table 12) and a tariff's unification would imply a tariff increase for Milan's city water users.

While CAP Holding and the political circle of the outskirts are in favour of a fusion with Metropolitana Milanese, the opposite is not true for all the above reasons. Historically CAP Holding directors and top management had some political affinity with the left wing parties. The same parties hold now the Milan's municipal board and this might change the odds in favour of a unification.

Table 12 – water tariff in Cinisello Balsamo [Euro/m³]

a	b	c	d	e	f	g	h=a+f+g	j=b+f+g
Water supply							Total	
Domestic		Non Domestic		Agriculture	Sanitation	Waste water treatment		
first tranche	second tranche	first tranche	second tranche				domestic 1	domestic 2
0.239292	0.384948	0.384948	0.38589	0.192474	0.142228	0.421007	0.802527	0.948183

Source: author's elaboration based on AMIACQUE⁸¹ website.

8 Tariffs, Finance and Distributional Issues with respect to public missions

8.1 The tariff structure

A two-part tariff with increasing block rates is in place. Water is mostly billed through collective metering (one bill per residential building). Indeed there are only 47 136 meters in Milan and the majority of the bills are paid by the apartment block administrator which is the "user" from the utility's point of view. The user pays both a volumetric tariff (commodity charge) T_{vol} and a fixed charge T_{fixed} . The commodity charge T_{vol} is composed of four volumetric

⁸¹ <http://www.amiacque.it/FileFolder/b474e910-0f87-4996-b2e4-73aeel22457/File/Tariffe/TARIFFE%20ProvMI+MonzaB-08.11.12.pdf>, retrieved on the 07/05/2013.

elements (t_w , t_s , t_{ww} and $t_{stralcio}$ ⁸²) charging respectively for water, sanitation, waste water treatment and the special part for the *Piano stralcio*'s amortization. The three last elements are uniform and charged just the same to all users. T_w instead is charged differently to domestic, non domestic and agriculture users. Furthermore T_w is charged according to a volume increasing block- rate system (Table 13). The formulas below show how the bill amount is computed:

- (1) $T_{total} = T_{fixed} + T_{vol}$
- (2) $T_{vol} = T_w + t_s * V_{tot} + t_{ww} * V_{tot} + t_{stralcio} * V_{tot}$
- (3) $T_w = t_{w1} * Vol_1 + t_{w2} * Vol_2 + t_{w3} * Vol_3$
- (4) $Vol A = 0.350 * n^{\circ}flat * n^{\circ}days$
- (5) $Vol_1 = \min [V_{tot} ; Vol A]$
- (6) $Vol B = 0.750 * n^{\circ}flat * n^{\circ}days$
- (7) $Vol_2 = \min [V_{tot} - Vol_1 ; Vol B]$
- (8) $Vol_3 = V_{tot} - Vol_2$

Table 13 – Volumetric Tariff applied by MM [Euro/m³]

a	b	c	d	e	f	g	h	i=a+f+g+h	i=c+f+g+h
Water Domestic			Water Non domestic	Water agriculture	Sanitation	Waste water treatment	Piano stralcio	Total	
Less than 0.350 m ³ /d per flat	Between 0.351 and 0.750 m ³ /d per flat	More than 0.750 m ³ /d per flat							
t_{w1}	t_{w2}	t_{w3}	t_{wnd}	t_{wa}	t_s	t_{ww}	$t_{stralcio}$		
0.110	0.226	0.382	0.376	0.158	0.108	0.277	0.034412	0.529412	0.801412

Source: author's elaboration based on data from Metropolitana Milanese.

The commodity charge (water + sanitation + waste water treatment) for domestic users varies from a total of 0.53 to 0.80 euro per cubic meter depending on the block of consumption. The fixed part T_{fixed} is not very significant when compared to the volumetric part. It slightly depends on the consumed volumes too as shown in Table 14. The total consumption of the building is divided by the number of flats within the building obtaining an average consumption per flat. Depending on the value of such an average consumption T_{fixed} value is picked up in column a, b, c or d of the table below.

⁸² The *piano stralcio* is a special investment plan to undertake sanitation infrastructures (see § 6.3).

Table 14 – Fixed part of the Tariff

a	b	c	d
Water Fixed – Non-proportional monthly fee ([Euro/flat])			
Less than 100 m ³	Between 101 and 500 m ³	Between 501 and 1 500 m ³	More than 1 500 m ³
0.232406	0.387343	1.032914	2.065828

Source: author’s elaboration based on data from Metropolitana Milanese.

8.2 A well chosen increasing block rate?

According to the *Legge Galli* and to the *Metodo Tariffario Normalizzato* (MTN - § 6.1) the water service has to be billed with an increasing block rate (IBR). This charging policy which had started in Italy already in the 1970’s was supposedly designed both to ensure financial sustainability to the WSS and to apply a discounted rate on essential water needs of the domestic users⁸³. Indeed, starting in those decades a general trend in favor of increasing block rates was taking place in the western world as this was considered not only a second-best solution from the economic efficiency point of view but also a way to meet the ecologic objective of water conservation (Hanemann 1998, pt. 5-14).

WSS is billed in Milan through collective metering and one should distinguish the “user” from the company point of view that it in fact an “intermediate user” (the entity who pays the bill – most of the time it is the apartment block administrator) and the “end-user” (which is a household or a non-domestic entity leaving in the block of flat). Not only the implementation of an IBR policy is not straightforward then, but its evaluation is tricky too as we will see.

The switch points between the various blocks are expressed in terms of volumes/day/flat (Table 13). For each user the switch points (Vol A and Vol B) are computed as the number of flats per the number of days since the previous meter reading (§ 8.1). The amounts paid are then re-invoiced by the apartment block administrator to the end-users within the general expenses of the building. These are shared among the inhabitants according to the flat’s surface (*millesimi di proprietà*). IBR in presence of collective metering raises serious questions from an efficiency point of view but also from a sustainable development perspective.

In his excellent chapter on rates and pricing in water services Hanemann points out that

⁸³ “*La ristrutturazione tariffaria deve armonizzare le denunciate ed accertate necessità del graduale ripianamento economico della gestione aziendale con l’esigenza di assicurare all’utenza una tariffa agevolata, limitata ai consumi essenziali.*” (Provvedimento CIP n°26/Agosto 1975).

“IBRs have been used by several utilities to reshape the distribution of consumption by discouraging end-uses ... If designed so that every customer pays the marginal cost of service for at least some of their consumption, they can mimic the efficiency properties of marginal cost pricing. The heterogeneity of customer demands, however, makes this exceedingly difficult to accomplish. More typical is a block-rate structure that results in some people paying a higher price for services than others. Unless there are cost-based reasons to do so, concerns about equity will emerge” (Hanemann 1998, pt. 5-52).

Hanemann’s remark concerned IBRs policy in presence of individual metering. In Milan’s case however IBRs applied to the intermediate user are not perceived by the end-user which pays water in the end. Then, for sure IBR can hardly pretend to “mimic the efficiency properties of marginal cost pricing”.

If IBR and collective metering can hardly be justified on an efficiency ground what about in terms of sustainable development? Are we able to “design a tariff system that induces water conservation (environment) while still allowing them to cover their costs (economic sustainability) and remaining affordable to the lowest incomes (social dimension)” (Barraqué 2011, 2). We can let aside the economic sustainability since by definition according to the full cost recovery principle the tariff revenues cover the costs. We can focus then on the water conservation and on the social dimension.

What is the impact of Milan’s IBR in terms of water conservation? Using Hanemann’s formulation does the chosen provide “proper incentives for conservation, including investment by water users in cost-effective water saving appliances, fixtures, and landscaping?” (Hanemann 1998, pt. 5-6). Hanemann also point out another key issue when evaluating rates aimed at incentivizing water conservation:

“Pricing to encourage more efficient use of water rests on the assumption that prices can change consumers’ behaviour, even for a basic commodity like water ... A major point we wish to emphasize, however, is that *how* prices are used matters every much as *whether* they are used. Prices can be effective or ineffective as tools for influencing behaviour depending on how they are deployed.” (Hanemann 1998, 5-14).

Clearly in Milan (and in Italian cities with collective metering) the water conservation incentivizing potential of IBR is completely absorbed and neutralized by the intermediate user and not perceived at all by the end-user (which is the only one that counts in terms of water demand).

What about the social dimension? According to Hanemann two considerations can be made concerning equity:

- i) “Fair Allocation of Costs – The rate structure should apportion costs of service among the different uses and users in a manner that is fair and is not arbitrary.

- ii) Avoid Cross Subsidies – The rate structure should apportion costs of service in a manner that avoids the subsidy of one group of users at the expense of another.” (Hanemann 1998, pt. 5-6).

Generally speaking when an IBR system is chosen in presence of individual metering and billing “the blocks need to be carefully designed so as to reach the target. The size of each family must be taken into account; otherwise large, low-income families will be badly hit” (Barraqué 2011, 231) while people leaving alone (which might have higher income than large families) would benefit of the preferential block. The only way to avoid such an effect would be to have per capita switch points to determine the blocks. However information on each household’s composition is complex and costly to obtain and manage. Hanemann reminds us that “administration and billing costs should be balanced against the potential benefits of a more complex rate structure” (Hanemann 1998, 5-5).

In Milan IBRs have been adopted in presence of collective metering. A two-phases cost-sharing process is taking place then. First the IBR structure determines a cost allocation between the intermediate users (the apartment blocks) with the switch points depending on the number of flats within the block (and not on the number of people living in the blocks). Using a caricatured example a block with 20 flats inhabited by large families will have a total water bill higher than a block with 20 flats mostly inhabited by single people.

The second level of cost allocation takes place within the apartment block. Most of the time water costs is just included in the yearly general costs of the condominium and shared on flat’s surface basis⁸⁴. In presence of such a two level rating system evaluating what is *in fine* the allocation of the costs between the end-users is not trivial. From our perspective the combination of three key variable plays a key role for sure in determining the cost allocation: i) Number of people in each flat, ii) Total number of people in the block and iii) Relative size of the flats.

We have shown that Milan’s IBR system (in presence of collective metering) has many caveats: i) it can hardly pretend to mimic marginal cost pricing, ii) it does not give a clear price signal incentivizing water conservation and iii) it is far from being transparent in the cost-allocation it determines between the various users. In principle all Italian WSS have to apply an IBR and as far as we know many other Italian cities have adopted it in presence of collective metering as in Milan. We think that Milan’s IBR system raises many policy questions and that there is the need for further research including data collection on the ground.

⁸⁴ Results from an interview with a block administrator show that sometimes water bills is allocated between the end users taking into account the number of people leaving into the flat. This might make more sense but the information on the number of people living in a flat is costly to obtain and keep updated.

8.3 When dirty water pays for drinking one

From our interviews it appears that even if there is a separate rate for the various services (water, sanitation and waste water treatment) in practice the revenues are not ear-marked and cover MM-WSS as a whole. According to our interviewees it appears that there is a mismatch between the relative value of the three rates and the true costs. The water revenues represent roughly only 40% of the costs while the sanitation and waste water treatment rates are higher than the cost faced. While the global rates allow Milan's WSS as a whole to break even, when considering instead separately each segment of the water service these are not financially balanced.

If all users were paying the three rates, one could argue that what matters only is the financial sustainability of the service as a whole. However in Milan there are some users which subscribe only to the water service with MM and receive a subsidized (by all others sanitation users) water service. This is the case for three categories of people:

- Milan's users within the sewerage basin whose waste water is channeled to the CAP Peschiera Borromeo waste water treatment plant (see also § 3.2). Waste water rates for these users are collected by MM on behalf of CAP and transferred almost completely to CAP. As a consequence the water service of all those users is cross subsidized by all other users.
- Users in neighbouring municipalities which are connected to MM's water service while they rely on an other utility for the sanitation and waste water treatment services.
- A few users in rural part of Milan (*cascine*) which are still not connected to the sanitation and waste water treatment service. These users receive a subsidized water.

8.4 Lower volumes, higher rates

Water consumption is decreasing in many European cities and the case of Milan confirms this general trend as the Figure 9 shows. Indeed the yearly water volumes⁸⁵ peaked in 1971 (more than 352 Million m³) and decreased almost steadily afterwards due to various factors among which the city's tertiarisation.

The tariff revenues are mainly based on the sold volumes of water since the fixed part of the rate is not very significant. On the contrary most of the costs are fixed regardless of the volumes.

In the constrained framework of full cost recovery where only Tariff revenues of the service have to cover its costs a decrease in sold volumes implies sooner

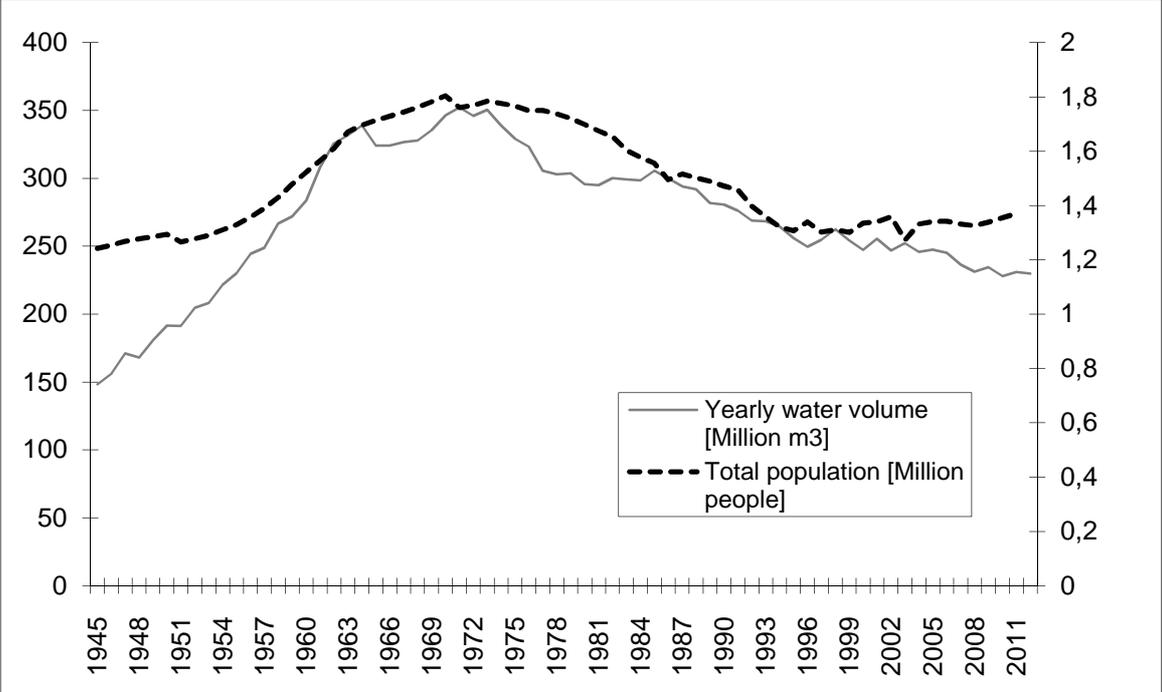
⁸⁵ The values in the figure refer to the volumes withdrawn from the water table and pumped into the network. According to MM these are the only reliable figures in the long run. Volumes metered and billed to the users are lower.

or later an increase in the unitary rate. This is the sustainability dilemma faced by many WSSs in all of Europe.

WSSs might be considered club goods⁸⁶. In the developed countries almost everyone is member of the club (Barraqué 2011, 240). Most of the costs of the club are fixed regardless of the volumes consumed. The club membership (total yearly water bills) is then condemned to remain constant regardless of the sold volumes too.

It might be politically slippery however to first incentivize users to water conservation and then to increase their unitary rates in order to collect roughly the same amount of revenues as if the sold volumes had stayed constant. Such a counter-intuitive fact has to be explained to the users. That's one of the reasons for more user's participation in the WSS's governance.

Figure 9 – Yearly water consumption and populations in Milan (1945-2011)



Source: author's elaboration based on Metropolitana Milanese internal database.

⁸⁶ a specific kind of impure public goods.

Table 15 – Water revenues, water consumption and average water tariff in real terms

	Yearly water consumption
year	m ³
1956	244 543 198
1960	283 670 535
1965	324 098 977
1970	346 195 059
1975	329 194 315
1980	295 628 898
1985	305 497 640
1990	280 707 948
1995	255 899 284
2000	247 313 611
2005	247 522 570
2010	228 039 422
2012	229 796 156

Source: water consumption from Metropolitana Milanese internal database.

9 Conclusion and lessons learned

From a historical perspective Milan's WSS is a pioneer example of full municipal provision from its creation in 1888 (§ 2.1). In those first decades Milan's WSS was an example of intense commitment to public service mission not only concerning the extension of the access to the service but also in the high concern for intergenerational equity when designing long lasting infrastructure (§ 4.2).

Unfortunately Milan's WSS in the second half of the 20th century might also be pointed out as a paradigmatic example of public policy failure in the water sector when considering the decades of postponed investments both in drinking water treatment and waste water treatment plants (§ 2.2 and Box 1). Indeed, after WWII Italian's WSS were more influenced by general interests goals which were sometimes in conflict with public mission goals (§ 4.3).

In 2002, prior to its corporatization, Milan's WSS was the largest⁸⁷ Italian WSS under full municipal provision. In 2003 the WSS was corporatized to comply with the national legal framework and the WSS's provision became *Metropolitana Milanese's* responsibility (§ 2.3.2).

Keeping both the historical path and Italian water sector reforms as background elements, we have focused this paper on an in-depth analysis of Milan's WSS after corporatization. Two perimeter of analysis make sense to

⁸⁷ Metropolitana Milanese, *Bilancio d'esercizio 2003*, page 15.

fully understand Milan's case study: i) an analysis only focused on *Metropolitana Milanese* as a company and ii) a wider analysis of Milan's WSS institutions as a whole as shown in Figure 7.

Metropolitana Milanese

Let us limit at first our analysis to MM as a corporatized entity providing the WSS on behalf of its shareholder, Milan's Municipality. From our research MM appears as a well run company with rather good technical and financial performances (section 5). One could wonder however what is the rationality justifying the fact that MM operates in two very different area of business (civil engineering services especially in underground transport lines and water and sanitation service) apart from the fact that the two area of business require knowledge concerning the underground since groundwater is used in Milan. Moreover in this kind of situation hidden or apparent cross-subsidies might take place. However in the case of MM the risk of hidden cross-subsidies should not exist anymore. Indeed, since 2011 the two areas of business have clear distinct accounting sections in order to enhance transparency on their profitability and cost-effectiveness (§ 5.3).

The corporatization of Italian WSS can be considered as part of the New Public Management (NPM) paradigm (Osborne and Gaebler 1993; Hood 1995). Admitting that implementing NPM might improve the public sector efficiency and effectiveness, one could wonder then whether the corporatized service might imply a loss in the commitment to public service goals or not (§ 4.4). From our investigation it appears that despite being a corporatized entity, MM and its staff are strongly committed to public service goals with no significant differences with what was happening previously when full municipal provision was in place (§ 4.4.3). Our results on this point are consistent with Colon and Guérin-Schneider (2012) which shows that in the selected case studies in two developing countries NPM implementation did not imply a loss of "Public Value" (as defined by M. Moore 1994; 1995). In Milan's case, one could even argue that the corporatized WSS is more effective in fulfilling public service goals than the full municipal provision was previously as the stories of postponed investments tell us (§ 2.2 and Box 1).

Milan's WSS

We think however that enlarging the perimeter of analysis to all the stakeholders (Figure 7) of Milan's WSS is much more interesting than focusing only on MM. The results of such an enlarged analysis raise various puzzling issues.

- 1) The implementation in Milan of the Italian regulation model implying two regulation authorities at the local and at the national level (respectively AATO and AEEG) is puzzling. On one hand the formal

regulation process is formal, complex and costly⁸⁸ on the other hand both the Milan's municipality and the AATO-MI lack of knowledge, human resources and capability to truly control and regulate MM (§ 7.2). The regulatory process in place might be compared to a play in which the two actors (MM and AATO-MI) are forced to perform following a formal and imposed script. Indeed, if it was not for the existence of an expert and powerful national regulator (AEEG see § 6.2) which plays the role of the “unwanted third party⁸⁹” one could even wonder whether a regulatory process would be truly performed since the regulatory key documents (such as the Piano d'Ambito) were *de facto* drafted by MM on behalf of the regulator AATO-MI (§ 7.2).

- 2) Milan's municipality as a whole is not able to express an unambiguous goal function to which MM should comply. Indeed Milan's municipality is composed of many entities which might give contradictories signals to MM. Let's take two examples: i) on one hand MM has to stick to the investments level specified by the *Piano d'Ambito* which has been approved by Milan's municipality, on the other hand digging authorization are so complex to obtain that they slow down MM investments' rhythm, ii) on one hand the water tariff is a political issue and Milan's municipality push for keeping a low water tariff, on the other hand the municipality still ask MM to pay a significant yearly fee (§ 5.1).
- 3) What is the best territorial scale for the management of Milan's WSS is also an open question (§ 7.4). When the Galli reform was implemented the choice of maintaining two distinct ATOs and operators within Milan's county was made in order to safeguard Milan's city autonomy and preserve the existing operators. It seems that a fusion of Milan's city WSS within the Provincia di Milano's WSS would not be very convenient for Milan's users since it would imply a financial transfer in favour of Milan's outer districts. On the other hand a unified water service might allow economies of scale and an interesting financial mutualisation. Notwithstanding the technical advantages/disadvantages of a unified water service, such a choice will be clearly driven by political considerations.
- 4) As prescribed by a national law, Milan's water tariff is based on an Increasing Block Rate (IBR) system. In the same time in Milan water is billed through collective metering. Our paper raises more than one question on the rationality and effectiveness of an IBR system applied in presence of collective metering as in Milan (but also in other Italian

⁸⁸ As the quantity of documents (available on <http://www.atocittadimilano.it/default.asp?pag=22&tipo=3>) required to perform the 2013 regulatory process shows.

⁸⁹ *Il terzo incomodo*.

cities having collective metering). Firstly, such a system can hardly pretend to mimic marginal cost pricing. Secondly, such a system does not give a clear price signal incentivizing water conservation (if that was the major aim). Lastly, it is far from being transparent in the cost-allocation it determines between the various users.

From the general public point of view Milan's WSS is seen as a well performing public service delivering the water and sanitation service at an affordable price (the lowest price in Italy). Indeed, if we limit to the first perimeter of analysis our case study confirms that MM-WSS in itself is rather well performing. However an enlarged perimeter of analysis shows that MM is part of an imposed baroque institutional governance system (institutional map in Figure 7) which is neither very effective nor efficient. Indeed, the regulatory architecture at the local level is perfectly performed from a formal point of view but does not seem to be truly taking place in substance. This is largely due to the total lack of knowledge and capabilities left to Milan's municipality and AATO-MI after the corporatization.

One of the advantages of direct provision and public ownership models should be an improved transparency and a tighter control of the operations and performances. In fact this is currently not taking place in Milan's case since MM is very autonomous and submitted only to a formal regulation process. Luckily, MM's commitment to public service mission balances such a lack of control. Such a loose control however could be very problematic in the case of a totally or partially privately owned operator. Indeed, in these years of public finance crisis in Italy, it could always happen that Milan's municipality might be incited or constrained to sell all or part of MM's shares. In that hypothetical case a substantial implementation of the regulatory process would be essential.

The entry of a national regulator (AEEG) into the water sector regulation arena might be criticized on the basis that it makes the regulatory process more complex and costly. From our perspective however additional complexity and transaction costs will be justified if AEEG's guidelines and supervision will imply a switch from a formal vision of the regulatory process to its substantial implementation.

One might consider that Milan's WSS is effective and well performing concerning the short run public service goal consisting in delivering a good quality water and sanitation service to all users at an affordable price. The judgment might be quite different if one adopts a long run and intergenerational point of view using "sustainability" as an evaluation criterion. Is Milan's WSS fully sustainable? Not really. On the contrary it seems that much more effort would be needed both from the environmental and infrastructural point of view to reproduce the infrastructure capital and to restore the good ecological status of the river system (§ 5.5 and 6.3).

Capital expenditures and investments are a key pattern in water and sanitation service. One of the weakest points of the implementation of the Galli reform in

Italy was that the investments plans (*Piani d'ambito*) were too ambitious and often not “bankable”. Things got even worse after the 2011 referendum due to the regulatory uncertainty it created (§ 5.5 and § 6.2). The new MTT implemented by AEEG should help to restore the bankability of the Italian water sector.

However all efforts made by AEEG will be useless if the Damocles sword of an effective deployment of an Internal Stability Pact to constrain the debt of publicly owned companies will not be neutralized (§ 6.4). Indeed, the low Tariff level of Italian WSS does not allow an elevate level of self-financing of the planned investments. If their access to debt was to be constrained by the Internal Stability Pact, Italian WSS would be condemned to stay in the under-investment status in which they have been for the last decades. Their sustainability would be challenged even more.

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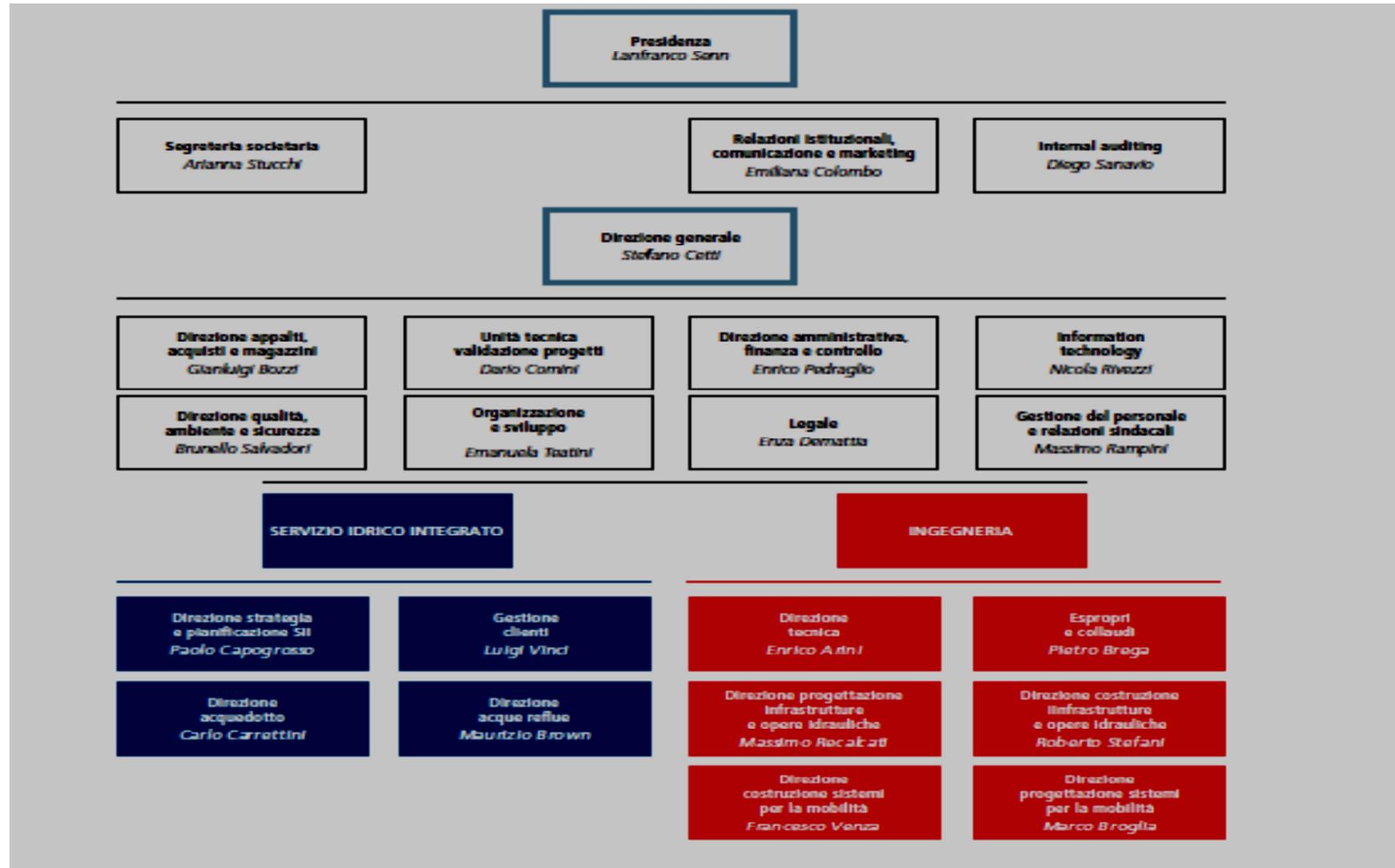
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Appendix 1 – Organizational Chart of MM, source MM, bilancio d'esercizio 2011



Appendix 2 – A benchmark of the commitments made Italian water utilities in their *Carta di Servizio*

Tabella 5.3

Data for 2007		Preventivi		Tempi operazioni tecniche				Tempi operazioni					Frequenza			Verifiche		
		senza sopraluogo	con sopraluogo	Allacciamento standard	Allacciamenti complessi	Allacciamenti fognatura	servizio emergenza	attivazione	riattivazione	cessazione	domande scritte	reclami	orari	letture	fatturazione	rettifica	contatori	pressione
Metropolitana Milanese	ATO Città di Milano	8		20		30	24	10		8	20	20	30	3	4	30	15	3
Smat	ATO 3 - Torino			36	40		48	7	7	7	30	30	40	2	2	45	7	2
Mediterranea Acque (IREN)	ATO Genova	15	30	15	40	25		5	5	5	15	15	32		2	30	30	20
Acegas APS	ATO B Bacchiglione	15	30	45		45	48	10	7	10	20	15	32	2	4	60	10	5
Irisacqua	ATO Gorizia		30	30		30	24	15	6	6	30	30	20	1	2	30	90	10
Hera	ATO 7 Ravenna	15	46	15	45	40	24	10	10	5	20	20	32	2	3	60	10	10
Publiacqua (Acea)	ATO 3 Medio Valdarno	15	15	20	20		12	7	7	5	20	20	27	2	2	20	7	7
Umbra Acque	ATO 2 Umbria	15	30	30		30		7	3	15	30	30	29			30	30	20
Multiservizi Spa	ATO Marche Centro	20	20	20	30	30	12	7	7	7	20	20	19	2	2	20	40	2
Acea ATO 2	ATO 2 Lazio - Roma	30	40	45	50	40	48	10	8	15	30	30	38	1	2	30	20	30
Aca	ATO 4 Pescara		15	30				7	7	7	20	20	20	2	2		30	2
Molise Acque	ATO unico Molise	20	40	20	60			10	2	7	20	20	32	1			15	15
Gori (Acea)	ATO Sarnese Vesuviano		20	30	45	30	48	7	7	7	30	30	32	2	4		20	7
AQP	ATO unico Puglia	20	40	90		90	10	5	15	30	30	45	25	1	4		30	15
Acquedotto Lucano	ATO unico Basilicata	46		60		60	8	15	15	30	30	30	28	1	4		30	15
Caltacqua	ATO 8 Caltanissetta	25		32		25		10	5	12	30	20	28	2	5		5	5
Abbanoa	ATO unico Sardegna	15		10		10		5	5	15	30		9	2	6		10	15
Media		19,9	29,7	32,2	41,3	37,3	27,8	8,6	7,3	11,2	25,0	24,7	27,8	1,7	3,2	35,5	23,5	10,8

Source: Massarutto (2011) based on data from Bluebook 2010.

Tabella 5.1 – Perdite apparenti (acqua fatturata – acqua immessa in rete) per alcune gestioni, 2007

Abbanoa	54,78%
ACEA	35,36%
Acque	39,70%
Acque Vicentine	23,22%
Acquedotto Pugliese	48,71%
ARIN	23,46%
Asa	34,70%
ASMBS	28,24%
CAP Gestione	19,74%
ENIA/IREN	26,10%
Gaia	39,83%
HERA	25,87%
IRIS	51,05%
Mediterranea delle Acque	27,20%
MM	10,29%
Nuove Acque	34,41%
Publiacqua	42,72%
SMAT	30,93%
VERITAS (ex VESTA)	31,58%
Media	33,05%

Fonte: nostra elaborazione su dati di varie fonti (bilanci aziendali; Mediobanca; Irpet).

Source: Massarutto et al. 2012.

Tabella 5.2 – Costi unitari (per km di rete, per abitante, per 1000 mc fatturati, 2007 (aggiornati al 2009))

	Costo /km rete		Costo / abitante		Costo / 1000 m3		Costo / addetto	
	Costo totale	Costo operativo	Costo totale	Costo operativo	Costo totale	Costo operativo	Costo totale	Costo operativo
Abbanoa	€ 28.951	€ 25.356	€ 144	€ 126	€ 1,774	€ 1,587	€ 187.488	€ 164.204
ACEA	€ 42.041	€ 38.580	€ 82	€ 76	€ 988	€ 851	€ 229.663	€ 197.838
ACQ. DEL FIORA	€ 8.331	€ 7.866	€ 157	€ 148	n.d	n.d	€ 192.856	€ 170.922
ACQUE	€ 17.118	€ 14.744	€ 139	€ 120	€ 2,186	€ 1,768	€ 290.658	€ 235.017
Acque Vicentina	€ 9.561	€ 9.052	€ 95	€ 90	€ 1,427	€ 1,336	€ 281.670	€ 266.661
AQP	€ 12.197	€ 10.740	€ 91	€ 81	€ 1,164	€ 1,087	€ 227.799	€ 200.590
ARIN	€ 39.527	€ 36.799	€ 55	€ 51	€ 702	€ 614	€ 173.563	€ 151.682
ASA	€ 23.884	€ 18.673	€ 210	€ 164	€ 2,843	€ 2,086	€ 204.113	€ 149.800
ASM BS	€ 16.875	€ 16.232	€ 96	€ 92	€ 917	€ 828	n.d.	n.d.
Cap Gestione	€ 17.071	€ 18.146	€ 59	€ 63	€ 519	€ 517	€ 247.899	€ 247.348
GAIA	€ 16.764	€ 10.916	€ 179	€ 117	€ 2,302	€ 1,407	€ 188.382	€ 115.147
HERA	€ 14.260	€ 13.914	€ 137	€ 134	€ 1,739	€ 1,474	€ 201.504	€ 196.618
ENIA (poi IREN)	€ 12.372	€ 10.097	€ 346	€ 282	€ 1,636	€ 1,335	€ 191.379	€ 156.182
IRIS	€ 16.618	€ 14.343	€ 131	€ 113	€ 1,386	€ 1,200	€ 218.971	€ 188.993
Mediterranea Acque (poi IREN)	€ 35.883	€ 31.175	€ 95	€ 82	€ 1,252	€ 1,021	€ 221.011	€ 180.242
MM	€ 48.697	€ 46.795	€ 88	€ 84	€ 543	€ 519	€ 241.125	€ 231.709
NUOVE ACQUE	€ 12.101	€ 8.448	€ 151	€ 105	€ 2,304	€ 1,510	€ 190.392	€ 124.774
PUBBLIACQUA	€ 23.650	€ 20.605	€ 133	€ 116	€ 1,965	€ 1,607	€ 248.468	€ 203.208
SMAT	€ 28.598	€ 20.923	€ 128	€ 94	€ 1,177	€ 983	€ 296.051	€ 216.604
VERITAS	€ 22.070	€ 21.268	€ 125	€ 121	€ 1,268	€ 1,147	€ 215.161	€ 194.631
VERITAS (ex VESTA)	€ 43.261	€ 44.409	€ 187	€ 192	€ 1,407	€ 1,356	€ 193.213	€ 186.183
media	€ 23.325	€ 20.909	€ 135	€ 117	€ 1,475	€ 1,212	€ 222.068	€ 188.918

Fonte: nostra elaborazione su varie fonti (Bilanci aziendali, Mediobanca, IRPET)

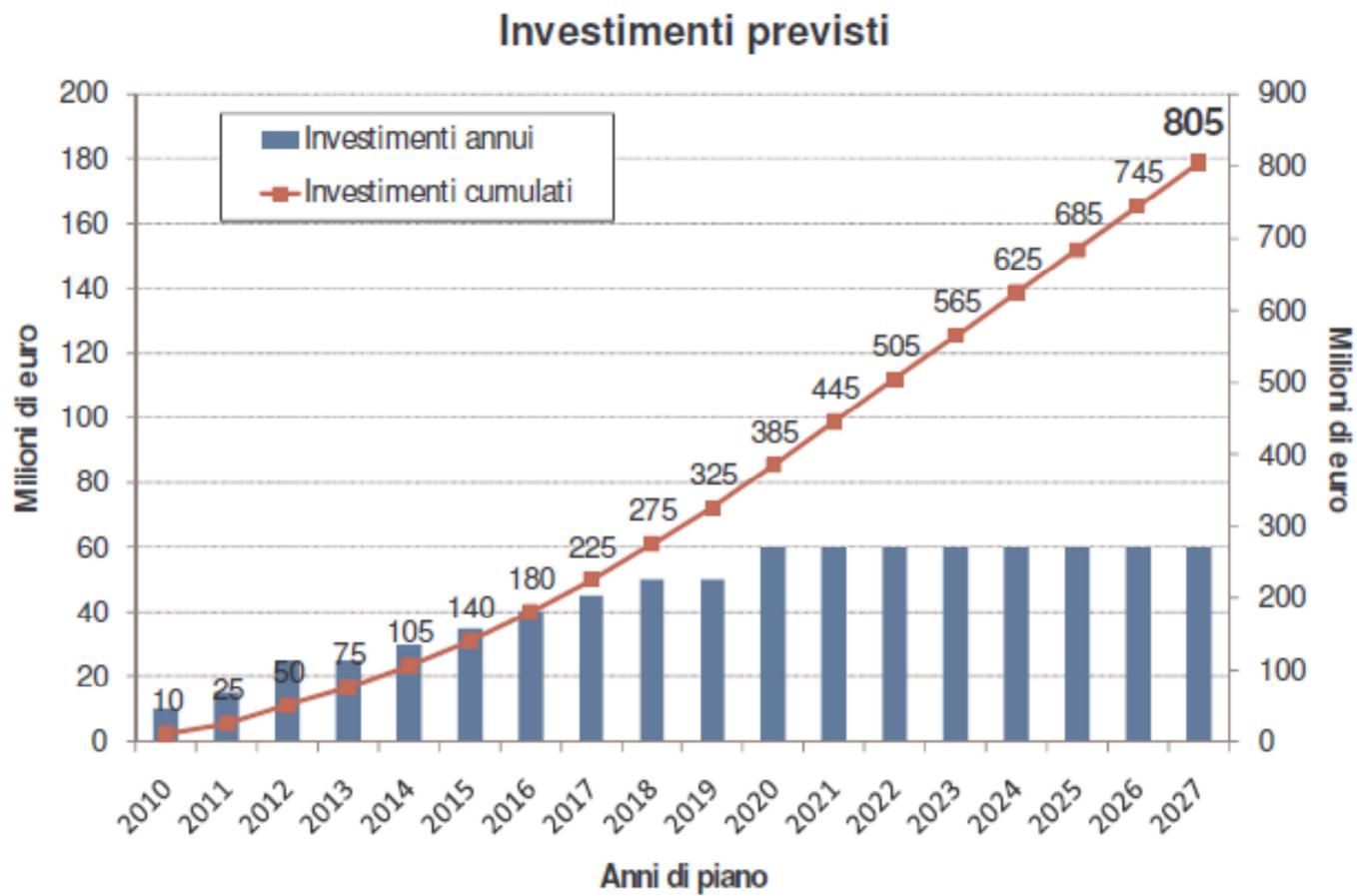
Source: Massarutto *et al.* 2012.

Appendix 4 – Investments plan in Water and Sanitation infrastructure (various revisions of the ATO Città di Milano schema d’ambito)

	Piano d’Ambito 2007	Piano d’ambito 2007 cumulative	completed	Piano d’Ambito 2010		Differenza (PdA 2010 – PdA 2007)	Revision proposal 2013	Difference (PdA 2013 – PdA 2010)
	Yearly amount	cumulative		Yearly	cumulative			
2001-2009	196,91		159,82			-37,10		
2010	51,31		17,38	10	10	-33,93		
2011	51,31			15	25	-36,31		
2012	51,31			25	50	-26,31		
2013	49,78			25	75	-24,78	34.91	9.91
2014	49,78			30	105	-19,78	40.80	10.80
2015	49,78			35	140	-14,78	42.09	7.09
2016	49,78			40	180	-9,78	43.05	3.05
2017	49,78			45	225	-4,78	43.68	-1.32
2018	40,92			50	275	9,08	43.55	-6.45
2019	40,92			50	325	9,08	43.85	-6.15
2020	40,92			60	385	19,08	43.40	-16.60
2021	40,92			60	445	19,08	41.65	-18.35
2022	40,92			60	505	19,08	39.35	-20.65
2023	26,18			60	565	33,82	36.75	-23.25
2024	26,18			60	625	33,82	34.65	-25.35
2025	26,18			60	685	33,82	29.45	-30.55
2026	26,18			60	745	33,82	24.65	-35.35
2027	26,18			60	805	33,82	19.90	-40.10
TOTALE	935,21		177,20	805,00		36,99	561.73 (651.5 if including the 2008-2012 years)	-153.5

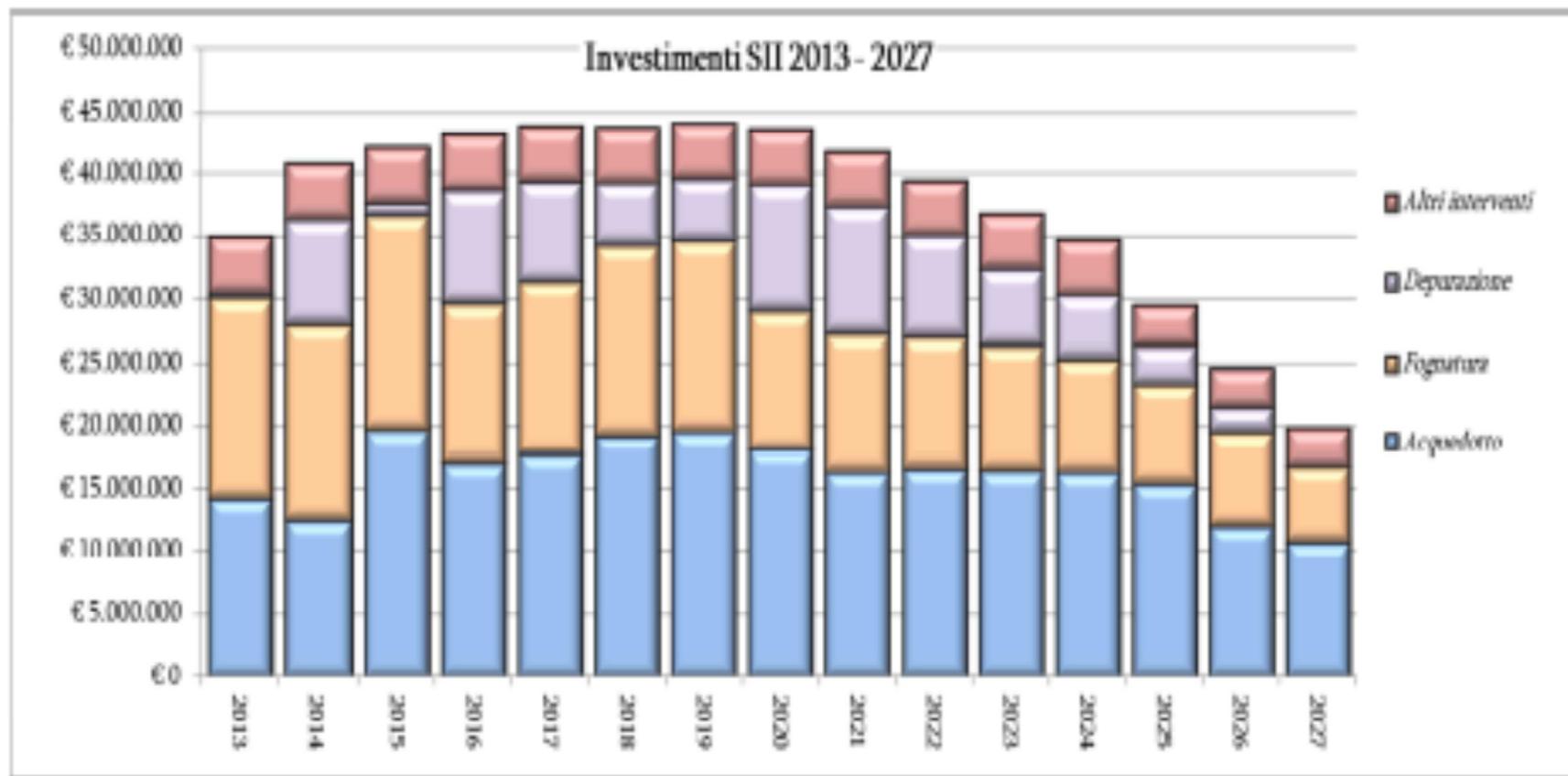
Source: Massarutto (2011) except last two columns elaborated by the author based on Data from the *Piano d’Ambito 2013*.

Piano d'ambito 2010



Source: (ATO Città di Milano 2010).

PdA 2013



Source: PdA 2013 (ATO Città di Milano 2013).

Appendix 5 – Milan’s water and sanitation services global financial flows (1889-1924)

Table 1: Water and sanitation services global financial flows (1889-1924)

Water	(a)	(b)	(c)	(d)	(e) = 100*c/d	(f)	(g) = c-f
Years	Revenues	OPEX	Gross profit	Invested capital	Return on capital %	Debt service	Net profit
1889	2 960	-	-	756 281	-	48 360	-48 360
1890	15 245	33 570	-18 325	1 370 026	-1.34	87 020	-105 345
1891	38 646	44 343	-5 697	2 219 648	-0.26	140 248	-145 945
1892	72 486	72 071	415	3 144 124	0.01	197 509	-197 094
1893	95 508	95 891	-383	4 626 908	-0.01	289 726	-290 109
1894	136 460	144 180	-7 720	5 754 260	-0.13	357 825	-365 545
1895	172 276	175 350	-3 074	6 794 383	-0.05	419 318	-422 392
1896	237 372	258 794	-21 422	8 058 846	-0.27	494 255	-515 677
1897	311 952	360 568	-48 616	9 581 572	-0.51	584 609	-633 225
1898	406 322	432 131	-25 809	11 453 328	-0.23	695 965	-721 774
1899	533 073	432 740	100 333	12 927 674	0.78	780 163	-679 830
1900	655 251	376 653	288 614	13 917 581	2.07	831 981	-543 367
1901	729 586	233 414	502 772	15 127 569	3.32	897 015	-394 243
1902	895 948	282 580	613 368	16 585 537	3.70	976 856	-363 488
1903	1 045 144	293 964	751 180	17 849 126	4.21	1 042 925	-291 745
1904	1 302 694	323 368	1 013 260	19 457 083	5.21	1 129 931	-116 671
1905	1 460 382	452 085	1 008 297	21 449 254	4.70	1 240 118	-231 821
1906	1 867 413	529 065	1 338 348	24 603 273	5.44	1 422 986	-84 638
1908	2 438 571	779 533	1 659 038	30 797 454	5.39	1 773 173	-114 135
1911	3 535 815	887 808	3 535 815	44 781 179	7.90	2 573 559	962 256
1914	3 542 715	1 155 222	2 387 493	55 408 997	4.31	3 124 008	-736 515
1917	4 539 394	1 552 272	2 987 121	60 499 928	4.94	3 294 262	-307 141
1920	8 389 454	4 435 513	3 953 941	66 482 521	5.95	3 512 238	441 703
1923	11 258 501	5 944 566	6 779 185	84 651 035	8.01	4 481 915	2 297 270
1924	14 038 096	6 736 070	8 350 890	96 554 604	8.65	5 168 748	3 182 142

Source: author’s elaboration, all data in Italian Lira.

Appendix 6 – Milan’s water supply network

Table 2: water supply network characteristics

Diameter (mm)	Length (km)
80	52.15
100	234.55
150	859.67
200	479.20
250	180.75
300	161.10
350	63.11
400	124.73
450	10.67
500	54.63
550	0.33
600	51.34
700	29.12
800	17.76
900	0.48
1 000	1.86
1 200	11.28
Total	2 332.73

Source: author’s elaboration based on data from MM.

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