

**INTEGRATED WATER SERVICE
AND EXTENDED WATER
SUPPLY CHAIN**

BLUE Book

EXECUTIVE SUMMARY

2024



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DE SARDIGNA
REGIONE AUTONOMA
DELLA SARDEGNA

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The background features a series of concentric circles in a lighter shade of blue, centered on the page. A large, faint square is also visible, framing the central area.

KEY MESSAGES

1

The periods of drought affecting Italy fall within the spectrum of phenomena caused by climate change. The **lack of rainfall** recorded nationwide in **2022 (-24% compared to the 1991-2020 average)** has resulted in a significant reduction in the natural availability of renewable water resources, which are produced annually through the hydrological cycle. Overall, nationwide, the level of **water availability** for the year 2022 amounted to a total volume of **67 km³** or **52% less than the average for the period 1951-2022**.

2

Water in Italy is supplied by around **37,400 sources** up and down the country, which provide an annual withdrawal of over **9 billion cubic metres of water**. **Wells** are the most widespread type of source across the country (43% of Italian municipalities), followed by **springs** (39% of municipalities). Other less prominent types of sources include waterways and artificial basins (< 5%), natural lakes (<0.5%) and residuals for marine or brackish waters. Taking into account the effects of ongoing climate change, it is **essential to promote unconventional forms of supply**, including the reuse of urban wastewater for irrigation, production processes and environmental services.

3

Proper management of water resources is essential for guaranteeing the availability of resources. To this end, it is essential **to overcome the remaining serious issues in terms of governance**. The national situation is clearly improving given that approximately **95%** of the country's population resides in basins where assignment has been done in accordance with the pro tempore regulations in force. There are still **problematic areas in terms of governance, expressly in Campania and Sicily**.

4

Overcoming management subdivision is essential for increasing investments in the water sector and improving resource management and the quality of service offered. **83%** of the Italian population is currently supplied by a single organisation running the **integrated service**. There are still **7.6 million inhabitants** (about 13% of the country's population) where the **water services are controlled by the Municipalities**. These are **1,465 municipalities** located mostly in the South. Over the next 5 years, the service licenses for over **14 million inhabitants** will also expire. So, we will witness the end of management subdivision and the achievement of single management in different areas of the country.

5

As part of the framework of the fourth regulatory period (**MTI-4**), the regulatory authorities introduced a package of new proposals for the water system which will take effect over the course of the next **6 years** in order to gradually and steadily improve the service. The aspect **covering energy costs** and focus on the effects of climate change with the introduction of the **M0 indicator**, therefore, give way to new priorities with a view to continuously improving the investment rate and adapting the sector to climatic and economic challenges.

Investments by **industrial managers** continue to rise and for which an average per capita value is estimated at **64 Euro per inhabitant in 2022 and 70 per inhabitant in 2023**. These values are gradually approaching the average of other European countries, marking a significant improvement over the last decade (+113%). **In-house management**, on the other hand, still confirms a poor investment capacity in 2022 (**11 Euro per inhabitant**), nowhere near European standards (five-year average of 82 Euro per inhabitant) or the average of Italian industrial management, and shows no signs of improvement.

6

In recent years, the value of investments supported by the tariff has increased to around **4 billion Euro per year**. The NRRP is definitely providing a significant boost with additional resources (around 0.7 billion Euro per year) but this will have run out by 2026. It is estimated that the sector **needs at least 6 billion Euro per year**: so, additional resources of between 1.3 and 2 billion Euro will be needed to raise the annual investment index and reach **100 Euro per inhabitant**, thus approaching the average of other European countries of a similar size to Italy.

7

One of the sectors most in need of urgent invest is **sewage treatment**. In addition to protecting the environment, the sector plays a significant role as a producer of unconventional water resources: the potential contribution offered by recycled water nationwide is between **38% and 53% of the country's irrigation requirements**. As far as the objectives set out in the UWWTD Directive's (COM(2022)541) amendment proposal are concerned, the amount of investment needed by **the largest plants to upgrade to a complete level of tertiary treatment** is around **5 billion Euro**. To achieve a **level of quaternary treatment** with the use of specific technologies from scratch, the estimated investment is forecast at between **1.6 and 6.1 billion Euro**.

8

The **European Taxonomy** aims to provide a structure for the evaluation, classification and management of investments in order to promote environmental sustainability and water efficiency. Over 70% of Italian water management companies found critical issues in the verification of the technical energy efficiency criteria for the construction of new plants and up to 80% for their renewal, consequently it would be desirable to review **the technical criteria** in question, which includes **progressive and gradual growth of the targets**, and that they should be drawn up to satisfy the Authorities' requirements and vice versa.

9

Thanks to the sustainable management of water resources, **the collective management system of the reclamation consortia's water supply network** plays a key role in guaranteeing not only an efficient productive agriculture and a strong manufacturing sector, but also **the hydrogeological stability** of the territory and safe duration of urban settlements. As a response in terms of mitigation and adaptation to the effects of climate change, the consortium system is introducing an **extensive multi-year plan of interventions and works, aimed at increasing the water reserve** (ANBI and Coldiretti's "Piano Laghetti" (Lake Plan) as well as saving the resource and using it more efficiently. The Plan requires adequate strategic investment of public resources, currently largely inadequate in meeting the urgent need to build up the country's resilience against future climate challenges.

10

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EXECUTIVE SUMMARY

POSSIBLE INCREASE IN PERIODS OF DROUGHT IN THE COMING YEARS

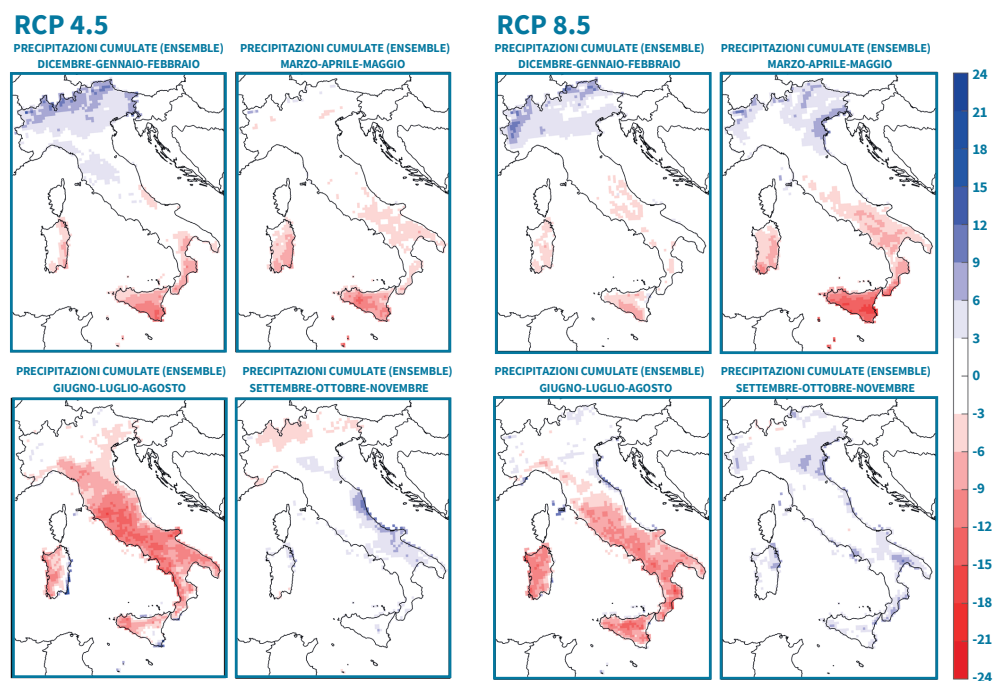
IN 2022, IN ITALY, -24% OF RAINFALL COMPARED TO THE PERIOD 1991-2020 AND WATER SUPPLY AT AN ALL-TIME LOW: -50% COMPARED TO THE AVERAGE FOR THE 1991-2020 PERIOD

The effects of climate change on the hydrological cycle are now obvious and any kind of alteration is pivotal as it affects the water supply. This is the case in the Mediterranean, considered a climatic "hot-spot", that is, an area on the Planet that is highly sensitive to the warming trend and variation in rainfall.

According to the predictions in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), compared to the period 1995-2014, the Mediterranean will be **the area most affected in Europe by episodes of drought** with an increase in the global average temperature of +1.5°C and, with a higher level of confidence, with an increase of +3°C. The **aridity**, derived from the Standardized Precipitation Index SPI-6 drought indicator, will be in the order of **10-20%** if we consider the current-day rainfall. The impact of increasingly longer and more intense periods of drought may have a significant impact on all economic activities and subsequently on public services. At national level, while taking into consideration the poor resolution of small-scale models, the entire Peninsula with the exception of the islands, would be affected by an **increase in days without rainfall** (Figure 1), with the situation worsening in some areas in the Centre-South depending on the scenario and the season in question. This drop would mainly occur in the summer months across the whole of Italy, while in the winter months a drop in rainfall is expected only in the Centre-South with a relative increase in the northern regions.

FIGURE 1

Territorial distribution of the variation in rainfall on a seasonal scale over Italy by the EURO-CODEX ensemble according to the RCP4.5 and RCP8.5 scenarios for the period 2021-2050 compared to the benchmark period of 1981-2010



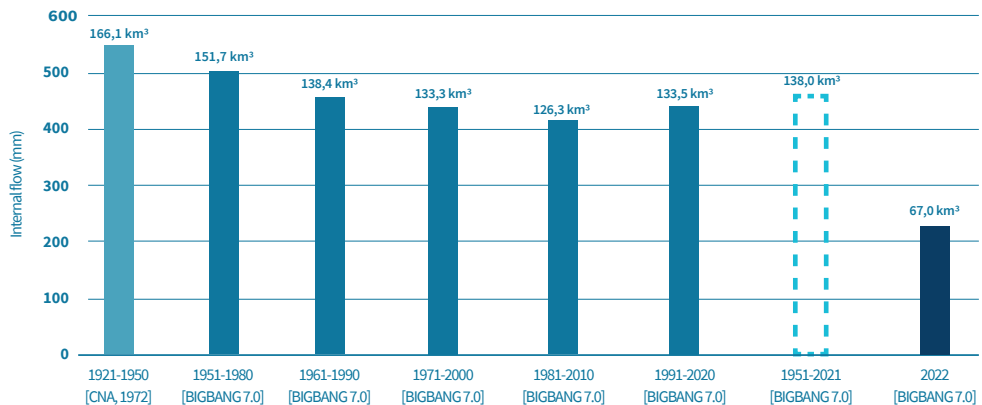
Source: CMCC 2021

The drought that hit Italy in 2022 and is still ongoing in certain parts of the country, is a fairly significant episode compared to others that occurred in recent times. Furthermore, the increase in the frequency of periods of drought recorded in recent years seems to be attributable to the effects of climate change induced by global warming. Considering the average annual rainfall in the period 1991-2020 across the whole country, **the rainfall deficit over the period is down approximately -24%, although, this weather pattern disturbance varies greatly from one geographical area to another.** The most affected area was the North West, with some areas reaching weather pattern disturbances of -50%. The lack of rainfall in 2022 has resulted in a significant reduction in the natural availability of a renewable water resource, which is produced annually through the hydrological cycle. Overall, nationwide, **the level of water availability for the year 2022 was 221.7 mm¹ equal to a total volume of 67 km³ (Figure 2).** This is a much lower level than the average for the period 1951-2022, standing at a total volume of 138 km³ (456.9 mm), for a change in percentage terms of -51%. The same order of magnitude applies to the reduction in percentage terms if referring to the 1991-2020 average (-50%). As a result, **2022 was the worst year ever in terms of the natural availability of a renewable water resource**, which has just recorded its lowest ever level.

¹ Renewable water availability refers to the change in "internal flow", that is, the difference between liquid inflow to the ground (rain or melting snow) and evapotranspiration and is conveyed in mm. It is then expressed in volumetric terms.

FIGURE 2

CALCULATION OF THE AVERAGE ANNUAL SUPPLY OF NATIONAL WATER RESOURCES GIVEN FOR THE NEXT THIRTY YEARS (IN LIGHT BLUE THE PREDICTION BY THE NATIONAL WATER CONFERENCE IN 1972, AND IN BLUE THE CALCULATION PRODUCED BY BIGBANG 7.0) AND FOR THE LONG TERM AVERAGE 1951-2022 (DOTTED BLUE BAR) AND A COMPARISON WITH THE ANNUAL CALCULATION FOR 2022 (IN DARK BLUE).



Source: Ispra

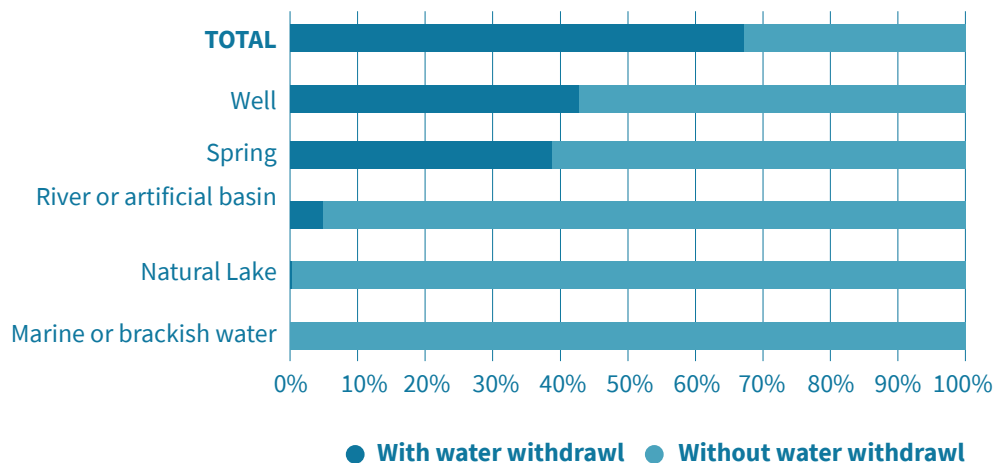
IN ITALY 37,400 SOURCES AND 9 BILLION M³ OF WITHDRAWALS FOR DRINKING WATER USE. AT LEAST ONE SOURCE OF SUPPLY IN 3 OUT OF 5 MUNICIPALITIES

Water is supplied in Italy by about **37,400 sources** throughout the country, which guaranteed the **withdrawal of 9.19 billion cubic metres of water in 2020**, destined for domestic, public, commercial, artisan, industrial and agricultural uses that fall within the municipal drinking water distribution network. In more than **3 out of 5 municipalities** there is at least **one source of supply** used for the purpose of drinking water.

The spread of withdrawal points varies across the country depending on the kind of source used for drinking water. **Wells**, found in **43% of Italian municipalities**, are the most common kind of source across the country; followed by **springs**, found in **39% of municipalities**. A smaller number of municipalities have other kinds of sources: just under 5% for surface waterways and artificial basins and less than 0.5% for withdrawals from natural and residual lakes for marine or brackish waters (Figure 3).

FIGURE 3

MUNICIPALITIES WITH WATER WITHDRAWALS FOR DRINKING PURPOSES BY TYPE OF SOURCE [YEAR 2020; PERCENTAGE COMPOSITION OF THE TOTAL NUMBER OF ITALIAN MUNICIPALITIES]



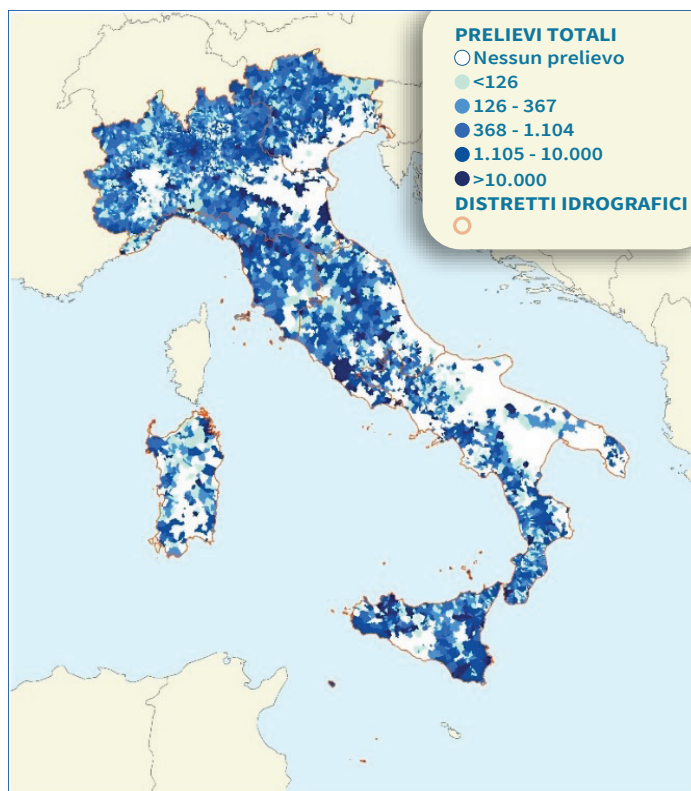
Source: Istat, Residential water usage census

IN THE SOUTH, POINTS OF WITHDRAWAL OFTEN DISTANT FROM PLACES OF CONSUMPTION

The volume of supply sources for drinking water use corresponds to a daily volume of **673 cubic metres per withdrawal point**, but there is a notable inconsistency linked to the type of source and the area in which the withdrawal occurs. In some cases, the supply source is close to the place of consumption, in others – as is the case, for example, in some southern areas – the distance covered by the water resource is considerable, even crossing over regional borders, in order to meet the demands from areas where local water supply is scarce or insufficient (Figure 4).

FIGURE 4

GROUPED INTO CATEGORIES OF ANNUAL WITHDRAWALS OF WATER FOR DRINKING PURPOSES [YEAR 2020; THOUSANDS OF CUBIC METRES]



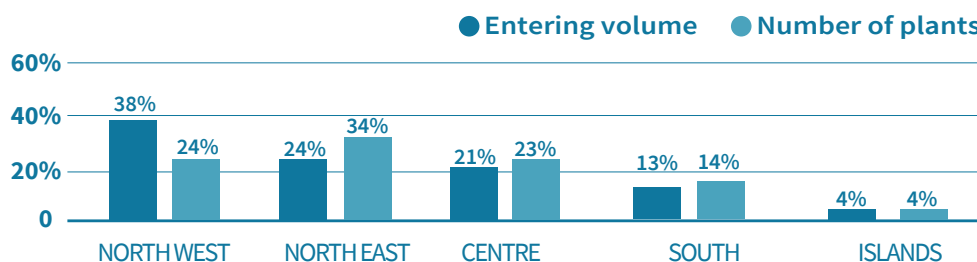
Source: Istat, Residential water usage census

6.7 BILLION M³
ENTERING
WASTEWATER
FOR URBAN WASTE

The wastewater collected from public sewage networks and treated in urban wastewater treatment plants can be a source of unconventional water supply for non-potable uses, such as irrigation, some industrial processes and environmental services (renaturation of run-down areas, street cleaning and fire prevention). On the subject of which, **the total volume of water entering all urban wastewater treatment plants** in operation in 2020 (18,402 plants), determined with the survey of the Istat "Census of water for civil use", is **6.7 billion cubic metres**. 70% of this volume, standing at 4.7 billion cubic metres, is treated in advanced plants, where there is a greater reduction of polluting loads found in wastewater. The largest amount is generated in advanced plants in the North West. In specific terms, **advanced plants represent only 11% of the total** (2,010 plants) and in proportion the largest number (679 plants) can be found in the North-East (Figure 5).

FIGURE 5

VOLUME OF WASTEWATER ENTERING URBAN PURIFICATION TREATMENT PLANTS WITH ADVANCED TREATMENT AND RELATIVE NUMBER OF PLANTS PER GEOGRAPHICAL LOCATION [YEAR 2020; PERCENTAGE VALUES]



Source: Istat, Residential water usage census

GOVERNANCE
PROCESS
IMPROVEMENT:
95% OF
THE POPULATION IN
ASSIGNED AREAS

A PREDOMINANCE OF
THE IN-HOUSE MANA-
GEMENT MODEL FOR
60% OF THE POPULA-
TION SERVED BY INDU-
STRIAL MANAGERS

In recent years, the regulation of the integrated water service has seen no substantial changes: the reform of services of general economic interest introduced under Legislative Decree 201/2022 (so-called TUSPL) had no significant effects on the sector. Indeed, the legislator aimed to safeguard the sectoral regulations and the jurisdiction of the regulatory authorities in specific matters (in particular, optimal territorial areas, duration of the assignment, rates and quality, and management supervision) and has reproduced most of the institutions already present in our legislation, thus having no effect on the lack of action taken by local authorities or non-compliant regions.

However, it is essential **to overcome critical issues surrounding the governance** of the water service as it proves harmful to the efficiency, efficacy and cost-effectiveness of a public service intended for the management of an essential resource under threat from shortage. Although completed in almost every region in Italy, the process of local governance of the integrated water service still has some serious issues, especially in some parts of Southern Italy and in relation to the functioning of Local Government Bodies as well as a management subdivision that still sees numerous municipalities managed by local authorities.

To date, **88 basins have been assigned in accordance with the pro tempore regulations in force** (Figure 6) in areas where approximately 95% of the national population resides. There are still problematic areas in Campania and Sicily. The areas identified are the district basins of Napoli Nord and Sannita in the Campania Region and the Optimal Territorial Areas of Messina, Trapani and Siracusa in Sicily. Altogether, these are 5 areas for a population of about 2.6 million inhabitants.

FIGURE 6

STATUS OF THE SERVICE ASSIGNMENTS IN ITALIAN TERRITORIAL AREAS [SITUATION AS OF 2023]

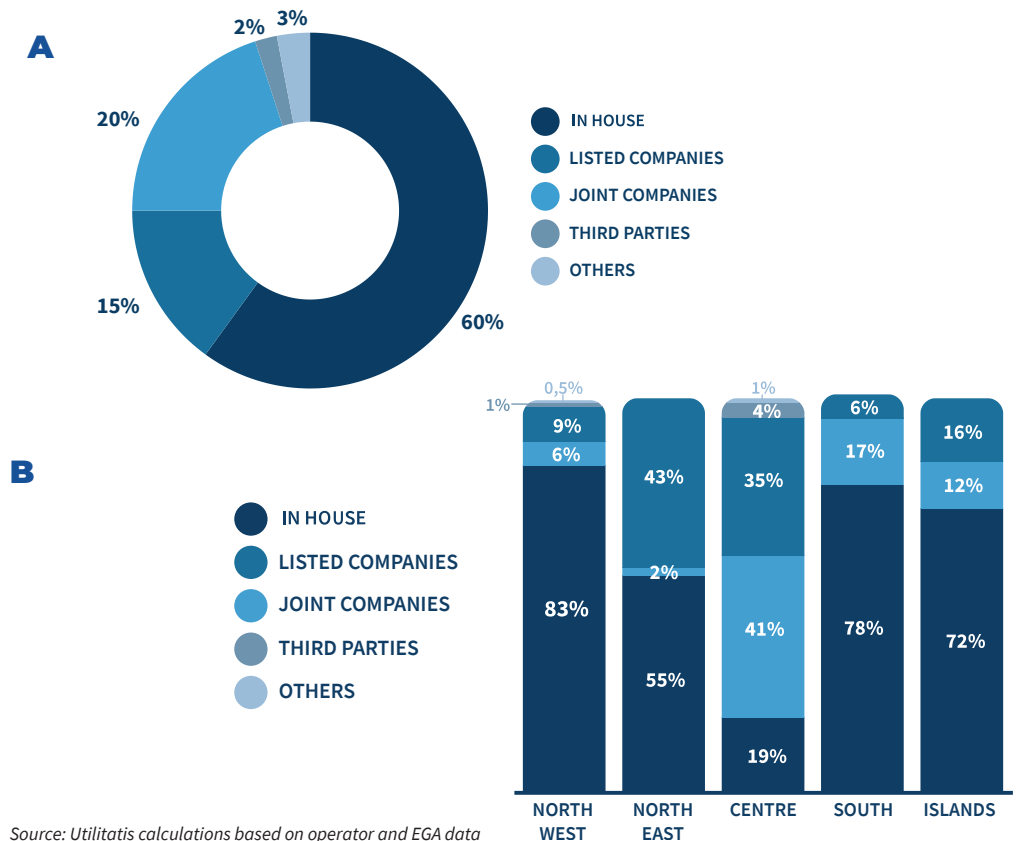


Source: Utilitatis calculations based on operator and EGA data

Considering the methods of management assignment in the various territorial areas (Figure 7A), for the management in which the water service is integrated at national level (**48 million inhabitants, 83% of the national population**), the most predominant one is **in-house provision (60% of the population)**, followed by assignments to listed companies (20%), assignments to joint enterprises (15%), licences to third parties for 2% and other forms of management (including individuals) around 3%. The territorial distribution of forms of assignment (Figure 7B) shows that in the North West, **South and Islands** the most common forms are **in-house assignments (between 72% and 83% of the population served by Integrated Water Service)**. In the North East and Central Italy, a significant number of assignments are to listed companies (**43% and 35%** of the population served with full integration of services, respectively). Assignments to joint enterprises are recorded in the areas of Central Italy, where **41% of the population** is catered for.

FIGURE 7

PERCENTAGE DISTRIBUTION OF THE POPULATION SERVED BY INTEGRATED WATER SERVICE BY TYPE OF ASSIGNMENT ON A NATIONAL BASIS (A) AND DETAIL BY MACROAREA (B)



Over the next few years, the service licenses for a large number of citizens will expire: **44 licenses will expire by 2028 affecting about 14.5 million inhabitants**. This is an important opportunity to strive for uniqueness in management and overcome the management sub-division in the service.

The evolution of the state of governance in the Italian water service therefore seems to be at its best, thanks in part to the regulatory interventions introduced by the reforms in the National Recovery and Resilience Plan (NRRP). The vertical integration of the service, however, still has **serious issues**, especially in the **southern contexts** where the existence of in-house management continues to endure even in territorial areas assigned in line with current pro tempore regulations.

There are currently **5,933 municipalities in Italy where the water service is integrated** and managed by a single industrial operator (Figure 8A): that means **48 million inhabitants**, the equivalent of 83% of the Italian population. On the other hand, there are **224 municipalities** where the service is managed by at least one different industrial manager, meaning it is **sub-divided**, for a total population of about 2 million inhabitants (around 4% of the national population). At least **1,465 municipalities directly manage one or more of the following three services - aqueduct, sewage and purification**. That means 19% of Italian municipalities or about **7.6 million inhabitants** (13% of the national total). 80% of in-house management is concentrated in the South (61%) and on the Islands (19%); that means 1,168 municipalities where about 7.1 million inhabitants reside, the equivalent of 93% of the population on a national scale.

To assess the level of integration of the service in the various catchment areas, the ratio between the population served by the Integrated Water Service and the number of inhabitants per area was considered (Figure 8B); it is possible to observe how **the level of integration of the service in different regions exceeds 90% or 95%**. However, there are still areas in the country where the vertical integration of the service is practically non-existent (e.g. Valle d'Aosta, ATO (Optimal Territorial Area) Trapani, Napoli Nord), very low < 10% (e.g. ATO Calabria, ATO Ragusa) or low 10-35% (e.g. ATO Centro Ovest Savona 1, Calore Irpino district, ATO Messina and ATO Siracusa).

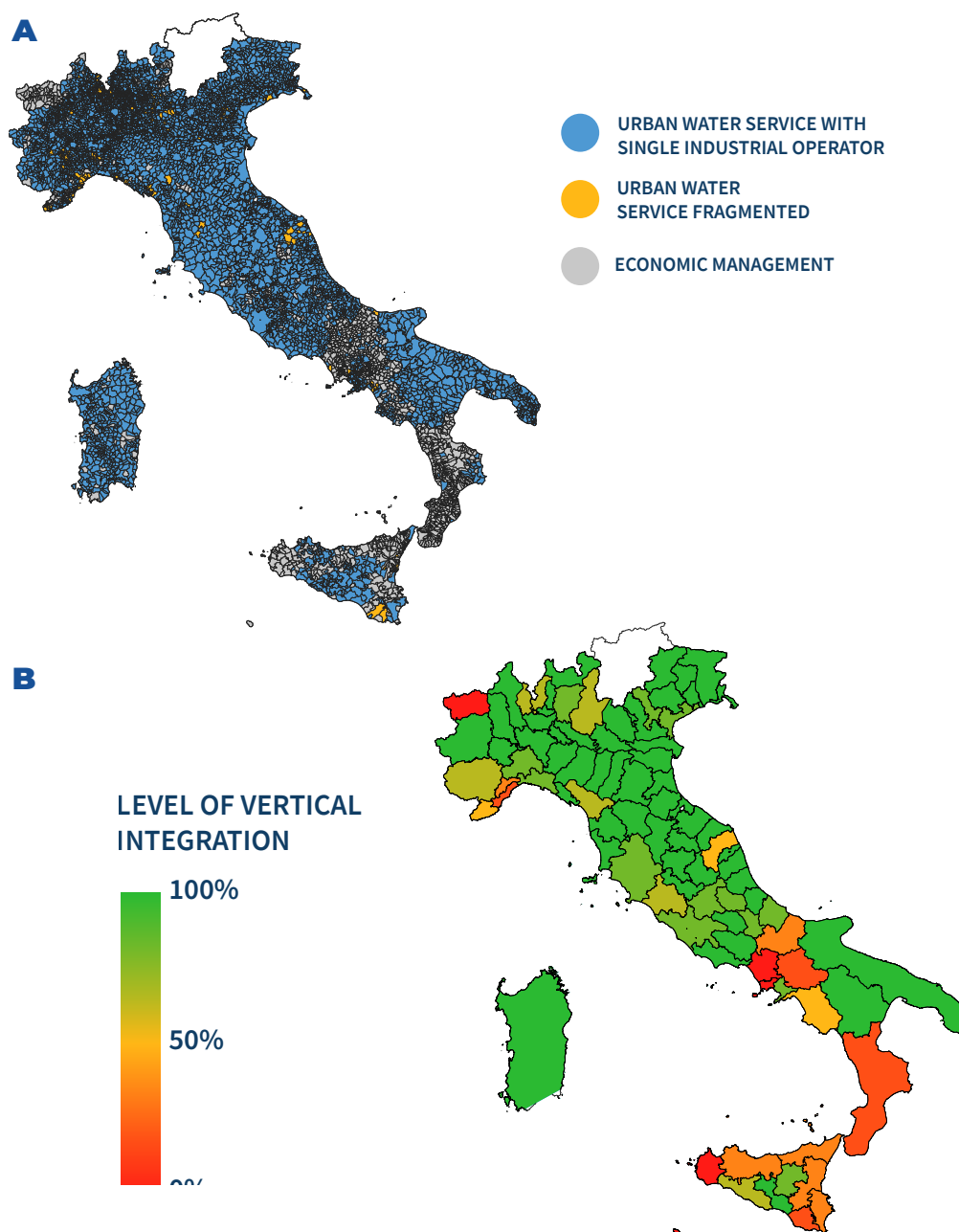
BY 2028,
44 LICENCES
WILL EXPIRE FOR 14.5
MILLION ITALIANS

INTEGRATED WATER
SERVICE FOR 83%
OF ITALIAN CITIZENS

7.6 MILLION
INHABITANTS
SUPPLIED BY
IN-HOUSE
MANAGEMENT

FIGURE 8

TERRITORIAL DISTRIBUTION OF TYPES OF MANAGEMENT (A) AND LEVEL OF VERTICAL INTEGRATION OF THE SERVICE (B)



Source: Utilitatis calculations based on operator data and ARERA registry

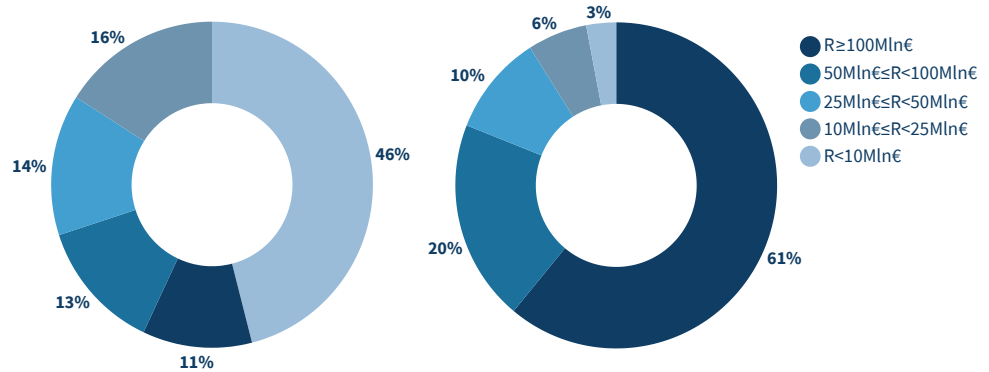
Taking into account the percentage of the population not yet supplied by a single water company, the licences that are about to expire, and the presence of managers specialising only in particular stages of the supply chain, it is reasonable to assume that **in the coming years, the water sector will continue to be affected by corporate aggregation processes** and/or vertical integration, which may come in the form of the establishment of new companies or consolidation of companies due to mergers.

The Italian water sector, with a total turnover of **9.4 billion Euro**, is worth about **0.5% of the national GDP**, contributing to the employment of over 33,000 people (0.6% of industry employment and 0.1% of total employment). **Compared to 2021, the sector recorded a turnover and an employment rate both respectively at +16%**, confirming the positive trend of the main points in the budget from 2011 to the current day. On the selected sample of companies (Figure 9), the highest number are those that recorded revenues below 10 million Euro (46%), but they only account for 3% of the total turnover in the sector. In contrast, **companies with a turnover in excess of 100 million Euro are only 11% of the sample but produce 61% of the total turnover.**

A SECTOR WORTH
9.4 BILLION EURO
IN TURNOVER
AND WITH 33,000
EMPLOYEES

FIGURE 9

DISTRIBUTION OF THE NUMBER (A) AND TURNOVER (B) OF INDUSTRIAL MANAGERS ACTIVE IN THE WATER SERVICE BY SIZE CATEGORY

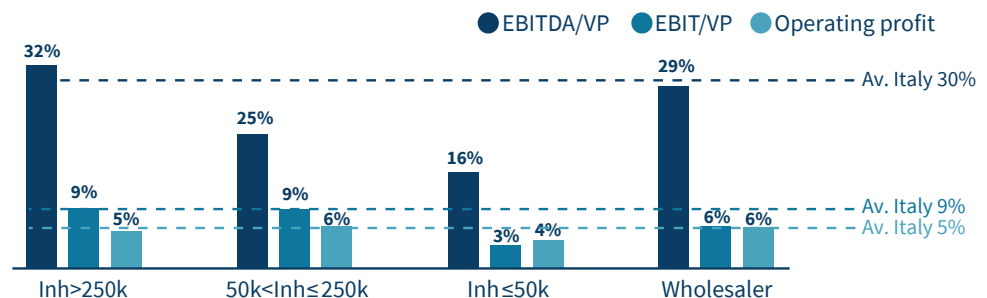


Source: Utilitatis calculations based on AIDA Bvd data

By analysing the economic margins in relation to the size of the company (Figure 10), it is clear that, as the number of inhabitants served per operator increases, there is an **increase in EBITDA**, compared to the value of production. This trend is similarly reflected in the EBIT indicators and in the result for the year, which, however, maintain substantial stability above the threshold of 50,000 inhabitants. From this it emerges that, while medium- and large-sized operators show better performance results, **small-sized operators** show values that indicate **difficulties in covering total costs**, with a value of 16% for EBITDA/VP, 3% for EBIT/VP and 4% for operating profit. Wholesalers have slightly lower values than the industry average, except for the EBITDA/VP ratio.

FIGURE 10

ECONOMIC MANAGEMENT MARGINS [SAMPLE: 191 MONOUTILITIES; YEAR 2023]



Source: Utilitatis calculations based on AIDA Bvd data

The costs that account for the largest share of the total expenses incurred by water utilities are **service costs**, with a share of about 43%. This is followed by depreciation expenses (18%) and personnel expenses (16%). The proportion of service and personnel costs increases with decreasing size, to the detriment of depreciation, which, on the other hand, shows a significant proportion in the cluster of companies with high turnover categories; this shows a **greater ability by large operators to allocate resources to investment expenditure**.

In terms of **added value generated per employee**, without considering wholesalers, the largest operators report the highest values, with **195,400 Euro per employee**. Small utilities reach a value of 107,000 Euro per employee, a value considerably lower than the industry average. The **cost of labour**, on the other hand, has a uniform value for all company dimensions, which is on average **59,400 Euro per employee**.

In terms of costs, the period 2022-2023 was affected by the significant impact of energy costs linked to considerable international instability. This stress factor, together with others caused by the climate crisis, were taken up by the Regulatory Authorities which, with resolution 639/2023/R/hydr, launched the fourth **regulatory period (MTI-4) 2024-2029**.

Some of the most important innovations introduced include the increasing centrality taken

DIFFICULTY IN COVERING TOTAL COSTS FOR SMALL OPERATORS

THE ADDED VALUE PER EMPLOYEE IS HIGHER FOR LARGER SCALE MANAGERS

MTI-4 THE ACKNOWLEDGEMENT OF THE COSTS OF ELECTRICITY

MTI-4 AND THE FOCUS ON CLIMATE CHANGES: THE M0 INDICATOR

AVERAGE
EXPENDITURE
ON WATER
TREATMENT
AMOUNTING TO
€364 FOR 150 M³
PER YEAR

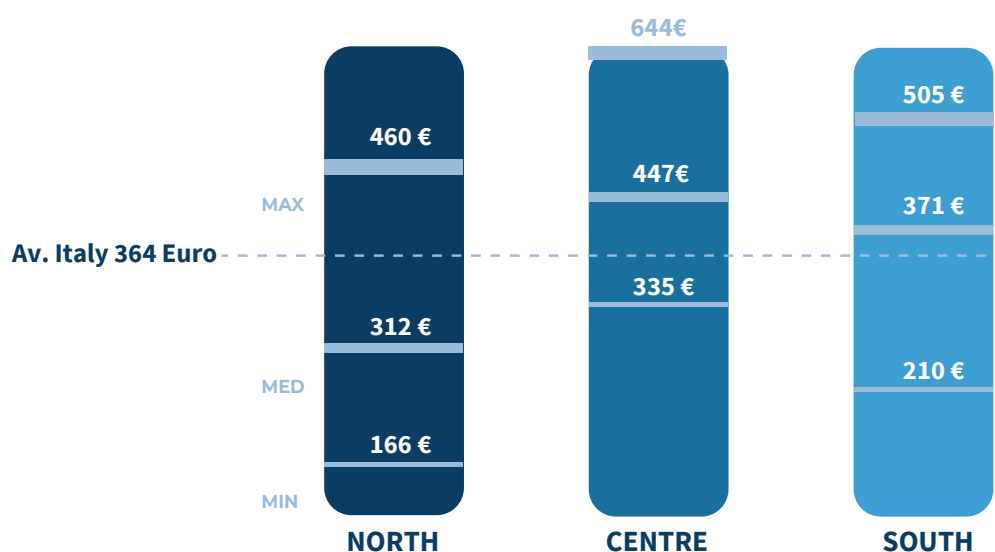
on by the planning function, with a subsequent **extension of the regulatory period from 4 to 6 years** and of the timeframe for planning the strategic works (POS) up to **12 years**, in order to strengthen the conditions of stability and predictability to encourage investment spending. The establishment of innovative and structural regulatory instruments such as **the introduction of a new mechanism to identify electricity costs**: specifically through the introduction of a benchmark against which to compare the unit cost incurred by each operator and calculated as the theoretical cost of purchasing electricity referring to consumption of the year ($\alpha-2$) and relating to a theoretical purchase mix, with improved incentives for the self-generation of electricity, and with the incentive to save on the overall amount of energy used to run the service. The Authorities also stressed **the importance of attaining energy and environmental sustainability objectives** with the introduction of two reward factors to be attributed to the operator and relating to a share in the purified volumes intended for reuse, but not intended for this purpose, and to the amount of electricity purchased.

It is particularly important to update and improve the regulation of technical quality due to the need to strengthen measures to promote specific work required to deal with the new challenges faced due to climate change, hence the introduction of a **new macro indicator** that monitors the expected effectiveness of the complex supply system in the face of predictions concerning the fulfilment of water demand in the managed territory, which includes uses other than just civil (indicator **M0 – Water resilience**). Measures to facilitate the creation of infrastructures related to the security of supply and the protection and production of water resources also contribute to this design.

An analysis of the amounts charged to resident households for the integrated water service was conducted on a sample of **almost 38 million inhabitants** (the equivalent of 64% of the Italian population), including the utilities of 62 tariff basins. In **2023**, for the sample considered, the **average expenditure for a domestic household of 3 members with a consumption of 150 cubic metres of water per year was 364 Euro**, with differences between the various geographical areas in the country (Figure 11). **Northern Italy** records the lowest expenditure with **312 Euro per year**, well below the national average, while **central Italy** reaches a level of expenditure well above the average at **447 Euro per year**. **Southern Italy** with **371 Euro per year** stands slightly above the sample average.

FIGURE 11

MINIMUM, AVERAGE AND MAXIMUM VALUES OF THE ANNUAL FEE FOR THE INTEGRATED WATER SYSTEM (INCLUDING 10% VAT), CONSIDERING A UTILITY OF 3 COMPONENTS WITH A CONSUMPTION OF 150 CUBIC METRES PER YEAR, DIVIDED INTO MACRO-AREAS [DATA IN EURO – 2023]



Source: Utilitatis calculation based on tariff proposals and manager and EGA websites

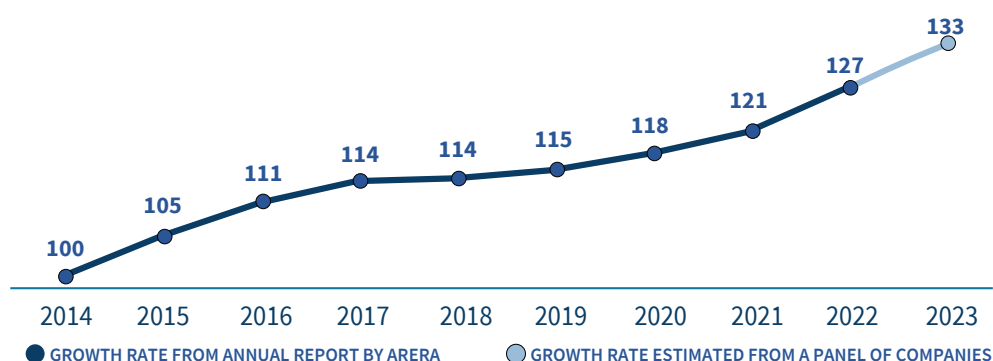
INCREASE IN
INTEGRATED WATER
SYSTEM FEES FOR
THE INTEGRATED
WATER SYSTEM AT
+33% IN 9 YEARS

IN THE THIRD
REGULATORY PERIOD
GREATER
INVESTMENTS IN
CENTRAL ITALY

The analysis of the fees published annually by the Authorities (compiled for the period 2014-2022), coupled with the 2022-2023 increase estimated for the sample of managers covering a resident population served by over 37 million people, yields the trend in tariff increases in Figure 12. Taking 2014 as the base year, **over 9 years, the increase in fees was about 33%**, with an average growth rate of about 3% per annum. Looking at the trend over time, there is a marked increase in the first two years, on average more than 5% per year. From 2016 onwards, a less evident growth trend begins, going from almost 3 percentage points in 2017 to 0.7% in 2020, also due to the tariff consequences of the implementation of technical quality regulations. **In recent years** and in particular, from 2020, there has been **a significant growth in payments** up to about **+5% per year**, a factor that may have been influenced by the contribution of those tariff components aimed at partially recovering the increase in electricity prices, a phenomenon that is still ongoing. The estimated growth in fees **between 2022 and 2023**, defined on the basis of the sample analysed, is **+4.7%**.

FIGURE 12

ESTIMATED AVERAGE FEE TREND [BASE YEAR 2014 = 100]

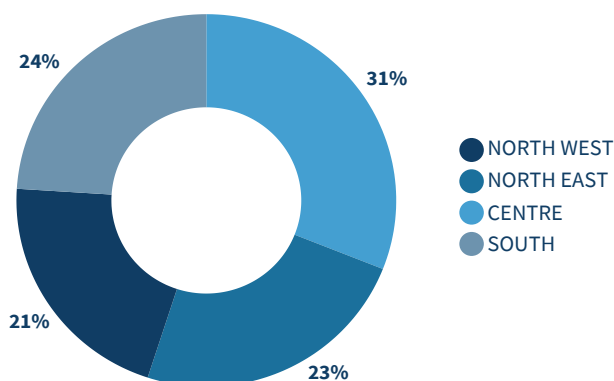


Source: Utilitatis calculations based on ARERA data, tariff proposals from Resolution 639/2021/R/Idr and data from the manager and EGA websites

Growth in the annual fee is not only linked to the issue of increased costs but also to the growth in investments in the sector. **The tariff, moreover, retains a key role in ensuring an adequate level of investment** to improve the resilience of water infrastructure, a fundamental objective and essential in dealing with the effects of climate change on the availability of the resource. By analysing the territorial distribution of **investments** of a sample of industrial managers over the entire regulatory period 2020-2023 (Figure 13), it is clear that they are fairly evenly distributed in the North-West, North-East and South macro-areas, while a slightly higher share of investment is observed in the Centre (31%).

FIGURE 13

PERCENTAGE DISTRIBUTION OF THE TERRITORIAL DISTRIBUTION OF INVESTMENTS MADE BY INDUSTRIAL MANAGERS IN THE REGULATORY PERIOD 2020-2023.



Source: Utilitatis calculation based on industrial manager's data

² The calculations are based on a sample of 48 managers serving a resident population of about 30 million inhabitants, the equivalent of about 50% of the national population

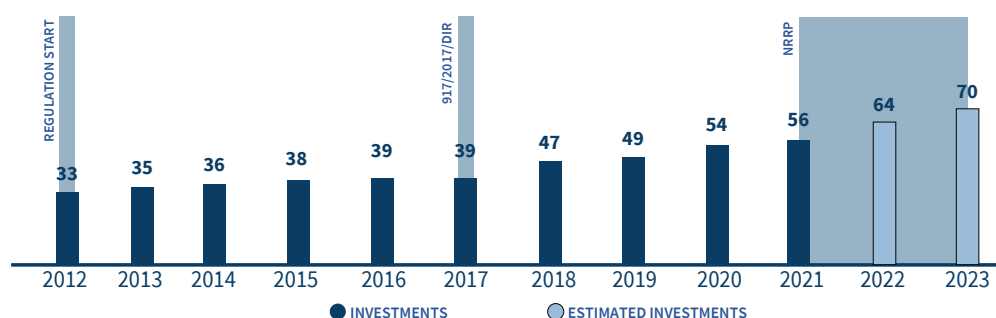
INVESTMENTS IN 2023:
+113% IN 11 YEARS

IN-HOUSE
MANAGEMENT
INVESTMENTS:
€11/INHABITANT
IN 2022

The management subdivision, which essentially contrasts industrial managers with in-house management, also translates into a different investment capacity that slows down the modernisation of water infrastructure and a uniform quality of service at national level. **Industrial management confirms a significantly greater investment capacity than those in-house³.** Since 2012 (Figure 14), the year in which the Regulatory Authorities joined the water service, industrial managers have progressively increased investments from **33 Euro per inhabitant in 2012 to around 70 Euro per inhabitant in 2023 (+113%), with an average annual increase of around 7%.** These interventions saw a significant boost from the period 2017-2018 onwards, and it is plausible that this trend was encouraged by the introduction and entry into the technical quality of service (RQTI) regime, which gave a strong stimulus to the implementation of the interventions through incentives and penalties, conditioned to achieve specific standards by the service managers. In the same way, it is likely that the increase in the investment rate, observed from 2021, is also linked to the effects of the NRRP resources allocated to work on water service infrastructures.

FIGURE 14

TIME FRAME OF PER-CAPITA INVESTMENTS MADE BY INDUSTRIAL MANAGERS IN THE PERIOD 2012-2023
[DATA IN € PER INHABITANT]

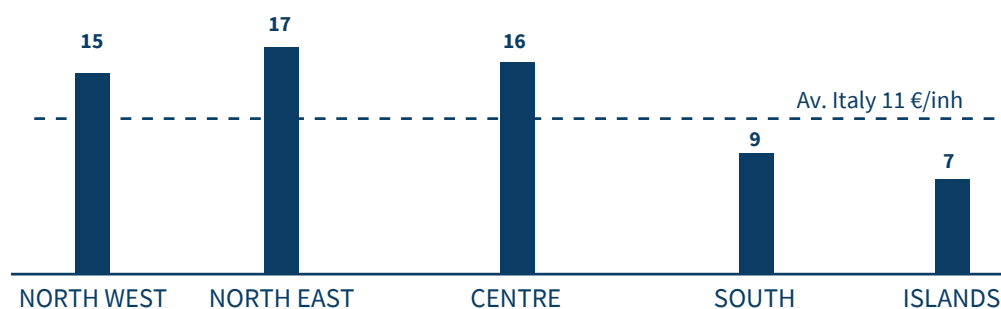


Source: Utilitatis calculation based on industrial companies

The average **per capita investment values of in-house management**, analysed annually by the Utilitatis observatory, stand at **11 Euro per inhabitant in 2022** (Figure 15). The territorial distribution of the average investment rates allows us to observe how the investment capacity is slightly higher in the municipalities of Northern and Central Italy compared to the southern and island areas of the country where, among other things, such operations are still quite widespread.

FIGURE 15

TERRITORIAL BREAKDOWN OF THE AVERAGE VALUES OF PER-CAPITA INVESTMENTS OF IN-HOUSE MANAGEMENT AND NATIONAL AVERAGE VALUE [YEAR 2022, DATA IN € PER INHABITANT]



Source: Utilitatis calculation based on CCC (final account certificates) data from Municipalities

While the average figure for industrial managers is progressively approaching the **five-year European average of 82 Euro per inhabitant**, the figures for in-house management once again confirm a level of investment that is too low, nowhere near European standards or that of the average Italian industrial management.

³ The processing is carried out on final account certificate data (CCC).

⁴ The data for 2022 and 2023 was estimated by applying a planned investment implementation rate of 93% as per the ARERA Annual Report (2023).

FROM THE REMODELING OF THE NRRP, ABOUT 1 BILLION ADDITIONAL EURO

THE SECTOR'S NEEDS ARE ESTIMATED AT 6 BILLION EURO PER YEAR (€100/INHABITANT)

930 BUILT-UP AREAS CURRENTLY IN VIOLATION FOR PURIFICATION

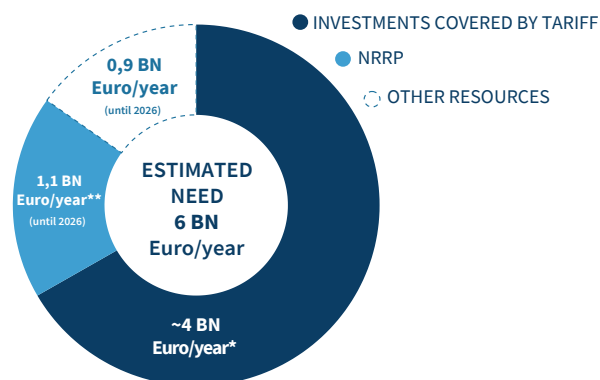
FULL RECYCLING OF WASTE WATER WOULD COVER BETWEEN 38% AND 53% OF WHAT IS NEEDED FOR ITALIAN IRRIGATION

The **NRRP** is effectively acting as a driver to ensure the security, supply and sustainable management of water resources throughout the entire cycle. About **3.5 billion of Euro** has been allocated to work that must be completed by 2026 and that concerns not only supply (e.g. collection, adduction) but also distribution and purification. The time frame of the **RE-ACT-EU** resources, the equivalent of **476 million Euro**, for work on the recovery of network losses and the digitalisation of networks in some regions of Southern Italy, concluded at the end of 2023. The recent **remodelling** of the NRRP has also seen the proposal of additional new resources for the sector, quantified at **about 1 billion Euro for the recovery of network losses**. Overall, the NRRP resources allocated to the water sector amount to **about 5 billion Euro**.

In recent years, the value of **investments supported by the tariff** (considering total annual average investments planned by managers in the period 2021-2023, covered by tariff and public funds) has increased to around **4 billion Euro per year** (Figure 16). This is a value that is, however, lower than the **sector's estimated need of at least 6 billion Euro per year** and is intended to renew the infrastructure, cutback on network losses and bring the plants into line with European pollution regulations. The NRRP is undoubtedly providing a significant boost with additional resources that have helped bring the investment rate made by Italian industrial managers more in line with those of other European countries. The time frame of the resources, however, is limited to 2026, so **additional resources of about 2 billion Euro** will be needed to raise the annual investment index and reach **100 Euro per inhabitant**.

FIGURE 16

SUMMARY DIAGRAM OF THE ESTIMATED ANNUAL REQUIREMENT FOR THE WATER SECTOR



* total annual average investments, planned by managers in the period 2021-2023 (investments covered by tariff + public funds)

** the figure does not include the 476 million Euro from the React EU fund dedicated to interventions for network losses in Southern Italy with a spending time frame in 2023. The figure does include 1.02 billion Euro of additional resources having a spending window from 2024 to 2026.

Source: Utilitatis calculation based on industrial manager's data, NRRP

One of the sectors most in need of urgent invest is sewage treatment. Indeed, Italy is subject to **four infringement proceedings** for failure or inadequate compliance with the directive on urban wastewater treatment 91/271/EEC (UWWTD). At national level, there are still **930 built-up areas in infringement proceedings** for a generated organic load equating to about **54 million equivalent inhabitants**, with the largest number of procedures concentrated in **Southern Italy (677, corresponding to 73% of the built-up areas and 79% of the load generated)**. Overcoming these critical issues, however, is not enough. It is essential to ensure that purified water can be reused in a circular economy perspective.

The potential of the sector is huge. In Italy there are **3,678 plants** serving built-up areas with a load generated greater than or equal to 2,000 equivalent inhabitants and 799 with a design capacity greater than 10,000 equivalent inhabitants ⁵. Comparing the volumes of wastewater produced by these two large groups of plants in the purification sector with the data on water requirements in the agricultural sector, in order to theoretically highlight the potential contribution offered by water reuse, the water would cover, in the first instance, more than **half the national requirement (53%)** and in the second instance, **more than a third (38%)**, pointing out however that more detailed estimates need site-specific assessments on feasibility and opportunity. In terms of plant adaptation needs, in order to achieve the technological objective required by EU Regulation 2020/741 and, therefore, implement the

⁵ EEA data (Waterbase UWWTD – data call 2021)

5 BILLION EURO TO
UPDATE TREATMENT
PLANTS
FULL TERTIARY

THE WATER SECTOR
IN THE PERIMETER
OF EUROPEAN
TAXONOMY

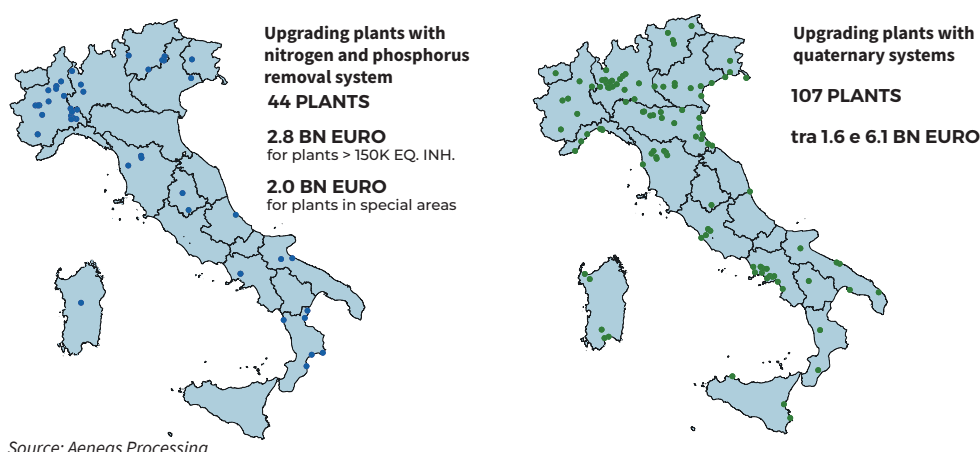
existing plant park with secondary treatment and filtration systems, to date a total of **2,326 plants** should have started work on about **3.9 billion cubic metres** of treated wastewater per year.

Shifting attention to the treatment objectives set out in the **proposed revision of the UWWTD Directive**, assessments were carried out on to establish what was needed to upgrade the plant based on the current size of the Italian purification sector aimed at understanding the forecasts of possible investment and operating costs. In particular, two different objectives were considered from the measures reported in the UWWTD standard revision proposal:

- i. **upgrading plants** with a treatment potential **greater than or equal to 150,000 inhabitants equivalent to complete nitrogen and phosphorus removal systems**: for this purpose, the total expected investment cost is approximately **2.8 billion Euro**. On the other hand, considering the upgrading interventions intended for plants of **between 10,000 and 150,000 equivalent inhabitants** in sensitive areas according to the current designation, the total investment needed stands at **around 2.0 billion Euro**.
- ii. **implementation of ex-novo quaternary systems** for plants with a project potential greater than or equal to 150,000 equivalent inhabitants: to achieve this goal, investments of **between 1.6 and 6.1 billion Euro** are required, considering a lifespan of infrastructure assets of 20 years.

FIGURE 17

SUMMARY OF THE RESULTS OF THE ECONOMIC ANALYSIS LINKED TO THE INVESTMENT NEEDED FOR PURIFICATION PLANTS IN ITALY ACCORDING TO THE TWO OBJECTIVES IDENTIFIED BASED ON THE CONTENTS PROVIDED FOR IN THE NEW WASTEWATER DIRECTIVE



Future investments in the water sector, including purification, are part of the **European Taxonomy** which identifies technical screening criteria with associated quantitative targets, both in the construction, extension, management and renewal of water collection, treatment and supply systems, and for the construction, extension, operation and renewal of wastewater collection and purification systems (TAXO2). The remaining objectives (TAXO4) are aimed at the distribution service, where compliance with **Directive (EU) 2020/2184 and Implementing Decision (EU) 2022/6793** of the European Commission is required as well as a certain rate of water losses, and wastewater treatment, which requires compliance with Directives 2000/60/EC, 2008/56/EC and 91/271/EEC and the presence of anaerobic digestion systems for treatment facilities with capacities greater than or equal to 100,000 equivalent inhabitants. To analyse the perception of Italian water managers on the European Taxonomy, the Valore Acqua per l'Italia Community has drawn up a **survey**, distributed with the support of Utilitalia and Fondazione Utilitatis. 16 questions were asked concerning the technical criteria of energy efficiency and water losses for activities that can contribute to the first 2 climate mitigation and adaptation objectives (TAXO2). Six questions were then added on the new economic activities and on the criteria that can make a substantial contribution to the achievement of the remaining 4 objectives of the EU taxonomy (TAXO4).

CRITICAL ISSUES FOUND BY SERVICE MANAGERS

REVIEW THE TECHNICAL CRITERIA OF THE TAXONOMY FOR THE WATER SECTOR

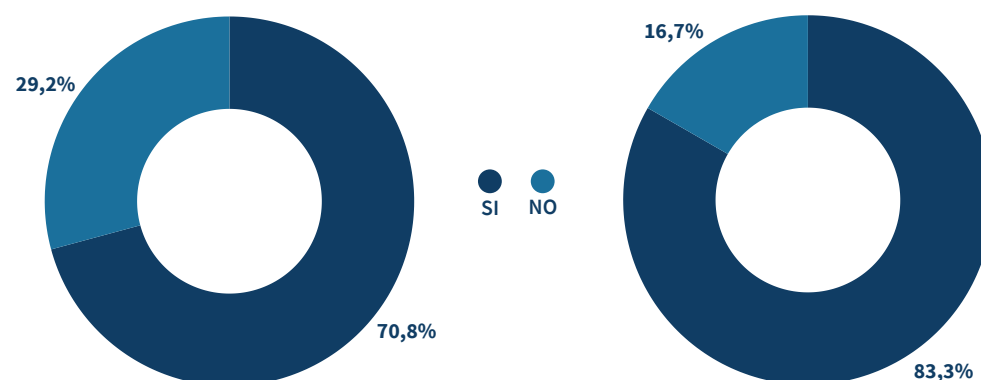
AN ESSENTIAL AND WIDESPREAD CAPILLARY INFRASTRUCTURE

THE EFFECTIVENESS INTEGRATION OF MATERIAL AND IMMATERIAL ASSETS

As far as the first two objectives of the European Taxonomy (TAXO2) are concerned, for which quantitative screening fees have already been defined for about 2 years, **over 70% of Italian managers found critical issues** when verifying the technical criteria of energy efficiency for both the management of water and discharge systems (Figure 18). Operator concerns are in excess of **80% of the total** regarding the **verification of the technical energy saving criteria** for the renewal of water and wastewater collection, treatment and supply systems. The **difficulties in implementing the screening criteria** of the managers for the TAXO2 criteria is, therefore, clear.

FIGURE 18

POSITIVE OR NEGATIVE ANSWERS TO QUESTIONS RELATING TO ANY CRITICAL ISSUES FOUND IN THE VERIFICATION OF TSC COMPLIANCE FOR ENERGY EFFICIENCY IN THE CASE OF WATER OR WASTEWATER TREATMENT PLANTS.



Source: Community Water Value calculation by The European House of Ambrosetti based on service manager's data

The Italian managers, however, point out that it would be advisable to revise the technical criteria of the Taxonomy, which includes progressive and gradual growth of the targets, and that they should be drawn up to satisfy the Italian ARERA Authorities' requirements and vice versa. In addition, those who took the survey request that the investment capacity of the individual company be taken into account when **defining the time frame within which the targets must be reached**. As far as the additional objectives of the Taxonomy are concerned, **only about 26% of operators** began to consider and address the **new criteria imposed**, demonstrating once again a certain difficulty in implementing the screening criteria. The Taxonomy, therefore, aims to provide a structure for the evaluation, classification and management of investments in order to promote environmental sustainability and water efficiency, objectives that must be reached not only in the field of the water system for civil uses but also, for example, in the irrigation sector.

Agricultural water networks are crucial for ensuring the sustainable management of water resources and territorial protection. The collective management system, through a widespread network of Reclamation Consortia, manages an extensive water network that covers not only agricultural production areas, but also the hilly and mountainous territories, as well as many urban areas. The development of infrastructure has significantly boosted the process of country's urbanisation and industrialisation, providing a material basis on which to build efficient agricultural production systems and a strong manufacturing sector.

Agricultural water infrastructure includes both **tangible and intangible resources**. The material infrastructures consist of canals, pipelines, waterworks and expansion chambers, intake and regulation works, storage basins, without which a hydraulic balance in the territory, a productive agriculture and the persistence of urban settlements across a large portion of the Italian plains would not be possible. Intangible infrastructure is represented by human capital, services and the ability to manage material infrastructure sustainably and economically. The State entrusts the **Reclamation Consortia** with the execution and maintenance of strategic works of public interest, which today can boast over 150 years of experience in managing public/private agreements, in line with the aforementioned, and sought in practice, "three Ps" of the Public-Private Partnership of European economic programmes. Climate models estimate an increase in water withdrawals between 20% and 45% by 2080,

A SUCCESSFUL UPGRADING OF OPERATIONS AND INFRASTRUCTURES THAT NEEDS TO SPEED UP

NEW GOVERNMENT INFRASTRUCTURES IN THE AREA WITH SOLUTIONS BASED ON NATURE

ACTIVE CONSTRUCTION SITES BUT STILL INADEQUATE INVESTMENT

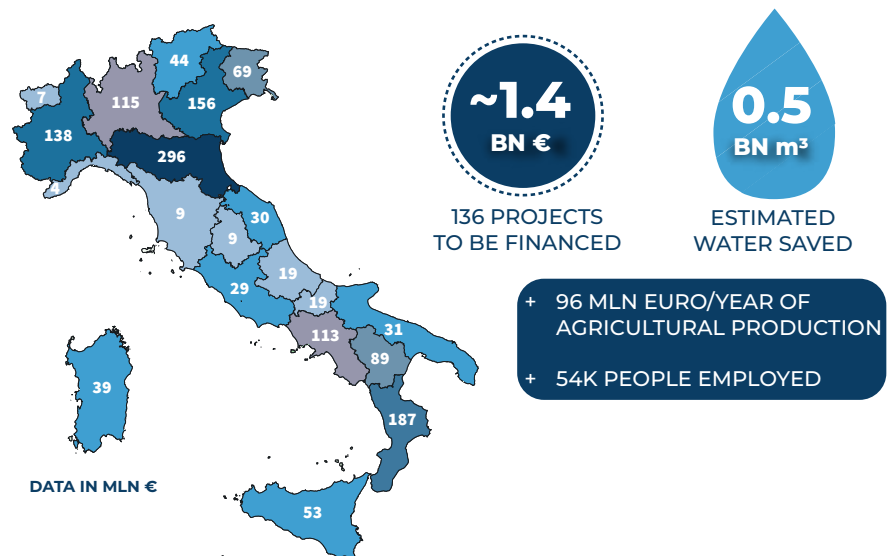
and at the same time 20% in network distribution losses. In 2022, there was an increase in evapotranspiratory demand compared to the multi-year average of 16%, with peaks of up to 61%. The **upgrading** work has resulted in about **10% of water being saved** in the face of a constant increase in the demand for water for crops and agroecosystems. The consortium supply of water on demand, allowing maximum flexibility in use and at the same time the use of high-efficiency irrigation technologies and strategies, has ensured a **saving of about 2,500 cubic metres per hectare per year, compared to other types of supply**.

With a view to retaining water resources for longer in the territory, without causing unsustainable human disruption and with a view to energy neutrality, ANBI and Coldiretti have drawn up the "**Piano Laghetti**": **10,000 medium-small and multifunctional reservoirs** in hilly and lowland areas by 2030. The plan has the potential to **increase the current total reservoir capacity by more than 60%**. Already with the first tranche of work, about **16,300 new work units** will be created, increasing irrigable areas in Italy by almost **435,000 hectares**. The reservoirs will be equipped with **337 floating photovoltaic plants** and **76 hydroelectric plants**, for over **7 million MWh/year**. The basins will be built in line with green engineering criteria. The Reclamation system promotes nature-based solutions such as green infrastructure to retain, regulate and store water for productive and protective purposes, and for the purpose of protecting and increasing local biodiversity, not confined to just a water body. "**Gentle Maintenance**" solutions have already been introduced in many areas.

Under the open financing lines pertaining to the Ministry of Agriculture, Food Sovereignty and Forestry (MASAF), **136 projects** have been financed to the sum of over **1.4 billion Euro**. The financed works will lead to an estimated water saving of over **548 million cubic metres per year**, equal to the entire useful volume of Lake Garda. The advancement of the works, to a large extent over **50% or 75% of the project**, illustrates the ability to quickly carry out even complex infrastructure work that the Reclamation system requests. The increased value of agricultural production in the areas concerned is over **96 million Euro per year**, protecting a production estimated at about **1.8 billion Euro per year**. The social added value comes from the protection of a capital of over **9.7 million working days per year** and about **54,000 people employed**.

FIGURE 19

TERRITORIAL DISTRIBUTION OF THE TOTAL RESOURCES MANAGED BY MASAF ALONG OPEN FINANCING LINES AND INTENDED FOR THE IRRIGATION SECTOR (LEGISLATIVE DECREE NO.178/2020, PSRN OF THE 2014-2022 CAP AND M2C4.4.3 LINE OF THE NRRP).



Source: ANBI and Utilitatis processing based on MASAF data

Current investments are largely inadequate for satisfying the urgent need to upgrade and create new infrastructure and to make the most of existing and future investments. More reservoirs, interconnections, semi-automated or automated management systems, monitoring tools, etc. coupled with more training on all levels.



Promote knowledge, innovation and best practices when managing Local Public Services.

The Utilitatis Foundation is the fruit of a journey that began in 1995 with the establishment of the Istituto di ricerca sui servizi pubblici/Italian public services research institute, the then Proaqua, at the behest of Federgasacqua (now Utilitalia). Since its inception, it has taken the form of a non-profit consortium aimed at study and research activities of a technical-economic nature, as well as assistance to administrations or companies involved in service reorganisation processes.

In 1999, the institute expanded its research activities, at first focusing exclusively on the integrated water service, to other local public services, such as the natural gas distribution service and the municipal waste management service, transforming itself into the CRS-PROAQUA public utilities research centre. In 2006 the Research Centre took on its current name, UTILITATIS pro acqua energia e ambiente.

In May 2011, the consortium was transformed into a Foundation, strengthening its mission as an entity oriented towards promoting the culture of local public service management and the dissemination of legal, economic and technical content.

In 2021, the Founder Promoter, Utilitalia, supported the functional redesign of the Foundation, relaunching its study and research activities, increasing its scientific standing and, at the same time, developing its business activities with regard to both training and consultancy, also outside the federal sphere.

The Foundation's aim is to promote knowledge, innovation and best practices in the management of Local Public Services, improving their quality and efficiency as well as their economic, social and environmental sustainability, orienting the business model towards sustainable success, i.e. the stable creation of long-term value for its shareholders, in a form shared with the relevant stakeholders.

The Foundation's activities focus on drafting periodical industry-related publications such as the Blue Book and the Green Book, monographs dealing with technical, economic and governance aspects of the water and waste service, which contain proprietary data of the managers; the Orange Book, dedicated to innovation in public utilities; the Utilities Sustainability Report, which collects the extra-financial performance of Utilitalia's members; and on collaboration in study and research projects with other Italian and foreign research centres and foundations.

