

cycle that enables **recovery of ammonium sulphate**, which can be used as an agricultural conditioner. In 2020, **255,000 tonnes** of this were produced. The Company also provides services for design, creation and management of plants for the treatment of wastewater for third parties, decontamination of polluted sites and environmental consulting for the management of plants, investing in research and development in the relevant sectors, in collaboration with recognised Research Bodies. Included in this context is the “NANOBOND” project, coordinated by

Acque Industriali, which combines traditional technology and innovation to develop an **integrated treatment system for the management of contaminated sludge and dredging sediments**, based on the use of **innovative nanostructured materials** with eco-compatible and environmentally sustainable characteristics. The project, amongst many expected benefits, will also enable **waste to be transformed into a resource**, from a circular-economy and environmental-protection perspective (see info. box for details).

ACQUE INDUSTRIALI COORDINATES THE “NANOBOND” PROJECT: TREATMENT OF CONTAMINATED SLUDGE AND SEDIMENTS

The project **coordinated by Acque Industriali**, entitled “**NANOBOND**” – **Nanomaterials for the decontamination associated with dewatering of environmental materials** – approved for regional co-financing through the **European Development and Research Fund** (POR-FESR 2014-2020), proposes the development of a new integrated treatment system for the management of contaminated sludge and dredging sediments, based on the use of innovative nanostructured materials with eco-friendly and environmentally sustainable characteristics. **The project aims to implement tubular elements in draining geotextile for the dehydration of sludge and sediments (dewatering), integrating this with the decontaminating action of nanostructured materials (nanoremediation).** This will allow the removal of contaminants present in wastewater and sediments, significant reduction of the volumes and relative costs of transport and transformation of processed sediments from “**waste**” into a **resource**, for the **management of riverbanks**, recovery of the water component and other possible applications.

Through development of **nanoremediation techniques associated with dewatering**, “**NANOBOND**” approaches dredging and management of sludge and sediments, connected with the **stabilization of watercourses**, providing tangible solutions for hydrogeological instability and maintenance of port areas, increasingly subject to build-up

of sand. This technique is **efficient in terms of its capacity to reduce contaminants and implementation times**, and it is easily scalable for on-site applications on a large scale with competitive costs.

The system **has been tested** on dredging of marine sediments (Port of Livorno), brackish waters (Navicelli Canal) and freshwater (drainage channels), where the need to remove variable quantities of contaminated sediments has become an absolute priority at the regional, national and European level. There has been a particular focus on the choice of **raw materials from renewable sources**, also from **recycling**, starch from tubers and waste paper pulp for the synthesis of nanomaterials/structures, with competitive production and process costs, and environmental compatibility. These are the principles underlying green nanotechnology for the development of nanotechnologies that are safe for the environment and human health (**nano-ecosafety**), which minimise the risks linked to production and use throughout their life cycle.

In addition to Acque Industriali, heading up the project, partners include: the National Interuniversity Consortium of Materials Science and Technology, the Universities of Siena, Pisa, Turin, and the Politecnico di Milano, ISPRA, ERGO (start-up of the Scuola Superiore Sant’Anna high school in Pisa), LABROMARE, BIOCHEMIE Lab and the BARTOLI paper mill for the production of (nano)materials and ASEV Ag. for development and Technology District.

WATER SEGMENT

SCOPE

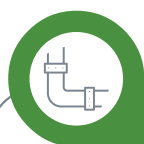
The scope includes the Companies Acea Ato 2, Acea Ato 5, AdF, Gori and Gesesa.

Acque, Publiacqua and Umbra Acque, water Companies not included in the scope of the *Consolidated Non-Financial Disclosure* (pursuant to Legislative Decree no. 254/2016). They have been

included only in the water graphs, with evidence of their contribution, and in a few other global data (water fed into the system and analytical calculations). Specific data concerning these Companies are provided in a separate chapter: *Water Company data sheets and overseas activities*.



6.1 million CITIZENS SERVED AND **480 Mm³** OF DRINKING WATER SUPPLIED BY ACEA ATO 2, ACEA ATO 5, GORI, ADF AND GESESA



APPROXIMATELY **34,100 km** OF DRINKING-WATER NETWORK MANAGED BY ACEA ATO 2, ACEA ATO 5, GORI, ADF AND GESESA



769,888 analytical tests ON DRINKING WATER (ACEA ATO 2, ACEA ATO 5, GORI, ADF AND GESESA)

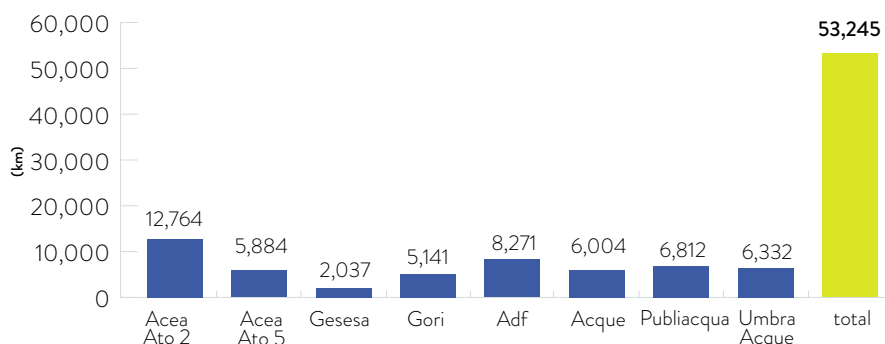
The Acea Group is a national leader in terms of number of citizens served and one of the primary operators in the water sector. Activities regarding **management of water resources** for all phases defined by the **integrated water service** are performed with an increasing focus on preservation and safeguarding of water and natural ecosystems (from springs to receiving bodies of the water returning into the environment).

Safeguarding of water resources translates into the priority action of **recovering leaks** (see the section *Attention to water consumption*), the **circular economy**, activities to combat **climate change**, **protection of springs** (see the paragraph *Protection of the territory*) and also increasingly precise **monitoring** of internal water consumption, with the end goal of reducing consumption.

The **total** pool of users served in Italy by the Group¹²³ is about 8.5 million residents, with **volumes of drinking water fed into the network** in 2020 equal to approximately **1,360 million cubic**

metres. The distribution networks of the main Group Companies operating within the integrated water service stretches over 53,000 km (see chart no. 50).

CHART NO. 50 – THE WATER DISTRIBUTION NETWORK OF THE GROUP IN ITALY (2020)



NOTE The kilometres of network include the aqueducts.

The **volumes of drinking water drawn and delivered by Acea Ato 2, Acea Ato 5, Gori, AdF and Gesesa** are equal to approximately **1,074 million cubic tonnes**, with total issue¹²⁴ of 480 million cubic metres for **6.1 million citizens served**. For specific data on the three Companies, see the *Environmental Accounts*.

99.9% of the volumes drawn are fresh water, with the remainder, approximately 2 million m³ being seawater and drawn in the Tuscany area. The sources are located in areas at potential risk of water stress, as defined by the *Aqueduct Water Risk Atlas*, the map drawn up by the World Resources Institute (WRI)¹²⁵ that compares water availability with communities present, taking into consideration risks caused by climate change, pollution and ex-

treme weather events (drought and flooding). The Companies in the water segment implement various initiatives to mitigate the impacts associated with these risks, including Water Safety Plans (see the section *Water Safety Plans - WSPs*), investments to secure water supplies and actions to minimise leaks on distribution networks.

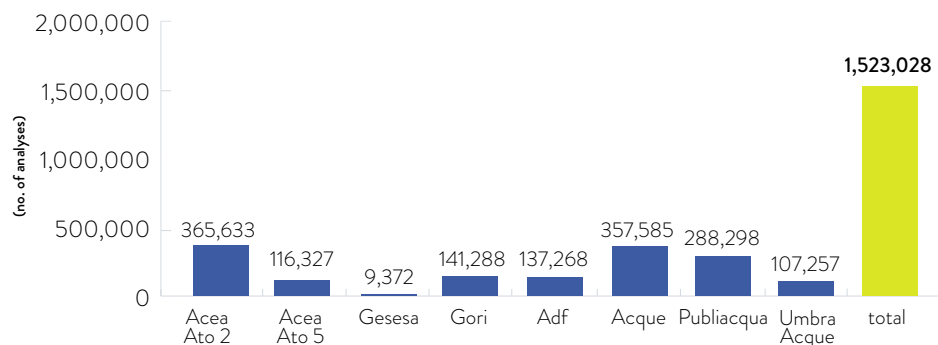
In **OTA 2 – Central Lazio** alone, comprising the city of Rome and 111 other municipalities – of which 79¹²⁶ under management at 31 December 2020, in line with 2019 – **the volume of water withdrawn and fed into the network** serving the approximately 3.7 million inhabitants was approximately **691 million cubic metres**¹²⁷.

WATER QUALITY

Water quality is monitored by all of the Companies of the relative industrial area (see chart no. 51). The **checks**, in addition to those performed by the Local Water Authorities, are performed on a scheduled, ongoing basis and regard both drinking water issued and

wastewater issued back into the environment following the treatment process. The **analyses** on the **drinking water** distributed to users play an **essential role** for the resulting health related effects. Analyses with compliant results, for all Companies, are always above 89% of the total¹²⁸.

CHART NO. 51 – TESTS OF DRINKING WATER, TOTAL AND BY COMPANY (2020)



NOTE For Acea Ato 2 it is noted that out of a total of 365,633 analyses, 340,178 were performed by Acea Elabori.

¹²³ The data of the total inhabitants served by the water business, of the volume fed into the network, and the size of the networks and checks on the water (shown in special graphs) include the main Operating Companies of the Group, also those not included within the scope of the *Consolidated Non-Financial Disclosure*.

¹²⁴ This refers to the total amount of drinking water dispensed and billed in the network by the Companies within the scope.

¹²⁵ For identification of areas under water stress, as indicated by the standard GRI 303, the *Aqueduct Water Risk Atlas* was employed, available on the World Resource Institute website: <https://www.wri.org/aqueduct>.

¹²⁶ In 18 other municipalities the integrated water service was managed partially.

¹²⁷ The items of the water balance of the past three years were calculated using the calculation criteria supplied by ARERA. See the *Environmental Accounts* for details.

¹²⁸ The figure ranges from 89% for Acea Ato 5 to 99% compliance for Acquadotto del Fiora.

In **Rome**, the qualitative characteristics of the resource collected and distributed are monitored through **continuous testing**, with instruments located along the water systems and through **daily sampling** at the collection points and in the distribution network. In Lazio there are areas of volcanic origin where the water has potability problems, linked to the natural presence of some substances in greater concentrations compared to those permitted by the relevant legislation. In these areas, Acea Ato 2 has taken various actions over the years aimed at resolving these problems, increasing the number of drinking water plants capable of removing unwanted substances, reducing them to concentrations well within legal limits.

Regular monitoring of the chemical/biological parameters of the water which circulates in the distribution network of the water system allows the quality safety level to be kept high. Overall, in 2020, 365,633¹²⁹ analyses were performed in the area managed by OTA 2, for a total of 11,875 samples, of which 340,178 anal-

yses on 9,311 samples of drinking water were performed at the Grottarossa Laboratories managed by Acea Elabori.

The Company Acea Elabori, accredited pursuant to the ISO/IEC 17025 standard (in 2020 it obtained ISO/IEC 17025:2018 certification), performs and certifies chemical and microbiological analyses in different substrates, including water (see table no. 56 for the analyses performed on Rome drinking water). **Gesesa** instead uses two outside laboratories (see the *Environmental Accounts* for aggregate and detailed data). **AdF**, which outsources analyses to Publiacque SpA, took 3,987 samples, identifying representative withdrawal points in the context of districts, with equivalent characteristics, into which the entire network of the aqueduct is divided. All withdrawal points are georeferenced using the GPS system and area available in WebGis. In 2020, AdF launched a development project for creation of an in-house laboratory from as early as 2021, with plans for accreditation pursuant to standard ISO IEC 17025:2018.

TABLE NO. 56 – ANALYSES IN ROME (2018-2020) AND MAIN QUALITY PARAMETERS OF THE DRINKING WATER DISTRIBUTED IN LAZIO, IN CAMPANIA AND IN TUSCANY (2020)

ANALYSES PERFORMED BY ACEA ELABORI ON DRINKING WATER – ROME HISTORICAL NETWORK (2018-2020)

withdrawal area	no. withdrawal points	no. samples			no. analyses		
	2020	2018	2019	2020	2018	2019	2020
collection	53	437	329	227	21,119	11,968	13,579
water system and water feed pipes	21	130	164	135	5,167	5,617	4,950
tanks/water centres	22	152	203	85	6,306	7,096	3,048
distribution networks	436	3,326	3,095	3,619	109,571	99,835	120,372
total	532	4,045	3,791	4,066	142,163	124,516	141,949

MAIN AVERAGE CHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF THE DRINKING WATER DISTRIBUTED IN LAZIO, IN CAMPANIA AND IN TUSCANY (2020)

parameters	measurement unit	average value Acea Ato 2 (Rome and Fiumicino)	average value Acea Ato 5	average value Gori	average value Gesesa	average value AdF (all Municipalities)	parameter Legislative Decree no. 31/01
chlorides	mg/l Cl	7.2	6.4	59	17.8	25.0	< 250
sulphates	mg/l SO ₄	16.3	11.6	26	28.8	39.0	< 250
calcium	mg/l Ca	101.3	124.2	134	exempt (*)	61.0	not applicable
magnesium	mg/l Mg	19.1	18.4	33	exempt (*)	9.6	not applicable
sodium	mg/l Na	5.5	3.8	42	17.7	16.0	< 200
potassium	mg/l K	2.4	1.0	14	exempt (*)	2.2	not applicable
calculated fixed residue	mg/l	409.3	454.6	663	374.7	297.0	(**)
nitrites	mg/l NO ₂	3.5	4.5	18	12.1	4.6	< 50
fluorides	mg/l F	0.16	0.17	0.46	0.3	0.14	< 1.50
bicarbonates	mg/l HCO ₃	406.3	467.2	580	exempt (*)	196.0	not applicable

(*) In accordance with Legislative Decree no. 31/01 and in agreement with the health authority, Gesesa is exempted from supplying the parameter.

(**) Maximum value recommended: 1,500 mg/l.

WATER SAFETY PLANS (WSPS)

The implementation of a **Water Safety Plan (WSP)** is required for all water systems pursuant to the Decree of the Italian Ministry of Health of 14/06/2017, in implementation of European Union Directive 2015/1787, which adopted the WSP methodology developed by the World Health Organization (WHO). The WSP enables **prevention and reduction of the risks inherent**

in the drinking water service, assessing dangerous events along the entire water supply chain (collection, treatment and distribution to the user's meter). The risk is calculated on the basis of the severity and probability of the pollution event or water shortage and after such assessment, the following are defined: **actions to mitigate risks, monitoring systems, operating procedures** under normal and emergency conditions, the **water quality control plan**, the methods for **informing** the public and the competent authorities.

¹²⁹ The data on analyses of drinking water from 2018 also include tests on aqueducts acquired recently (Civitavecchia and others).

The WSPs must be constantly updated, taking into account changes to plants, evolution of the regulatory context and climate and environmental changes. Finally, their implementation involves internationally recognised methods established by the WHO. In Italy, the Istituto Superiore di Sanità (ISS) has adopted WHO guidelines and will approve WSPs on a case-by-case basis. The first WSP implemented in 2019 in **Acea Ato 2** concerned the water system fed by the new Grottarossa plant for generation of drinking water using water from the River Tiber and, subsequently, the Company launched the WSPs for major aqueduct systems managed. Overall, implementation of the **Water Safety Plans in Acea Ato 2** will involve 100% of the population served by aqueduct systems managed by Acea Ato 2. So far, site surveys have been completed, along with **preparation of checklists for six aqueduct systems. For three aqueduct systems, the WSP documents have been sent to the Ministry of Health.**

In 2019, AdF also launched a project for development and implementation of a **Water Safety Plan**, focused on the aqueduct systems fed by the **Santa Fiora springs**. After the first year of work dedicated to organisation, definition of the project team and mapping of the drinking water system, in 2020 **infrastructure risk analysis** was conducted, with an approach based on the **FMEA methodology** (Failure Mode and Effect Analysis). The results of the analysis highlighted the main critical areas of plants and water networks for which it is necessary to identify and plan structural/management actions. In addition, to perform a detailed assessment of the potential vulnerability of the aquifer, in 2020, AdF launched an agreement for scientific partnership with the Institute of Geoscience and Georesources of the CNR (National Research Council) of Pisa (see also the section *The commitment to research and innovation* in the chapter *Institutions and the Company*). The study will form a scientific knowledge base for the definition of appropriate protection areas by the competent Authorities. During the year, **Gori** created a cloud environment for sharing information regarding the entire drinking water supply chain and useful knowledge for the **WSP implementation and approval process**, to make available also to Institutions. In the context of these activities, a meeting was organised with the ASL NA3 local health authority of Naples, the Campania regional authority and the Istituto Superiore di Sanità for dialogue and preparatory technical training on WSP development, with a particular focus on aqueduct systems and the entire drinking water supply chain. In 2020, **Gesesa** continued with training plans and authorisations on the draining necessary to manage WSPs, which will be prepared in collaboration with the University of Sannio. After mandatory training for personnel that will draft the Water Safety Plans (WSPs), in 2020, **Acea Ato 5** proceeded with acquisition of information on water collection sources.

WATER LEAKS

Sustainable management of water also requires **minimising leaks from distribution networks** and all Group Companies operating in the water sector are involved in this important area. During 2020, in line with the previous year, there was **intensive activity to search for leaks**, quantified as presented in chart no. 52, in order to recover the greatest possible quantity of water. In particular, this was done by division of the network into districts, i.e. areas not connected to each other and with measured inputs. Dividing the network into water districts makes it possible to

optimize operating pressures with an immediate advantage in terms of reducing lost volumes, facilitating targeted searches for leaks in the most critical districts. The system enables optimisation of network management, supporting repair works and reducing their frequency. With greater control of the individual parts of the network, it is possible to reduce the formation of leaks and promptly and simply identify their existence or other problems. Overall, to date, **Acea Ato 2** has created 399 measurement districts for over 7,000 km of distribution network. The activity consisted of surveys, flow and pressure measurements, map production, user analysis and water balancing, creation of measurement stations, installation of shut-off and adjustment elements, mathematical modelling and searches for leaks. The results of efficiency actions were imported into the GIS systems. Further actions implemented in 2020 to safeguard water resources included: verification and calibration of water meters installed on large water sources and the installation of flow meters on all “minor” sources and in drinking water plants, with the goal of optimising the quality of process measurements, continuation of survey activity and georeferencing of networks under management. **The actions implemented enabled a reduction in water-loss volumes of approximately 4% compared to 2019.**

In 2020 **Acea Ato 5** continued analysis of water networks in 27 municipalities. The Company created **235 districts**, covering 2,026 km of network and, on the basis of precise water-leak identification activity, primarily through acoustic systems, it identified **382 leaks**, of which 97 not acted upon (false positives, unsuccessful, leak already repaired, etc.), **215 repaired** and 70 awaiting works. Finally, using innovative technology such as satellite and aerial searches for leaks, during the year another 25 leaks were identified, some of which are under repair.

In 2020, **Gesesa** continued with development of the division of the water networks into districts, extending the reduction of pressures, in order to cover all municipalities managed. Specifically, three new water districts were created. Following an analysis of the networks, about **7 km of infrastructure was reclaimed.**

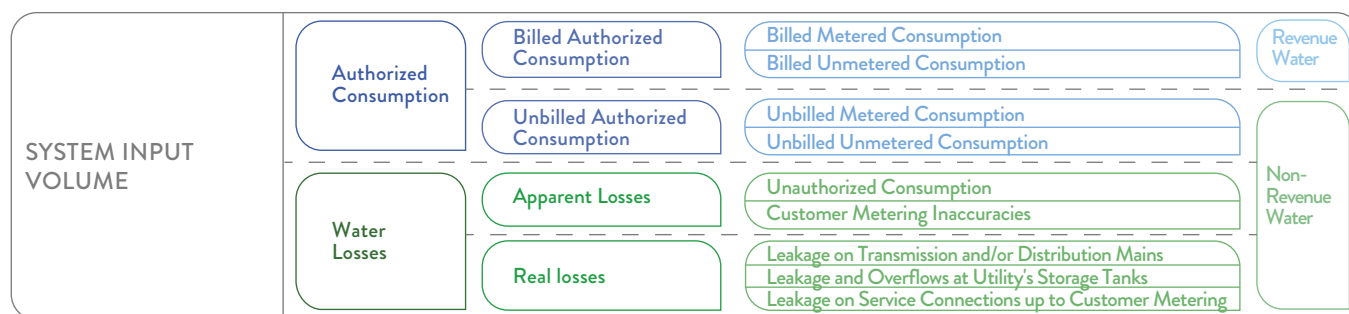
AdF conducted intensive activity to search for system leaks on its own water networks. In total in 2020, the Company inspected approximately 2,800 km of distribution network. In the context of division of the network into districts, approximately 280 km of water network has been placed under monitoring and remote control, for a total coverage of 88% of the distribution network. In addition, AdF has launched three pilot studies that will continue in 2021, with experimentation of innovative technologies in the context of network management. Specifically, a satellite monitoring project has been launched for the location of water leaks, covering approximately 600 km of network, and a project for monitoring and management of pressures with automation of water regulation valves. AdF is also experimenting with a **predictive methodology**, which uses historical geomorphological and water data to precisely identify the zones at the highest risk of breakages, reducing investigation areas. The goal is to identify 70% of leaks and probable breakages in 30% of the network. The activities launched have allowed a significant reduction in the volume of water lost, corresponding to approximately 1.5 million m³ (-5% compared to 2019).

In 2020 **Gori** conducted searches for leaks on 1,608 km of water network, of which 834 km of network was analysed using “systematic” searches for leaks, and 774 km on the basis of “faults”. The “systematic” search for leaks primarily involved the Municipalities of Angri, Capri, Castellammare Di Stabia, Gragnano, Lettere, Marigliano, Massa Lubrense, Nocera Inferiore, Nola, Pagani,

Pomigliano D'Arco, Sant'Agnello, Sarno and Vico Equense, while "fault" searches were spread over the entire territory managed. In addition, in 2020, Gori installed 41 pressure and flow regulation valves and carried out reclamation works on over 60 km of water network, distributed across almost all OTA 3 Municipalities. These

actions enabled a recovery of water resources estimated at approximately 146 l/s over the whole of OTA 3. In the 2020-2024 Sustainability Plan, all of the Companies defined targets for reduction in water-loss volumes.

CHART NO. 52 – WATER LOSSES

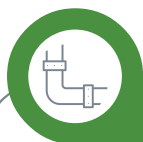


NOTE The image refers to the model of the International Water Association.

Thanks to efforts to improve the efficiency of metering and to combat illicit use, at **Acea Ato 2** the overall losses for the year fell to about 42% (they were equal to 44% in 2019). Furthermore, in line with the downward trend of the previous two years, total losses on the Rome network were down by 29.5% (34% in 2019 and 38% in 2018). For **Acea Ato 5**, due to the actions taken, 2020 losses were equal to approximately 68% (76% in 2019) of the total issued into the aqueduct system. Following the actions described above, **Gori** saw a reduction in global losses from 53.2% to 52.4%.

For **Gesesa** annual losses came to around 59.5% of water issued into the aqueduct system. An improvement is expected from 2021, with launch of a Water Resource Recovery Plan that involves replacement of pipes in some Municipalities and implementation of remote-control systems. For **AdF** the works performed enabled a reduction in the figure for losses from 46% in 2019 to 44% in 2020. See the *Environmental Accounts* for details on individual water balances.

SEWERAGE SERVICE AND TREATMENT SYSTEM



APPROXIMATELY **13,500 km** OF SEWERAGE NETWORK AND **484 treatment plants** MANAGED BY ACEA ATO 2, ACEA ATO 5, GORI AND GESESA, FOR **714 Mm³** OF TREATED WASTE WATER



APPROXIMATELY **124,590 tonnes of sludge** produced BY ACEA ATO 2, ACEA ATO 5, GORI AND GESESA, OF WHICH **44% recovered**

The water resource, after uses for the various civil purposes, is **collected through the sewer pipes** and **sent to the treatment plants**. There, **pollutants are removed via physical processes** (filtering, sedimentation, flocculation) **and biological methods** (aerobic and/or anaerobic decomposition of the organic substance with bacteria). With **around 868 treatment plants** (of which **484** are managed by Acea Ato 2, Acea Ato 5, AdF, Gori and Gesesa), the total volumes of water processed by the Group¹³⁰ in 2020 was approximately **914 Mm³**, of which **714 Mm³** by Acea Ato 2, Acea Ato 5, Gori, AdF and Gesesa¹³¹. The total number of Group treatment

plants has decreased, from 895 in 2019 to 869 in 2020, on the basis of the **project for centralisation of treatment of wastewater** in order to streamline the service, which involves all Companies (see info. box for details on Acea Ato 2). For the Companies Acea Ato 2, Acea Ato 5, Gori, AdF and Gesesa, the percentage coverage of the sewerage and purification services, out of the total users served by the water service, and the volumes of wastewater treated are given in table nos. 56 and 57. The sewerage networks managed amount to about **22,100 km**, of which **13,492 km** relate to the five Companies cited.

¹³⁰ Again in this case, the data relating to the number of treatment plants, the volumes treated, the size of the networks and the controls refer to the main Group Companies operating in the water sector, including those not included in the full scope of consolidation.

¹³¹ Gesesa started installing the first flow meters on certain plants in 2020 and estimating the quantities of wastewater treated.

TABLE NO. 57 – VOLUMES OF WASTEWATER TREATED BY WATER COMPANIES OPERATING IN LAZIO, IN CAMPANIA AND IN TUSCANY (2018-2020) (Mm³)

Company	2018	2019	2020	destination
Acea Ato 2	582.7	599.8	596.9	returned to the environment (river/channel)
Acea Ato 5	21.2	21.3	21.3	surface water body (river)
Gori	7.7	45.2	70.1	surface water body and sea (4% in sea)
AdF	25.4	25.8	23.3	surface water body and sea (0.9% in sea)
Gesesa (*)	n/a	n/a	2.2	surface water body (river)

(*) In 2020, Gesesa began installing flow meters at the entry to treatment plants. The 2020 figure is estimated.

CHART NO. 53 – SEWER NETWORKS OF THE GROUP IN ITALY (2020)

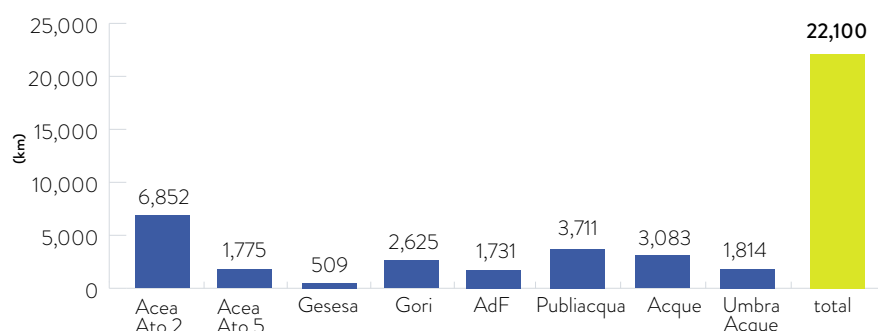


TABLE NO. 58 – PERCENTAGE COVERAGE OF THE SEWER AND PURIFICATION SERVICES OVER THE TOTAL USER ACCOUNTS OF THE WATER COMPANIES IN NFD (2018-2020)

Company	2018		2019		2020	
	sewer	purification	sewer	purification	sewer	purification
Acea Ato 2	91.6%	88.2%	91.5%	88.1%	91.7%	88.4%
Acea Ato 5	66.9%	56.1%	66.5%	55.9%	66.8%	57.3%
Gori	82.2%	65.7%	82.3%	66.0%	84.0%	70.4%
Gesesa	80.2%	27.3%	80.3%	30.4%	80.6%	33.9%
AdF	86.8%	75.9%	86.8%	75.0%	86.8%	75.0%

The water in output from the plants cited, after having undergone the purification treatments described, **has chemical and biological properties compatible with the life of the receiving body of water** and in accordance with the values of the parameters which must not be exceeded in order to guarantee full compatibility (as per Legislative Decree no. 152/2006).

Almost 100% of the wastewater treated, which can be defined entirely as “fresh water”, containing less than 1,000 mg/l of total dissolved

solids, **ends up in bodies of surface water**. Only 0.9% of the water treated by AdF is discharged into the sea and 4% of the water treated by Gori, equal to approximately 1% of total water treated¹³². The portion of water discharged into the sea travels through underwater pipes, following treatment at the coastal treatment plants of the Sorrento Peninsula (Sorrento, Massa Centro and Marina del Cantone) and the island of Capri (Gasto, Occhio Marino and La Selva). The main basins affected by discharge are presented in table no. 59.

TABLE NO. 59 – HYDROGRAPHIC BASINS AFFECTED BY DISCHARGES OF COMPANIES MANAGING THE IWS

Company	hydrographic basins affected
Acea Ato 2	basins of rivers Tiber, Aniene, Mignone and Arrone
Acea Ato 5	basins of rivers Gari, Sacco, Cosa and Liri; Fosso della Maddalena, tributary of the River Sacco, Fosso del Diluvio, tributary of Lago di Canterno
Gesesa	basins of rivers Calore, Sabato, Isclero and Tammara
Gori	hydrographic basin of the river Sarno and Regi Lagni canals
AdF	basins of the rivers Ombrone, Orcia, Fiora, Albegna and Elsa Pecora

NOTE Prior to discharge, wastewater is treated in the treatment plants managed by the Companies themselves.

¹³² The discharge of water, as for intake, occurs in areas at potential risk of water stress, as defined by the cited Aqueduct Water Risk Atlas.

CENTRALISATION OF ACEA ATO 2 TREATMENT PLANTS

To improve the quality of treated water, Acea Ato 2 has defined a Centralisation Plan for treatment plants aimed at streamlining the treatment service, centralising treatment, where sustainable, at a limited number of sites identified through analysis of the territory from a geomorphological and urban-planning perspective.

In fact, with a high number of small and medium-sized treatment plants (127 treatment plants with capacity below 10,000 P.E.), service coverage is guaranteed primarily by large and medium-large treatment plants (42 treatment plants with capacity above 10,000 P.E.). From the date of acquisition of the Integrated Water Service (2003), 22% of treatment plants with a low capacity have already been elim-

inated. The reduced fragmentation in favour of medium-large plants, combined with integration of sewerage collector systems, has allowed **greater control of treatment efficacy** and **optimisation of management and energy costs**.

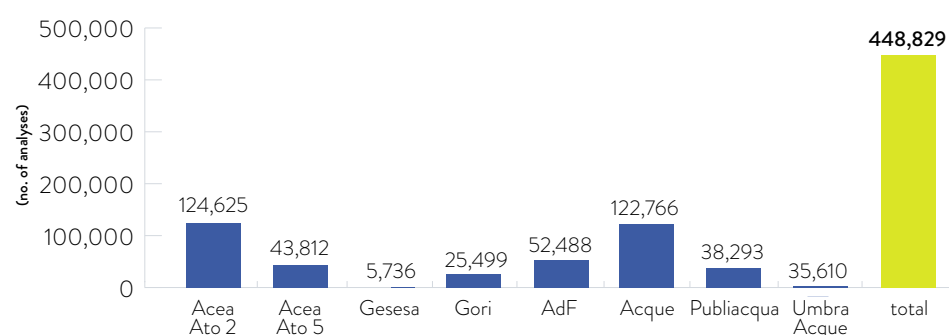
Acea Ato 2 has therefore prepared a rationalisation plan, which it keeps up to date, choosing between centralisation and upgrading of small plants on a case-by-case basis. The optimal solution depends on many factors that must be carefully evaluated for the specific case, in the context of assessing the entire life cycle of a treatment system. In 2020, the Centralisation Plan reached the goal of **eliminating a further 7 minor treatment plants**.

The Company manages treatment processes pursuing the maintenance and improvement of efficiency, in line with the provisions of the authorisations required for each plant and on the basis of the regulatory context in which they operate. The discharge limits are established for each plant, through an authorisation issued by the competent administrative body, which, on the basis of technical and environmental assessments during evaluation, may set stricter parameters compared to those applicable nationally. In this regard, for example, the regulatory framework in which Acea Ato 2 operates is characterised by prescriptive standards for discharge which are slightly higher compared to the national regula-

tory reference level, and similarly, for Acea Ato 5, in the Province of Frosinone, authorisations regarding the quality of water discharged are stricter than those established by sector-wide regulations. This is a precautionary approach.

The Company that performs analyses to verify the proper treatment of waters precisely indicated the percentages of non-compliance with discharge limits, which are nevertheless very low, relative to the total quantities analysed: 3.5% for Acea Ato 2, approximately 2% for Gesesa, 0.6% for Gori and 0.9% for AdF. Acea Ato 5 has zero non-compliance. In 2020, no hazardous substances were identified in analyses of Group wastewater.

CHART NO. 54 – ANALYTICAL CHECKS ON WASTEWATER, TOTAL AND BY COMPANY (2020)



Specifically, **for Acea Ato 2**, more than **124,600 analyses performed confirm the high purification performance** achieved by the **treatment process**.

In the “historic” area managed by Acea Ato 2, which includes **Rome and Fiumicino**, the main treatment plants treated in 2020 approximately 512 million of cubic metres of wastewater, a figure that is in line with the previous year (514 million cubic metres in 2019). Considering also the smaller treatment systems

and the plants of the municipalities acquired in OTA 2 (a total of 164) a total **volume of approximately 597 million cubic metres of wastewater treated**, in line with 2019 (approximately 600).

Table no. 60 shows the details of the main parameters from the main treatment plants of Acea Ato 2, Acea Ato 5, Gori, AdF and Gesesa. Other indicators of the efficiency of purification are described in the section *Key environmental performance indicators – Water segment* of the *Environmental Accounts*.

TABLE NO. 60 – OUTPUT PARAMETERS OF THE MAIN TREATMENT PLANTS MANAGED BY ACEA ATO 2, ACEA ATO 5, GORI, ADF AND GESESA (2020)

	Acea Ato 2	Acea Ato 5	Gori	AdF	Gesesa (Benevento)	concentration limits in surface water (Legislative Decree no. 152/06)
parameter	average of values (mg/l)					
BOD ₅	5	4	9	7	11	≤ 25
COD	16	22	20	36	21	≤ 125
SST	8	6	15	8	9	≤ 35
nitrogen (ammoniacal, nitrate, nitrous)	10	7	8	19	7	-
phosphorous	2	1	1	3	0	-
	quantity output (t)					
COD	13,905	1,159	1,231	585	41	-
SST	7,465	356	1,004	136	32	-

The **sludge produced** during the purification process is **mostly** sent for **recovery of material** (see the section *Intermediation and transport of waste in Environment segment*).

In 2020, numerous actions were taken aimed at reducing the **quantity of sludge produced by treatment plants** managed by the Group Companies. Specifically, **Acea Ato 2** launched works for the **new dehydration section for sludge at the Roma Sud treatment plant**. For the **Ostia treatment plant**, where testing was completed during the year of the **mobile dryer**, **installation of a fixed thermal dryer** is underway. On the basis of these actions, a reduction in the quantity of dehydrated/dried sludge is expected in 2021, in line with the goals established in the 2020-2024 Sustainability Plan. In 2024, it is expected that the sludge produced will be dried at the largest plants (Roma Est, Roma Nord, Roma Sud, Ostia and COBIS). It is also noted that, again in 2024, creation of a new line at the San Vittore del Lazio waste-to-energy plant, all of the sludge produced by Acea Ato 2, stabilized and dried, will be subject to energy recovery.

During 2020, **AdF** continued works at the Grosseto San Giovanni plant for **centralisation and thermochemical hydrolysis of all sludge produced** by treatment plants under its management, which will be launched in 2021. Monitoring and optimisation of performance of the centrifuges serving the main plants in any

case enabled a significant reduction of approximately 19% in sludge produced compared to 2019.

For **Acea Ato 5**, growing attention on the identification of innovative technological solutions aimed at **recovering material from treatment sludge**, as well as the decision to apply **circular-economy** principles in the waste-treatment sludge sector, led the Company to opt for the use of a high-efficiency treatment plant with residual capacity, with selection of the Fiuggi Colle delle Mele plant, for the treatment of liquid waste produced, rather than using smaller plants (in terms of equivalent residents) and without sludge lines. Planning is also underway for the dryer at another plant.

In 2020, **Gesesa** installed a centrifuge for dehydration of sludge at the main treatment plant serving the town of Benevento. **Gori**, which already has a sludge drying plant serving the Scafati treatment plant, at the end of 2020 launched operations of a drying plant at the Angri treatment plant, already created according to plans but held out of service by the previous management. For the plants of Nola and Nocera Superiore, annexed in 2019 under the old scope of treatment plants managed, authorisation and technical activity is underway for upgrading of existing dryers and activation is expected during the next two years.

EXPERIMENTATION OF GORI ON AGRICULTURAL USE OF TREATMENT SLUDGE

In 2020, experimental works were carried out in the context of two university theses conducted at the Nocera Superiore treatment plant in 2019 by students of the Department of Biology and Chemistry at the University of Salerno and the Department of Biology of the Università degli Studi di Napoli Federico II in Naples, which investigated the **potential agricultural use of treatment sludge produced**. The treatment sludge of the plant in question, in fact, is characterised by a significant component of **plant origin**, derived from wastewater produced by canned/preserved food industries that contain waters used to wash tomatoes. The study compared

the application of commercial compost and sludge produced at the Nocera plant, and evaluated the effects on soil quality, to verify maintenance of fertility and function. This initial verification identified that application of treatment sludge, in line with application directives regulating spreading, did not have negative ecotoxicological effects, but demonstrated very limited benefits in terms of fertility. Therefore **further experimental activities to proceed with** were identified, for a full understanding of the actual potential for agricultural use of sludge produced by the Nocera Superiore treatment plant.

In 2020, **Acea Ato 2** continued with **preparatory activities for the production of biomethane**, as an **opportunity for operators in a circular-economy context**, with a project aimed at future production of more than 2 million Sm³ of biomethane/year (1 Sm³/year in 2024, as per the Sustainability Plan), utilising the biogas available in the two large treatment plants for civil wastewater from Roma Est and Roma Nord. For the Roma Nord plant, a landscape authorisation was obtained from the Lazio Regional Authority. For the Roma Est plant, an authorisation was obtained regarding landscape aspects from the

Lazio Regional Authority, as the plant is located within the Valle dell'Aniene Nature Reserve, and for water purposes, for the location of the plant in a water risk area of the River Aniene. Finally, for both, positive opinions were received from the ASL local health authority and the plants are awaiting amendment of the Emissions Authorisations. In addition the procedures have been formally initiated for creation of interconnection systems with the gas network, in collaboration with Italgas, the operator of the gas distribution network, both for Roma Nord, since December 2019, and Roma Est, since November 2020.

ACEA ATO 2 – BIOMETHANE

The Acea Ato 2 project involves the creation of a **biogas upgrading (refinement) section**, composed of a line with selective membranes with a nominal capacity of 230 Sm³/h and a regulation and measurement unit to control the quality and amount of biomethane produced. The purpose of the project is to “isolate” the methane contained in the biogas, optimising its subsequent usage. Today, biogas is primarily used for the generation of heat for digesters. With the project underway, **the methane obtained from the refinement process will instead be input into the existing gas network and destined specifically to power vehicles through**

appropriate “certification” of the quantities produced and input into pipes. In this way, it will be possible to access new incentives available under current legislation, ensuring the sustainability of this large investment, with a total value of € 8 million, required for performance of engineering works. Each processing system will have a production capacity of approximately 1,300,000 Sm³ annually of biomethane, and will benefit from a significant improvement in the management of biogas produced, alongside all the other **benefits from an energy, economic and environmental perspective**.